



COURSE OUTLINE

Course Name: Aerospace Manufacturing

Grade
Level(s): 9-12

The Aerospace Manufacturing program, located at Auburn High School, is open to all district high school students' grades 9-12. Students interested in the Machining, Welding or the Engineering and Technology pathway should take this course. Topics covered include basic aircraft familiarization, aircraft drawings and work instructions, assembly hand tools, precision measuring and aviation materials and processes. Online course work through Tooling U is provided as part of the curriculum covering topics as shop essentials (math), safety, inspection (measuring), quality control, fasteners and supervisory essentials. Students acquire skills in measuring, print reading, manufacturing processes and leadership. Applicable safety requirements are also employed. Students taking this course will have an advantage in seeking employment in the aerospace assembly trades. Students may contract with the instructor to repeat this course for additional training and skill development.

1. Aerospace Manufacturing Careers

- A. Multimedia presentation of Aerospace Career research
- B. Students will perform a job search and create a resume
- C. Students will have the opportunity to participate in a mock interview

2. Safety

- A. Shop Safety
- B. Tool and equipment Safety
- C. OSHA and LNI laws
- D. Causes of accidents and avoidance
- E. Safety Assessment

3. Manufacturing Math Skills and Precision

- A. Blue print reading
- B. Material calculation
- C. Material layout
- D. Precision measurement

4. Basics of Flight and Aerodynamics

- A. Concepts of lift, drag, thrust, weight
- B. Fluid flow around vehicle bodies.
- C. Turbine engine and explain its purpose



5. Aircraft Manufacturing Processes

- A. Process of aircraft structure
- B. Engineering concepts
- C. FOD (foreign object Debris)
- D. Shop tool safety
- E. Part identification
- F. Quality inspection

6. Airline Operations Overview

- A. Drawings of air planes
- B. Reference of parts of an aircraft
- C. Air plane orientation
- D. Air plane emission testing

7. Airplane Manufacturing Principles and Quality Control

- A. Aircraft manufacturing testing.
- B. LEAN manufacturing
- C. SIX sigma
- D. 5s
- E. Iso
- F. FAA

8. Static & Dynamic Loads (Stress)

- A. Simple stress analysis of stringer
- B. Stress, strain & fatigue labeling by components and its affects

9. Materials Selection & Use in Aerospace

- A. Material used in aerospace
- B. Corrosion
- C. Coatings

10. Manufacturing Tools

- A. Hand tool
- B. Pneumatic tool
- C. Drilling and countersinking
- D. Inventory and control of tools
- E. Island tool (large tools, Mill & Lathe)



11. Fasteners and Introductory Projects

- A. Aircraft Fasteners
- B. Rivets
- C. Bolts and washers
- D. Tightening and fastening

12. Advanced Manufacturing Projects

- A. MIG and TIG welding
- B. Design working drawings
- C. CAM programing
- D. CNC programing and coding



INTRODUCTION

Course Name	<u>Aerospace Manufacturing</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>1 year 180 hours able to repeat total Capable 540 hours</u>	Course Code (s)	<u>CTE 395, 396</u>

Course Description	The Aerospace Manufacturing program, located at Auburn High School, is open to all district high school students' grades 9-12. Students interested in the Machining, Welding or the Engineering and Technology pathway should take this course. Topics covered include basic aircraft familiarization, aircraft drawings and work instructions, assembly hand tools, precision measuring and aviation materials and processes. Online course work through Tooling U is provided as part of the curriculum covering topics as shop essentials (math), safety, inspection (measuring), quality control, fasteners and supervisory essentials. Students acquire skills in measuring, print reading, manufacturing processes and leadership. Applicable safety requirements are also employed. Students taking this course will have an advantage in seeking employment in the aerospace assembly trades. Students may contract with the instructor to repeat this course for additional training and skill development.
Pathway Connections	Manufacturing
Primary Connection	Manufacturing production process development
Secondary Connection	Apprenticeship, Internships, Community and Technical College, Four-year College and University
Sample Sequence of Courses	Students may take aerospace manufacturing course and repeat several times.
Cross Credit and/or College Credit	Currently there is no tech prep credits offered for this course this year but could be reinstated once the courses are realigned with local community colleges (green river, bates tech, cover park and Tacoma community college).
Basic Textbook	Core plus curriculum, developed by the Boeing company. Machine tool operations; Kara Oswald St. Amand Essentials of Welding; Raymond J Sacks
Equipment	This course will need all necessary equipment to manufacture for a manufacturing program please see inventory sheet for facility.
Software	Master Cam version 5X or newer Auto desk sweet.



Supplemental Materials

None. If necessary find online

Skills Gap Data (CTE Courses only)

http://www.bls.gov/oes/current/naics4_336400.htm



U.S. Bureau of Labor Statistics

Occupational Employment Statistics

May 2014 National Industry-Specific Occupational Employment and Wage Estimates

NAICS 336400 - Aerospace Product and Parts Manufacturing

These national industry-specific occupational employment and wage estimates are calculated with data collected from employers of all sizes, in metropolitan and nonmetropolitan areas in every State and the District of Columbia, in NAICS 336400 - Aerospace Product and Parts Manufacturing.

Additional information, including the hourly and annual 10th, 25th, 75th, and 90th percentile wages, percent of establishments reporting the occupation, and the employment percent relative standard error, is available in the [downloadable XLS files](#).

NAICS 336400 - Aerospace Product and Parts Manufacturing is part of: [NAICS 336000 - Transportation Equipment Manufacturing](#).

[Links to OES estimates for other industries](#)

SOC Major Groups in NAICS 336400 - Aerospace Product and Parts Manufacturing:

- 00-0000 [All Occupations](#)
- 11-0000 [Management Occupations](#)
- 13-0000 [Business and Financial Operations Occupations](#)
- 15-0000 [Computer and Mathematical Occupations](#)
- 17-0000 [Architecture and Engineering Occupations](#)
- 19-0000 [Life, Physical, and Social Science Occupations](#)
- 23-0000 [Legal Occupations](#)
- 25-0000 [Education, Training, and Library Occupations](#)
- 27-0000 [Arts, Design, Entertainment, Sports, and Media Occupations](#)



- 29-0000 [Healthcare Practitioners and Technical Occupations](#)
- 33-0000 [Protective Service Occupations](#)
- 35-0000 [Food Preparation and Serving Related Occupations](#)
- 37-0000 [Building and Grounds Cleaning and Maintenance Occupations](#)
- 41-0000 [Sales and Related Occupations](#)
- 43-0000 [Office and Administrative Support Occupations](#)
- 47-0000 [Construction and Extraction Occupations](#)
- 49-0000 [Installation, Maintenance, and Repair Occupations](#)
- 51-0000 [Production Occupations](#)
- 53-0000 [Transportation and Material Moving Occupations](#)

To sort this table by a different column, click on the column header

NAICS 336400 - Aerospace Product and Parts Manufacturing

Occupation code	Occupation title (click on the occupation title to view an occupational profile)	Group	Employment	Employment RSE	Percent of total employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
00-0000	All Occupations	total	491,400	2.1%	100.00%	\$33.00	\$36.14	\$75,170	1.6%
11-0000	Management Occupations	major	30,840	3.9%	6.28%	\$64.76	\$67.24	\$139,860	1.6%
11-1000	Top Executives	minor	4,970	4.3%	1.01%	\$67.31	\$73.60	\$153,080	2.2%
11-1011	Chief Executives	detail	670	6.2%	0.14%	\$88.89	\$92.67	\$192,760	3.6%
11-1021	General and Operations Managers	detail	4,290	4.3%	0.87%	\$64.63	\$70.60	\$146,860	2.5%
11-2000	Advertising, Marketing, Promotions, Public Relations, and Sales Managers	minor	2,240	4.5%	0.45%	\$69.16	\$72.92	\$151,680	6.0%
11-2020	Marketing and Sales Managers	broad	2,090	4.7%	0.43%	\$69.61	\$73.36	\$152,580	6.3%
11-2021	Marketing Managers	detail	670	6.3%	0.14%	\$71.10	\$73.56	\$153,010	3.3%
11-2022	Sales Managers	detail	1,420	5.4%	0.29%	\$68.40	\$73.26	\$152,380	8.8%
11-2031	Public Relations and Fundraising Managers	detail	120	6.1%	0.03%	(8)	(8)	(8)	(8)
11-3000	Operations Specialties Managers	minor	13,650	3.9%	2.78%	\$59.77	\$61.97	\$128,900	1.6%
11-3011	Administrative Services Managers	detail	680	7.0%	0.14%	\$57.23	\$57.63	\$119,870	2.3%
11-3021	Computer and Information Systems Managers	detail	2,590	14.3%	0.53%	\$72.23	\$72.14	\$150,060	4.2%
11-3031	Financial Managers	detail	2,190	2.6%	0.45%	\$63.21	\$64.82	\$134,830	1.7%
11-3051	Industrial Production Managers	detail	4,580	2.6%	0.93%	\$54.05	\$57.44	\$119,470	1.5%
11-3061	Purchasing Managers	detail	1,970	3.3%	0.40%	\$57.54	\$58.48	\$121,640	2.0%
11-3071	Transportation, Storage, and Distribution Managers	detail	530	5.0%	0.11%	\$62.11	\$62.16	\$129,290	2.4%
11-3111	Compensation and Benefits Managers	detail	60	11.0%	0.01%	\$64.31	\$66.43	\$138,180	5.6%
11-3121	Human Resources Managers	detail	920	2.8%	0.19%	\$56.99	\$59.70	\$124,180	1.9%
11-3131	Training and Development Managers	detail	120	8.2%	0.02%	\$58.85	\$59.18	\$123,090	3.5%
11-9000	Other Management Occupations	minor	9,990	6.2%	2.03%	\$68.87	\$70.01	\$145,620	2.0%



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11-9041	Architectural and Engineering Managers	detail	6,960	4.7%	1.42%	\$71.11	\$72.25	\$150,290	1.6%
11-9199	Managers, All Other	detail	2,620	11.0%	0.53%	\$63.06	\$67.95	\$141,340	4.6%
13-0000	Business and Financial Operations Occupations	major	54,740	2.6%	11.14%	\$38.20	\$39.53	\$82,210	1.0%
13-1000	Business Operations Specialists	minor	43,920	2.3%	8.94%	\$38.40	\$39.69	\$82,550	1.1%
13-1020	Buyers and Purchasing Agents	broad	11,640	2.6%	2.37%	\$35.36	\$36.55	\$76,010	1.7%
13-1022	Wholesale and Retail Buyers, Except Farm Products	detail	60	9.5%	0.01%	\$26.03	\$26.99	\$56,130	5.7%
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	detail	11,570	2.6%	2.36%	\$35.41	\$36.59	\$76,110	1.7%
13-1041	Compliance Officers	detail	880	5.5%	0.18%	\$37.68	\$39.46	\$82,070	1.9%
13-1051	Cost Estimators	detail	1,980	5.7%	0.40%	\$38.69	\$39.90	\$82,990	1.6%
13-1070	Human Resources Workers	broad	2,630	3.2%	0.53%	\$38.49	\$38.97	\$81,070	1.4%
13-1071	Human Resources Specialists	detail	2,490	3.2%	0.51%	\$38.33	\$38.65	\$80,390	1.5%
13-1075	Labor Relations Specialists	detail	130	9.0%	0.03%	\$43.04	\$45.04	\$93,680	3.0%
13-1081	Logisticians	detail	9,810	3.2%	2.00%	\$38.78	\$39.76	\$82,700	1.1%
13-1111	Management Analysts	detail	4,400	3.4%	0.89%	\$41.66	\$42.99	\$89,420	1.5%
13-1121	Meeting, Convention, and Event Planners	detail	60	11.4%	0.01%	\$39.20	\$40.17	\$83,560	2.1%
13-1141	Compensation, Benefits, and Job Analysis Specialists	detail	310	6.8%	0.06%	\$42.02	\$42.19	\$87,750	2.6%
13-1151	Training and Development Specialists	detail	1,720	2.7%	0.35%	\$39.92	\$39.04	\$81,190	1.8%
13-1161	Market Research Analysts and Marketing Specialists	detail	1,260	4.3%	0.26%	\$53.29	\$51.84	\$107,830	3.0%
13-1199	Marketing Specialists, All Other	detail	9,240	3.8%	1.88%	\$38.81	\$40.57	\$84,390	1.5%
13-2000	Financial Specialists	minor	10,820	4.2%	2.20%	\$37.43	\$38.86	\$80,840	1.2%
13-2011	Accountants and Auditors	detail	3,690	3.9%	0.75%	\$35.54	\$37.14	\$77,250	1.3%
13-2031	Budget Analysts	detail	2,300	5.7%	0.47%	\$38.53	\$39.08	\$81,290	1.5%
13-2041	Credit Analysts	detail	80	19.3%	0.02%	\$41.44	\$42.87	\$89,180	4.1%
13-2050	Financial Analysts and Advisors	broad	3,020	11.5%	0.61%	\$38.71	\$40.76	\$84,780	2.6%
13-2051	Financial Analysts	detail	3,020	11.5%	0.61%	\$38.71	\$40.76	\$84,780	2.6%
15-0000	Computer and Mathematical Occupations	major	42,580	6.4%	8.66%	\$50.49	\$51.12	\$106,320	1.6%
15-1100	Computer Occupations	minor	39,580	6.8%	8.05%	\$51.32	\$51.75	\$107,640	1.7%
15-1120	Computer and Information Analysts	broad	6,730	4.3%	1.37%	\$45.95	\$45.99	\$95,660	1.1%
15-1121	Computer Systems Analysts	detail	5,840	4.4%	1.19%	\$45.96	\$46.00	\$95,670	1.0%
15-1122	Information Security Analysts	detail	890	5.8%	0.18%	\$45.84	\$45.94	\$95,550	2.0%
15-1130	Software Developers and Programmers	broad	25,890	9.3%	5.27%	(8)	(8)	(8)	(8)
15-1131	Computer Programmers	detail	2,190	5.0%	0.45%	(8)	(8)	(8)	(8)
15-1132	Software Developers, Applications	detail	10,380	10.4%	2.11%	\$54.55	\$54.70	\$113,780	2.0%
15-1133	Software Developers, Systems Software	detail	13,240	10.2%	2.69%	\$56.08	\$56.61	\$117,740	2.3%
15-1134	Web Developers	detail	80	21.0%	0.02%	\$34.54	\$33.69	\$70,060	3.9%
15-1140	Database and Systems Administrators and Network Architects	broad	(8)	(8)	(8)	\$47.99	\$48.00	\$99,840	2.2%
15-1141	Database Administrators	detail	770	4.6%	0.16%	\$43.41	\$43.74	\$90,980	1.9%
15-1142	Network and Computer Systems Administrators	detail	1,280	4.8%	0.26%	\$41.15	\$41.77	\$86,880	2.0%
15-1150	Computer Support Specialists	broad	1,600	3.7%	0.33%	\$37.28	\$38.32	\$79,700	7.6%
15-1151	Computer User Support Specialists	detail	1,170	3.9%	0.24%	\$38.43	\$38.65	\$80,380	9.9%
15-1152	Computer Network Support Specialists	detail	430	5.4%	0.09%	\$35.87	\$37.42	\$77,830	2.4%
15-1199	Computer Occupations, All Other	detail	(8)	(8)	(8)	\$46.51	\$46.99	\$97,740	2.6%
15-2000	Mathematical Science Occupations	minor	3,000	3.6%	0.61%	\$41.78	\$42.75	\$88,920	2.0%
15-2031	Operations Research Analysts	detail	2,770	3.9%	0.56%	\$40.89	\$40.96	\$85,200	1.8%



Occupation code	Occupation title (click on the occupation title to view an occupational profile)	Group	Employment	Employment RSE	Percent of total employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
17-0000	Architecture and Engineering Occupations	major	103,280	2.9%	21.02%	\$44.20	\$45.70	\$95,060	1.1%
17-2000	Engineers	minor	85,050	3.2%	17.31%	\$46.89	\$48.20	\$100,260	1.1%
17-2011	Aerospace Engineers	detail	27,660	3.2%	5.63%	\$49.25	\$50.00	\$104,010	1.0%
17-2041	Chemical Engineers	detail	90	24.2%	0.02%	\$36.77	\$40.60	\$84,460	6.2%
17-2051	Civil Engineers	detail	480	15.4%	0.10%	\$49.08	\$50.11	\$104,230	3.2%
17-2061	Computer Hardware Engineers	detail	730	12.7%	0.15%	\$52.39	\$52.37	\$108,920	2.6%
17-2070	Electrical and Electronics Engineers	broad	10,710	7.3%	2.18%	\$54.23	\$54.84	\$114,070	1.1%
17-2071	Electrical Engineers	detail	6,260	5.5%	1.27%	\$53.26	\$53.53	\$111,340	1.1%
17-2072	Electronics Engineers, Except Computer	detail	4,450	14.1%	0.91%	\$55.79	\$56.69	\$117,910	1.4%
17-2081	Environmental Engineers	detail	270	6.7%	0.06%	\$47.99	\$47.90	\$99,630	1.5%
17-2110	Industrial Engineers, Including Health and Safety	broad	20,980	2.8%	4.27%	\$43.37	\$44.82	\$93,230	1.6%
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	detail	520	7.0%	0.11%	\$41.93	\$43.51	\$90,490	2.0%
17-2112	Industrial Engineers	detail	20,460	2.8%	4.16%	\$43.40	\$44.86	\$93,300	1.6%
17-2131	Materials Engineers	detail	3,430	5.0%	0.70%	\$50.15	\$50.62	\$105,300	1.2%
17-2141	Mechanical Engineers	detail	15,360	5.6%	3.13%	\$43.08	\$44.85	\$93,290	1.7%
17-2199	Engineers, All Other	detail	5,340	5.9%	1.09%	\$44.94	\$46.29	\$96,280	2.0%
17-3000	Drafters, Engineering Technicians, and Mapping Technicians	minor	18,230	4.1%	3.71%	\$34.11	\$34.04	\$70,790	1.8%
17-3010	Drafters	broad	3,790	2.6%	0.77%	\$37.23	\$36.92	\$76,790	2.9%
17-3013	Mechanical Drafters	detail	3,020	3.3%	0.61%	\$35.89	\$35.89	\$74,660	2.8%
17-3019	Drafters, All Other	detail	40	14.4%	0.01%	\$30.06	\$30.88	\$64,220	6.1%
17-3020	Engineering Technicians, Except Drafters	broad	14,440	5.0%	2.94%	\$33.45	\$33.28	\$69,220	1.5%
17-3021	Aerospace Engineering and Operations Technicians	detail	3,730	17.8%	0.76%	\$33.37	\$32.68	\$67,970	3.7%
17-3023	Electrical and Electronics Engineering Technicians	detail	1,620	8.7%	0.33%	\$32.27	\$31.50	\$65,520	2.7%
17-3024	Electro-Mechanical Technicians	detail	390	6.5%	0.08%	\$36.85	\$37.66	\$78,340	3.1%
17-3025	Environmental Engineering Technicians	detail	120	36.5%	0.02%	\$26.58	\$26.42	\$54,940	3.5%
17-3026	Industrial Engineering Technicians	detail	4,940	3.5%	1.01%	\$34.65	\$34.62	\$72,000	2.0%
17-3027	Mechanical Engineering Technicians	detail	1,560	8.0%	0.32%	\$30.68	\$30.99	\$64,460	2.0%
17-3029	Engineering Technicians, Except Drafters, All Other	detail	2,070	7.3%	0.42%	\$33.16	\$33.86	\$70,420	2.1%
19-0000	Life, Physical, and Social Science Occupations	major	940	24.9%	0.19%	\$38.78	\$40.59	\$84,420	2.2%
19-2000	Physical Scientists	minor	750	30.2%	0.15%	\$41.64	\$43.55	\$90,590	2.0%
19-2010	Astronomers and Physicists	broad	(8)	(8)	(8)	\$44.08	\$57.90	\$120,430	7.5%
19-2012	Physicists	detail	(8)	(8)	(8)	\$44.08	\$57.90	\$120,430	7.5%
19-2030	Chemists and Materials Scientists	broad	(8)	(8)	(8)	\$43.42	\$42.62	\$88,650	1.8%
19-2031	Chemists	detail	100	17.6%	0.02%	\$42.35	\$41.86	\$87,070	3.2%
19-2099	Physical Scientists, All Other	detail	(8)	(8)	(8)	\$37.38	\$35.92	\$74,720	3.1%
19-4000	Life, Physical, and Social Science Technicians	minor	180	9.0%	0.04%	\$27.15	\$28.38	\$59,030	3.0%
19-4031	Chemical Technicians	detail	90	17.1%	0.02%	\$25.07	\$24.99	\$51,970	3.5%
19-4090	Miscellaneous Life, Physical, and Social Science Technicians	broad	80	1.7%	0.02%	\$32.33	\$31.79	\$66,130	3.6%
19-4099	Life, Physical, and Social Science Technicians, All Other	detail	70	1.7%	0.01%	\$32.10	\$31.83	\$66,200	3.9%
23-0000	Legal Occupations	major	530	4.8%	0.11%	\$63.47	\$71.69	\$149,110	3.8%
23-1000	Lawyers, Judges, and Related Workers	minor	400	5.1%	0.08%	\$79.09	\$83.24	\$173,130	4.6%



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23-1010	Lawyers and Judicial Law Clerks	broad	400	5.1%	0.08%	\$79.09	\$83.24	\$173,130	4.6%
23-1011	Lawyers	detail	400	5.1%	0.08%	\$79.09	\$83.24	\$173,130	4.6%
23-2000	Legal Support Workers	minor	130	6.6%	0.03%	\$33.46	\$35.18	\$73,180	3.4%
23-2011	Paralegals and Legal Assistants	detail	100	6.5%	0.02%	\$31.72	\$32.37	\$67,330	1.8%
25-0000	Education, Training, and Library Occupations	major	150	11.4%	0.03%	\$31.27	\$30.92	\$64,300	3.3%
25-1000	Postsecondary Teachers	minor	30	41.9%	0.01%	(4)	(4)	\$65,840	8.5%
25-1190	Miscellaneous Postsecondary Teachers	broad	30	41.9%	0.01%	(4)	(4)	\$65,840	8.5%
25-1194	Vocational Education Teachers, Postsecondary	detail	30	41.9%	0.01%	\$31.80	\$31.65	\$65,840	8.5%
25-4000	Librarians, Curators, and Archivists	minor	100	8.0%	0.02%	\$32.14	\$31.76	\$66,050	3.0%
25-4021	Librarians	detail	80	8.4%	0.02%	\$34.72	\$34.67	\$72,120	2.1%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	major	2,960	4.8%	0.60%	\$37.16	\$37.29	\$77,560	1.4%
27-1000	Art and Design Workers	minor	1,130	6.3%	0.23%	\$36.51	\$36.18	\$75,260	2.1%
27-1020	Designers	broad	(8)	(8)	(8)	\$34.70	\$34.64	\$72,050	2.3%
27-1021	Commercial and Industrial Designers	detail	420	8.1%	0.08%	\$37.31	\$36.92	\$76,800	2.1%
27-1024	Graphic Designers	detail	360	11.6%	0.07%	\$33.97	\$34.30	\$71,340	3.4%
27-1025	Interior Designers	detail	(8)	(8)	(8)	\$21.58	\$25.04	\$52,090	7.8%
27-3000	Media and Communication Workers	minor	1,660	5.9%	0.34%	\$37.73	\$38.11	\$79,270	1.3%
27-3031	Public Relations Specialists	detail	(8)	(8)	(8)	\$41.31	\$41.96	\$87,270	1.9%
27-3040	Writers and Editors	broad	(8)	(8)	(8)	\$36.59	\$36.57	\$76,060	1.5%
27-3041	Editors	detail	70	9.3%	0.01%	\$37.45	\$38.22	\$79,500	2.8%
27-3042	Technical Writers	detail	1,000	8.1%	0.20%	\$35.77	\$35.77	\$74,400	1.6%
27-4000	Media and Communication Equipment Workers	minor	170	5.4%	0.03%	\$36.04	\$36.57	\$76,070	2.0%
27-4011	Audio and Video Equipment Technicians	detail	50	10.0%	0.01%	(8)	(8)	(8)	(8)
27-4021	Photographers	detail	70	8.3%	0.01%	\$36.34	\$36.58	\$76,090	2.5%
29-0000	Healthcare Practitioners and Technical Occupations	major	950	3.2%	0.19%	\$37.32	\$39.03	\$81,180	1.5%
29-1000	Health Diagnosing and Treating Practitioners	minor	200	7.0%	0.04%	\$38.48	\$43.01	\$89,470	3.6%
29-1141	Registered Nurses	detail	160	8.7%	0.03%	\$35.27	\$35.56	\$73,960	2.2%
29-2000	Health Technologists and Technicians	minor	30	7.0%	0.01%	\$27.86	\$28.81	\$59,920	3.2%
29-9000	Other Healthcare Practitioners and Technical Occupations	minor	720	3.3%	0.15%	\$37.41	\$38.36	\$79,800	1.5%
29-9010	Occupational Health and Safety Specialists and Technicians	broad	720	3.3%	0.15%	\$37.41	\$38.36	\$79,800	1.5%
29-9011	Occupational Health and Safety Specialists	detail	650	3.3%	0.13%	\$38.57	\$39.56	\$82,290	1.4%
29-9012	Occupational Health and Safety Technicians	detail	70	9.1%	0.01%	\$25.70	\$26.50	\$55,120	2.8%
33-0000	Protective Service Occupations	major	2,770	6.1%	0.56%	\$27.01	\$28.22	\$58,700	2.2%
33-1000	Supervisors of Protective Service Workers	minor	(8)	(8)	(8)	\$37.53	\$40.96	\$85,190	1.9%
33-1021	First-Line Supervisors of Fire Fighting and Prevention Workers	detail	(8)	(8)	(8)	\$37.08	\$38.49	\$80,060	2.3%
33-1099	First-Line Supervisors of Protective Service Workers, All Other	detail	180	7.2%	0.04%	\$37.54	\$41.77	\$86,880	2.4%
33-2000	Fire Fighting and Prevention Workers	minor	(8)	(8)	(8)	\$27.26	\$27.30	\$56,780	1.9%
33-2011	Firefighters	detail	(8)	(8)	(8)	\$25.34	\$25.38	\$52,800	2.0%
33-2020	Fire Inspectors	broad	(8)	(8)	(8)	\$33.74	\$33.83	\$70,360	3.2%
33-2021	Fire Inspectors and Investigators	detail	(8)	(8)	(8)	\$33.74	\$33.83	\$70,360	3.2%



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33-9000	Other Protective Service Workers	minor	2,050	7.6%	0.42%	\$25.71	\$26.97	\$56,100	2.7%
33-9021	Private Detectives and Investigators	detail	580	12.2%	0.12%	\$36.93	\$37.17	\$77,320	1.6%
33-9030	Security Guards and Gaming Surveillance Officers	broad	1,270	9.0%	0.26%	\$21.25	\$21.54	\$44,790	3.3%
33-9032	Security Guards	detail	1,270	9.0%	0.26%	\$21.26	\$21.54	\$44,800	3.3%
33-9090	Miscellaneous Protective Service Workers	broad	200	7.5%	0.04%	\$33.39	\$32.06	\$66,680	8.2%
33-9099	Protective Service Workers, All Other	detail	170	9.1%	0.03%	\$35.61	\$34.94	\$72,670	6.1%
35-0000	Food Preparation and Serving Related Occupations	major	(8)	(8)	(8)	\$16.20	\$16.26	\$33,820	8.8%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	major	1,820	3.9%	0.37%	\$15.69	\$16.76	\$34,850	2.0%
37-2000	Building Cleaning and Pest Control Workers	minor	1,750	3.7%	0.36%	\$15.58	\$16.52	\$34,370	2.0%
37-2010	Building Cleaning Workers	broad	(8)	(8)	(8)	\$15.57	\$16.52	\$34,360	2.0%
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	detail	1,680	3.8%	0.34%	\$15.26	\$16.33	\$33,960	2.0%
37-3010	Grounds Maintenance Workers	broad	40	24.3%	0.01%	\$15.38	\$15.99	\$33,260	5.2%
37-3011	Landscaping and Groundskeeping Workers	detail	40	24.3%	0.01%	\$15.38	\$15.99	\$33,260	5.2%
41-0000	Sales and Related Occupations	major	3,500	5.4%	0.71%	\$37.54	\$40.06	\$83,320	2.1%
41-1010	First-Line Supervisors of Sales Workers	broad	220	16.1%	0.05%	\$44.78	\$48.07	\$99,980	5.2%
41-1012	First-Line Supervisors of Non-Retail Sales Workers	detail	220	16.1%	0.05%	\$44.78	\$48.07	\$99,980	5.2%
41-3000	Sales Representatives, Services	minor	40	42.0%	0.01%	\$33.82	\$34.44	\$71,630	6.8%
41-3099	Sales Representatives, Services, All Other	detail	40	43.8%	0.01%	\$32.85	\$33.69	\$70,070	7.6%
41-4010	Sales Representatives, Wholesale and Manufacturing	broad	2,790	5.6%	0.57%	\$35.86	\$39.04	\$81,210	2.4%
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	detail	1,210	12.6%	0.25%	\$42.18	\$45.56	\$94,770	3.0%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	detail	1,580	6.0%	0.32%	\$31.12	\$34.05	\$70,830	2.3%
41-9000	Other Sales and Related Workers	minor	420	6.1%	0.09%	\$42.67	\$44.21	\$91,960	3.8%
41-9031	Sales Engineers	detail	400	6.0%	0.08%	\$43.03	\$44.96	\$93,520	3.9%
43-0000	Office and Administrative Support Occupations	major	33,520	2.1%	6.82%	\$22.75	\$24.43	\$50,810	1.9%
43-1011	First-Line Supervisors of Office and Administrative Support Workers	detail	1,690	3.0%	0.34%	\$34.84	\$37.30	\$77,590	3.1%
43-3000	Financial Clerks	minor	2,460	2.9%	0.50%	\$20.22	\$21.59	\$44,900	2.1%
43-3021	Billing and Posting Clerks	detail	70	36.1%	0.01%	\$16.33	\$16.94	\$35,240	2.7%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	detail	1,590	3.6%	0.32%	\$19.05	\$19.83	\$41,260	1.6%
43-3051	Payroll and Timekeeping Clerks	detail	280	5.2%	0.06%	\$21.05	\$21.73	\$45,200	2.3%
43-3061	Procurement Clerks	detail	490	4.1%	0.10%	\$26.10	\$28.08	\$58,400	3.4%
43-4000	Information and Record Clerks	minor	2,980	5.5%	0.61%	\$19.55	\$21.33	\$44,370	3.1%
43-4051	Customer Service Representatives	detail	1,900	7.9%	0.39%	\$21.27	\$22.96	\$47,760	4.2%
43-4071	File Clerks	detail	150	14.2%	0.03%	\$16.88	\$19.60	\$40,760	5.0%
43-4151	Order Clerks	detail	80	20.6%	0.02%	\$17.26	\$18.25	\$37,970	5.2%
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	detail	380	5.2%	0.08%	\$21.45	\$21.66	\$45,050	1.7%
43-4171	Receptionists and Information Clerks	detail	400	6.7%	0.08%	\$13.97	\$14.51	\$30,190	2.4%
43-4199	Information and Record Clerks, All Other	detail	60	17.0%	0.01%	\$20.00	\$19.98	\$41,550	4.1%



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43-5000	Material Recording, Scheduling, Dispatching, and Distributing Workers	minor	17,160	2.7%	3.49%	\$22.48	\$24.31	\$50,550	2.1%
43-5030	Dispatchers	broad	170	12.9%	0.03%	\$32.08	\$29.99	\$62,370	6.1%
43-5032	Dispatchers, Except Police, Fire, and Ambulance	detail	160	10.9%	0.03%	\$32.93	\$30.62	\$63,700	5.8%
43-5061	Production, Planning, and Expediting Clerks	detail	10,100	3.2%	2.06%	\$27.85	\$28.13	\$58,510	1.9%
43-5071	Shipping, Receiving, and Traffic Clerks	detail	4,160	6.8%	0.85%	\$16.66	\$18.74	\$38,980	3.6%
43-5081	Stock Clerks and Order Fillers	detail	2,600	4.8%	0.53%	\$16.24	\$17.99	\$37,430	2.2%
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	detail	110	26.6%	0.02%	\$25.24	\$23.59	\$49,070	5.8%
43-6010	Secretaries and Administrative Assistants	broad	5,980	3.6%	1.22%	\$24.95	\$25.30	\$52,630	1.5%
43-6011	Executive Secretaries and Executive Administrative Assistants	detail	3,070	6.2%	0.62%	\$27.71	\$28.77	\$59,850	1.5%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	detail	2,900	4.4%	0.59%	\$21.09	\$21.62	\$44,970	2.1%
43-9000	Other Office and Administrative Support Workers	minor	3,250	3.5%	0.66%	\$19.54	\$21.78	\$45,310	3.9%
43-9011	Computer Operators	detail	50	25.7%	0.01%	\$20.71	\$21.65	\$45,030	5.9%
43-9020	Data Entry and Information Processing Workers	broad	170	6.3%	0.03%	\$22.84	\$22.83	\$47,490	2.7%
43-9021	Data Entry Keyers	detail	140	6.0%	0.03%	\$22.82	\$22.46	\$46,720	2.5%
43-9031	Desktop Publishers	detail	40	14.2%	0.01%	\$26.83	\$26.82	\$55,790	2.3%
43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	detail	60	14.4%	0.01%	\$20.03	\$20.67	\$42,990	4.5%
43-9061	Office Clerks, General	detail	2,230	4.6%	0.45%	\$16.94	\$18.38	\$38,240	2.3%
43-9071	Office Machine Operators, Except Computer	detail	70	17.5%	0.01%	(8)	(8)	(8)	(8)
43-9199	Office and Administrative Support Workers, All Other	detail	620	2.4%	0.13%	\$29.96	\$33.35	\$69,370	4.1%
47-0000	Construction and Extraction Occupations	major	4,720	6.7%	0.96%	\$27.37	\$27.52	\$57,240	2.2%
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	detail	60	29.0%	0.01%	\$40.08	\$39.57	\$82,300	8.2%
47-2000	Construction Trades Workers	minor	4,270	6.9%	0.87%	\$27.15	\$27.33	\$56,840	2.4%
47-2031	Carpenters	detail	350	17.9%	0.07%	\$22.84	\$24.50	\$50,960	4.1%
47-2111	Electricians	detail	1,470	14.1%	0.30%	\$32.19	\$31.75	\$66,030	2.4%
47-2140	Painters and Paperhangers	broad	250	8.3%	0.05%	\$26.13	\$26.63	\$55,390	3.6%
47-2141	Painters, Construction and Maintenance	detail	250	8.3%	0.05%	\$26.13	\$26.63	\$55,390	3.6%
47-2150	Pipelayers, Plumbers, Pipefitters, and Steamfitters	broad	530	6.8%	0.11%	\$33.40	\$32.75	\$68,120	2.0%
47-2152	Plumbers, Pipefitters, and Steamfitters	detail	530	6.8%	0.11%	\$33.40	\$32.75	\$68,120	2.0%
47-2211	Sheet Metal Workers	detail	1,580	11.5%	0.32%	\$21.61	\$21.92	\$45,600	2.6%
47-4000	Other Construction and Related Workers	minor	110	10.5%	0.02%	\$31.24	\$29.66	\$61,690	3.3%
47-4041	Hazardous Materials Removal Workers	detail	70	12.3%	0.01%	\$32.07	\$29.82	\$62,030	4.6%
47-5000	Extraction Workers	minor	250	18.3%	0.05%	\$28.07	\$27.76	\$57,740	5.8%
47-5031	Explosives Workers, Ordnance Handling Experts, and Blasters	detail	250	18.3%	0.05%	\$28.07	\$27.76	\$57,740	5.8%
49-0000	Installation, Maintenance, and Repair Occupations	major	37,400	2.8%	7.61%	\$29.09	\$29.52	\$61,400	1.7%
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	detail	1,590	6.1%	0.32%	\$35.58	\$37.61	\$78,220	2.0%
49-2000	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	minor	6,780	3.8%	1.38%	\$29.88	\$31.16	\$64,820	2.0%
49-2090	Miscellaneous Electrical and Electronic	broad	6,730	3.8%	1.37%	\$29.92	\$31.20	\$64,910	2.0%



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	Equipment Mechanics, Installers, and Repairers								
49-2091	Avionics Technicians	detail	5,330	4.9%	1.08%	\$29.91	\$31.25	\$65,000	2.2%
49-2092	Electric Motor, Power Tool, and Related Repairers	detail	160	16.6%	0.03%	(8)	(8)	(8)	(8)
49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	detail	410	4.2%	0.08%	\$25.50	\$26.42	\$54,950	3.7%
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	detail	840	11.0%	0.17%	\$33.00	\$32.57	\$67,740	3.2%
49-3000	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	minor	18,820	4.1%	3.83%	\$29.03	\$29.52	\$61,390	2.4%
49-3011	Aircraft Mechanics and Service Technicians	detail	18,460	4.2%	3.76%	\$29.02	\$29.48	\$61,330	2.4%
49-3020	Automotive Technicians and Repairers	broad	130	7.3%	0.03%	\$34.09	\$33.99	\$70,700	3.0%
49-3023	Automotive Service Technicians and Mechanics	detail	120	4.3%	0.02%	(8)	(8)	(8)	(8)
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	detail	40	46.2%	0.01%	\$24.11	\$24.24	\$50,430	3.4%
49-3040	Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics	broad	170	11.5%	0.03%	\$28.44	\$31.18	\$64,860	6.4%
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	detail	170	11.5%	0.03%	\$28.44	\$31.18	\$64,860	6.4%
49-9000	Other Installation, Maintenance, and Repair Occupations	minor	10,210	3.9%	2.08%	\$27.36	\$27.18	\$56,530	2.0%
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	detail	370	7.2%	0.07%	\$33.50	\$32.95	\$68,530	2.4%
49-9040	Industrial Machinery Installation, Repair, and Maintenance Workers	broad	4,970	5.1%	1.01%	\$29.45	\$28.65	\$59,600	2.6%
49-9041	Industrial Machinery Mechanics	detail	4,080	6.0%	0.83%	\$30.60	\$29.30	\$60,940	3.1%
49-9043	Maintenance Workers, Machinery	detail	660	5.8%	0.13%	\$23.07	\$23.63	\$49,160	2.4%
49-9044	Millwrights	detail	230	8.2%	0.05%	\$31.68	\$31.59	\$65,700	3.3%
49-9060	Precision Instrument and Equipment Repairers	broad	50	29.9%	0.01%	\$33.39	\$33.51	\$69,690	3.8%
49-9069	Precision Instrument and Equipment Repairers, All Other	detail	50	30.3%	0.01%	\$33.53	\$33.82	\$70,340	4.0%
49-9071	Maintenance and Repair Workers, General	detail	3,810	4.5%	0.78%	\$25.37	\$25.24	\$52,500	2.7%
49-9090	Miscellaneous Installation, Maintenance, and Repair Workers	broad	1,000	14.7%	0.20%	\$24.02	\$24.93	\$51,860	4.4%
49-9094	Locksmiths and Safe Repairers	detail	40	21.8%	0.01%	\$29.62	\$29.76	\$61,910	3.3%
49-9098	Helpers--Installation, Maintenance, and Repair Workers	detail	220	12.8%	0.05%	\$13.84	\$14.80	\$30,780	3.0%
49-9099	Installation, Maintenance, and Repair Workers, All Other	detail	700	20.4%	0.14%	\$28.15	\$27.59	\$57,390	4.9%
51-0000	Production Occupations	major	161,630	2.2%	32.89%	\$22.55	\$23.98	\$49,880	1.8%
51-1011	First-Line Supervisors of Production and Operating Workers	detail	10,510	2.2%	2.14%	\$35.93	\$36.75	\$76,450	1.5%
51-2000	Assemblers and Fabricators	minor	60,900	3.0%	12.39%	\$21.08	\$22.33	\$46,450	2.6%
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	detail	36,520	3.7%	7.43%	\$23.57	\$24.89	\$51,780	2.2%
51-2020	Electrical, Electronics, and Electromechanical Assemblers	broad	5,030	4.7%	1.02%	\$18.12	\$19.43	\$40,420	3.4%
51-2021	Coil Winders, Tapers, and Finishers	detail	40	33.0%	0.01%	\$15.40	\$14.90	\$30,990	9.9%
51-2022	Electrical and Electronic Equipment Assemblers	detail	3,880	4.8%	0.79%	\$18.14	\$19.59	\$40,750	4.1%



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51-2023	Electromechanical Equipment Assemblers	detail	1,110	11.8%	0.23%	\$18.13	\$19.05	\$39,630	2.6%
51-2031	Engine and Other Machine Assemblers	detail	1,050	11.0%	0.21%	\$20.63	\$21.06	\$43,810	5.0%
51-2041	Structural Metal Fabricators and Fitters	detail	2,400	19.6%	0.49%	\$22.07	\$22.85	\$47,520	3.9%
51-2090	Miscellaneous Assemblers and Fabricators	broad	15,900	9.6%	3.24%	\$16.33	\$17.37	\$36,130	3.7%
51-2091	Fiberglass Laminators and Fabricators	detail	870	20.5%	0.18%	\$13.41	\$14.61	\$30,380	3.2%
51-2092	Team Assemblers	detail	13,570	11.1%	2.76%	\$16.60	\$17.48	\$36,360	4.2%
51-2099	Assemblers and Fabricators, All Other	detail	1,460	18.0%	0.30%	\$14.85	\$18.02	\$37,490	5.2%
51-4000	Metal Workers and Plastic Workers	minor	55,900	3.4%	11.38%	\$22.04	\$23.27	\$48,390	1.7%
51-4010	Computer Control Programmers and Operators	broad	11,390	6.3%	2.32%	\$23.50	\$24.54	\$51,040	2.8%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	detail	10,000	6.6%	2.04%	\$22.66	\$23.33	\$48,520	3.2%
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	detail	1,390	9.0%	0.28%	\$31.23	\$33.28	\$69,220	3.6%
51-4020	Forming Machine Setters, Operators, and Tenders, Metal and Plastic	broad	960	16.9%	0.19%	\$18.38	\$20.19	\$41,980	5.2%
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	detail	400	31.5%	0.08%	\$18.35	\$21.21	\$44,120	6.3%
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	detail	300	17.5%	0.06%	\$19.39	\$19.35	\$40,240	5.4%
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	detail	250	19.0%	0.05%	\$17.46	\$19.54	\$40,650	8.6%
51-4030	Machine Tool Cutting Setters, Operators, and Tenders, Metal and Plastic	broad	9,270	5.2%	1.89%	\$19.01	\$20.93	\$43,540	3.5%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	detail	1,800	10.7%	0.37%	\$17.02	\$19.07	\$39,660	5.8%
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	detail	770	19.4%	0.16%	\$18.72	\$21.71	\$45,160	6.5%
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	detail	3,470	5.0%	0.71%	\$16.96	\$18.81	\$39,120	3.3%
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	detail	1,700	10.3%	0.35%	\$21.50	\$22.59	\$46,980	3.1%
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	detail	1,530	7.8%	0.31%	\$23.37	\$25.72	\$53,490	4.8%
51-4041	Machinists	detail	18,610	3.9%	3.79%	\$21.95	\$22.78	\$47,380	1.7%
51-4050	Metal Furnace Operators, Tenders, Pourers, and Casters	broad	(8)	(8)	(8)	\$24.45	\$24.97	\$51,940	8.4%
51-4060	Model Makers and Patternmakers, Metal and Plastic	broad	(8)	(8)	(8)	\$24.10	\$26.28	\$54,660	6.5%
51-4061	Model Makers, Metal and Plastic	detail	310	9.0%	0.06%	\$23.89	\$26.64	\$55,420	7.8%
51-4062	Patternmakers, Metal and Plastic	detail	(8)	(8)	(8)	\$24.66	\$25.10	\$52,210	12.2%
51-4070	Molders and Molding Machine Setters, Operators, and Tenders, Metal and Plastic	broad	720	17.8%	0.15%	\$14.62	\$16.15	\$33,590	3.6%
51-4071	Foundry Mold and Coremakers	detail	160	47.0%	0.03%	\$16.30	\$16.69	\$34,710	4.6%
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	detail	550	18.3%	0.11%	\$14.12	\$15.99	\$33,260	4.2%
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	detail	3,520	6.5%	0.72%	\$21.22	\$21.85	\$45,450	2.7%
51-4111	Tool and Die Makers	detail	4,010	4.8%	0.82%	\$29.36	\$29.46	\$61,280	2.1%



Occupation code	Occupation title (click on the occupation title to view an occupational profile)	Group	Employment	Employment RSE	Percent of total employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
51-4120	Welding, Soldering, and Brazing Workers	broad	3,610	6.0%	0.73%	\$20.98	\$22.05	\$45,860	1.7%
51-4121	Welders, Cutters, Solderers, and Brazers	detail	2,780	6.2%	0.57%	\$21.00	\$22.24	\$46,260	1.7%
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	detail	830	10.7%	0.17%	\$20.93	\$21.41	\$44,530	3.0%
51-4190	Miscellaneous Metal Workers and Plastic Workers	broad	3,390	10.0%	0.69%	\$24.08	\$25.46	\$52,960	3.8%
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	detail	950	10.6%	0.19%	\$19.33	\$20.80	\$43,270	3.5%
51-4192	Layout Workers, Metal and Plastic	detail	1,200	23.4%	0.25%	\$28.48	\$30.11	\$62,630	7.2%
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	detail	300	14.7%	0.06%	\$20.24	\$22.08	\$45,930	3.9%
51-4194	Tool Grinders, Filers, and Sharpeners	detail	340	20.3%	0.07%	\$34.28	\$32.28	\$67,140	4.9%
51-4199	Metal Workers and Plastic Workers, All Other	detail	580	18.2%	0.12%	\$18.62	\$21.19	\$44,070	5.5%
51-5110	Printing Workers	broad	70	8.8%	0.01%	\$20.74	\$22.35	\$46,500	8.8%
51-5112	Printing Press Operators	detail	50	11.1%	0.01%	\$22.42	\$23.95	\$49,820	8.2%
51-6000	Textile, Apparel, and Furnishings Workers	minor	530	15.9%	0.11%	\$16.52	\$17.60	\$36,620	5.1%
51-6031	Sewing Machine Operators	detail	150	32.4%	0.03%	\$13.03	\$13.86	\$28,830	6.9%
51-6090	Miscellaneous Textile, Apparel, and Furnishings Workers	broad	380	15.5%	0.08%	\$18.61	\$19.11	\$39,740	6.0%
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	detail	130	36.5%	0.03%	\$13.51	\$14.02	\$29,170	4.5%
51-6093	Upholsterers	detail	250	14.6%	0.05%	\$22.54	\$21.63	\$44,980	4.6%
51-8000	Plant and System Operators	minor	480	17.3%	0.10%	\$32.02	\$30.27	\$62,960	3.0%
51-8021	Stationary Engineers and Boiler Operators	detail	210	6.4%	0.04%	\$33.90	\$33.09	\$68,830	1.7%
51-8031	Water and Wastewater Treatment Plant and System Operators	detail	230	35.7%	0.05%	\$25.59	\$26.92	\$55,990	4.9%
51-9000	Other Production Occupations	minor	33,100	3.4%	6.74%	\$23.34	\$24.20	\$50,330	2.4%
51-9010	Chemical Processing Machine Setters, Operators, and Tenders	broad	90	14.5%	0.02%	\$21.48	\$22.97	\$47,790	7.5%
51-9011	Chemical Equipment Operators and Tenders	detail	90	14.6%	0.02%	\$21.48	\$22.99	\$47,820	7.8%
51-9020	Crushing, Grinding, Polishing, Mixing, and Blending Workers	broad	1,550	9.2%	0.32%	\$15.07	\$16.93	\$35,210	3.4%
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	detail	60	14.6%	0.01%	\$16.24	\$16.88	\$35,120	5.5%
51-9022	Grinding and Polishing Workers, Hand	detail	1,340	10.3%	0.27%	\$14.56	\$16.17	\$33,640	3.9%
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	detail	150	22.7%	0.03%	\$22.33	\$23.81	\$49,520	5.2%
51-9030	Cutting Workers	broad	80	42.7%	0.02%	\$19.01	\$20.06	\$41,720	19.0%
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	detail	80	20.8%	0.02%	\$17.60	\$19.32	\$40,180	9.5%
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	detail	100	16.6%	0.02%	\$19.52	\$22.09	\$45,960	7.6%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	detail	21,040	2.2%	4.28%	\$25.57	\$26.28	\$54,660	2.2%
51-9111	Packaging and Filling Machine Operators and Tenders	detail	160	25.1%	0.03%	\$12.62	\$14.63	\$30,440	8.3%
51-9120	Painting Workers	broad	3,920	5.0%	0.80%	\$21.80	\$23.51	\$48,910	2.8%
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	detail	980	10.8%	0.20%	\$17.18	\$18.17	\$37,800	4.1%



Occupation code	Occupation title (click on the occupation title to view an occupational profile)	Group	Employment	Employment RSE	Percent of total employment	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
51-9122	Painters, Transportation Equipment	detail	2,830	5.8%	0.58%	\$23.76	\$25.55	\$53,140	2.5%
51-9123	Painting, Coating, and Decorating Workers	detail	110	13.3%	0.02%	\$18.89	\$18.78	\$39,060	3.1%
51-9141	Semiconductor Processors	detail	70	18.7%	0.01%	(8)	(8)	(8)	(8)
51-9190	Miscellaneous Production Workers	broad	6,010	12.9%	1.22%	\$17.72	\$19.66	\$40,900	3.6%
51-9191	Adhesive Bonding Machine Operators and Tenders	detail	1,790	40.2%	0.36%	\$24.02	\$22.98	\$47,800	5.7%
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	detail	90	24.5%	0.02%	\$17.04	\$19.36	\$40,270	8.7%
51-9194	Etchers and Engravers	detail	60	26.7%	0.01%	\$17.43	\$22.00	\$45,760	8.7%
51-9198	Helpers--Production Workers	detail	2,430	5.9%	0.50%	\$14.08	\$15.61	\$32,470	5.0%
51-9199	Production Workers, All Other	detail	1,610	15.6%	0.33%	\$22.14	\$21.92	\$45,600	6.3%
53-0000	Transportation and Material Moving Occupations	major	9,010	3.8%	1.83%	\$23.66	\$26.32	\$54,750	3.6%
53-1000	Supervisors of Transportation and Material Moving Workers	minor	260	10.1%	0.05%	\$27.92	\$29.43	\$61,220	2.9%
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	detail	180	13.9%	0.04%	\$26.51	\$27.81	\$57,840	3.6%
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	detail	60	15.1%	0.01%	\$30.91	\$31.82	\$66,190	5.0%
53-2000	Air Transportation Workers	minor	1,080	9.4%	0.22%	(4)	(4)	\$111,240	3.3%
53-2010	Aircraft Pilots and Flight Engineers	broad	(8)	(8)	(8)	(4)	(4)	\$118,040	3.8%
53-2012	Commercial Pilots	detail	900	9.8%	0.18%	(4)	(4)	\$116,790	3.8%
53-2020	Air Traffic Controllers and Airfield Operations Specialists	broad	(8)	(8)	(8)	\$32.67	\$34.49	\$71,740	3.2%
53-2022	Airfield Operations Specialists	detail	150	23.3%	0.03%	\$32.99	\$34.77	\$72,320	3.4%
53-3000	Motor Vehicle Operators	minor	1,120	6.7%	0.23%	\$21.77	\$22.63	\$47,070	3.5%
53-3030	Driver/Sales Workers and Truck Drivers	broad	1,060	5.9%	0.22%	\$21.78	\$22.71	\$47,240	3.5%
53-3032	Heavy and Tractor-Trailer Truck Drivers	detail	640	8.7%	0.13%	\$28.50	\$27.02	\$56,200	2.7%
53-3033	Light Truck or Delivery Services Drivers	detail	420	7.0%	0.09%	\$14.79	\$16.19	\$33,680	2.9%
53-3099	Motor Vehicle Operators, All Other	detail	(8)	(8)	(8)	\$20.82	\$20.73	\$43,120	3.6%
53-6000	Other Transportation Workers	minor	680	5.8%	0.14%	\$34.64	\$34.31	\$71,360	3.1%
53-6051	Transportation Inspectors	detail	630	5.5%	0.13%	\$35.21	\$35.62	\$74,090	2.5%
53-6099	Transportation Workers, All Other	detail	50	37.2%	0.01%	\$14.91	\$18.03	\$37,510	13.9%
53-7000	Material Moving Workers	minor	5,870	5.9%	1.19%	\$18.87	\$20.94	\$43,560	4.4%
53-7051	Industrial Truck and Tractor Operators	detail	1,090	14.3%	0.22%	\$22.16	\$23.36	\$48,600	6.8%
53-7060	Laborers and Material Movers, Hand	broad	4,380	5.5%	0.89%	\$17.46	\$19.34	\$40,230	3.6%
53-7061	Cleaners of Vehicles and Equipment	detail	120	30.9%	0.02%	\$10.94	\$14.89	\$30,970	10.8%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	detail	3,590	5.9%	0.73%	\$18.39	\$19.98	\$41,550	3.7%
53-7064	Packers and Packagers, Hand	detail	670	15.0%	0.14%	\$13.35	\$16.78	\$34,910	6.8%
53-7199	Material Moving Workers, All Other	detail	130	20.1%	0.03%	\$26.26	\$25.89	\$53,850	7.0%

[About May 2014 National Industry-Specific Occupational Employment and Wage Estimates](#)

(1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.



(2) Annual wages have been calculated by multiplying the hourly mean wage by a "year-round, full-time" hours figure of 2,080 hours; for those occupations where there is not an hourly mean wage published, the annual wage has been directly calculated from the reported survey data.

(3) The relative standard error (RSE) is a measure of the reliability of a survey statistic. The smaller the relative standard error, the more precise the estimate.

(4) Wages for some occupations that do not generally work year-round, full time, are reported either as hourly wages or annual salaries depending on how they are typically paid.

(8) Estimate not released.

Other OES estimates and related information:

[May 2014 National Occupational Employment and Wage Estimates](#) (cross-industry estimates)

[May 2014 State Occupational Employment and Wage Estimates](#) (cross-industry estimates)

[May 2014 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates](#) (cross-industry estimates)

[May 2014 National Industry-Specific Occupational Employment and Wage Estimates](#)

[May 2014 Occupation Profiles](#)

[Technical notes](#)

Last Modified Date: March 25, 2015

U.S. Bureau of Labor Statistics | Division of Occupational Employment Statistics, PSB Suite 2135, 2 Massachusetts Avenue, NE Washington, DC 20212-0001

www.bls.gov/OES | Telephone: 1-202-691-6569 | [Contact OES](#)

SKILLS GAP/LABOR MARKET DATA
Aerospace Manufacturing

Aerospace Manufacturing	
Aerospace Manufacturing	<p>Job Outlook</p> <p>Assemblers and Fabricators Percent change in employment, projected 2012-22 Total, all occupations 11% Assemblers and fabricators 4% Production occupations 1%</p> <p><u>About this section</u> Note: All Occupations includes all occupations in the U.S. Economy. Source: U.S. Bureau of Labor Statistics, Employment Projections program</p> <p>Employment of assemblers and fabricators is projected to grow 4 percent from 2012 to 2022, slower than the average for all occupations.</p> <p>Within the manufacturing sector, employment of assemblers and fabricators will be determined largely by the growth or decline in the production of certain manufactured goods. In general, overall employment is not expected to grow as fast as all other occupations because many manufacturing sectors are expected to become more efficient and able to produce more with fewer workers.</p> <p>However, some individual industries are projected to have more jobs than others. The aircraft products and parts manufacturing industry is projected to gain jobs over the decade as demand for new commercial planes grow significantly. Thus, the need for assemblers for aircraft structures, surfaces, rigging, and systems is expected to grow.</p> <p>In most other manufacturing industries, improved processes, tools, and, in some cases, automation will reduce job growth. Automation will replace workers in operations with a large volume of simple, repetitive work.</p> <p>However, automation is not expected to have a large effect on the assembly of products that are low in volume or very complicated. Intricate product manufacturing and complicated techniques often cannot be automated.</p> <p>The use of team production techniques has been one factor in the continuing success</p>

of the manufacturing sector, boosting productivity and improving the quality of goods. Thus, while the number of assemblers overall is expected to decline in manufacturing, the number of team assemblers should grow as more manufacturing plants convert to team production techniques.

Some manufacturers have sent their assembly functions to countries where labor costs are lower. Decisions by U.S. corporations to move manufacturing to other nations may limit employment growth for assemblers in some industries.

The largest increase in the number of assemblers and fabricators is projected to be in the employment services industry, which supplies temporary workers to various industries. Temporary workers are gaining importance in the manufacturing sector and other sectors, as companies facing cost pressures strive for a more flexible workforce to meet fluctuations in the market.

Job Prospects

Qualified applicants, including those with technical vocational training and certification, are likely to have the best job opportunities in the manufacturing sector, particularly in growing, high-technology industries, such as aerospace and electro-medical devices.

Some employers report difficulty finding qualified applicants looking for manufacturing employment. Many job openings are expected to result from the need to replace workers who leave or retire from this large occupation.

Employment projections data for assemblers and fabricators, 2012-22

Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22 Percent	Numeric	Employment by Industry
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program						
Assemblers and fabricators	51-2000	1,755,200	1,819,400	4	64,200	[XLS]
Aircraft structure, surfaces, rigging, and systems assemblers	51-2011	41,500	44,000	6	2,400	[XLS]
Coil winders, tapers, and finishers	51-2021	14,400	12,900	-10	-1,500	[XLS]
Electrical and electronic equipment assemblers	51-2022	198,300	184,900	-7	-13,500	[XLS]
Electromechanical equipment assemblers	51-2023	50,500	46,900	-7	-3,600	[XLS]
Engine and other machine assemblers	51-2031	42,000	41,400	-1	-600	[XLS]
Structural metal fabricators and fitters	51-2041	79,700	85,900	8	6,200	[XLS]
Fiberglass laminators and fabricators	51-2091	18,200	17,400	-4	-700	[XLS]
Team assemblers	51-2092	1,031,800	1,081,300	5	49,500	[XLS]
Timing device assemblers and adjusters	51-2093	1,200	1,100	-3	0	[XLS]
Assemblers and fabricators, all other						



Auburn School District

Course: Aerospace Manufacturing	Total Framework Hours up to: 540
CIP Code: 469998 <input checked="" type="checkbox"/> Exploratory <input type="checkbox"/> Preparatory	Date Last Modified: November 19, 2015
Career Cluster: Architecture and Construction	Cluster Pathway: Construction

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Multimedia presentation of Aerospace Career research
- Students will perform a job search and create a resume
- Students will have the opportunity to participate in a mock interview

Leadership Alignment:

- Students will research a career in the aerospace industry and then deliver a multimedia presentation to a group.

Think Creatively

1.A.1 Use a wide range of idea creation techniques (such as brainstorming)

Work Creatively with Others

1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

Solve Problems

2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions

Communicate Clearly

3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

Standards and Competencies

Unit 1: Introduction to Aerospace Manufacturing Careers

Competencies	Total Learning Hours for Unit: 20
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- The student will demonstrate the ability to research and find job opportunities.
- The student will create a resume.
- The student will understand and demonstrate time management.
- The student will understand the need for and use of diversity in the workplace.
- The student will demonstrate basic computer skills.

Aligned Washington State Standards

Educational Technology	1.3.2 Locate and organize information from a variety of sources and media.
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	2.2.1 Practice ethical and respectful behavior.
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 2, 3) Presentation of Knowledge and Ideas (Standards 4, 5, 6)
Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Students will conduct a classroom and shop safety inspection
- Students will complete safety tests for hand tools and power tools

Leadership Alignment:

- Students will complete a shop safety inspection
- Students will demonstrate safe behavior and safety awareness in the shop
- Students will create a shop safety poster/publication

Think Creatively

1.A.2 Use a wide range of idea creation techniques (such as brainstorming)

Work Creatively with Others

1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

Solve Problems

2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions

Communicate Clearly

3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

Make Judgments and Decisions

2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

STANDARDS AND COMPETENCIES

Unit 2 : Safety

Competencies

Total Learning Hours for Unit: 25

- The student will understand how OSHA relates to the work environment.
- The student will demonstrate the use of the MSDS and how to find safety information on it.
- The student will demonstrate knowledge of correct safety practices in the aerospace manufacturing environment.
- The student will know and apply safe practices with hand tools.
- The student will know and apply safe practices with power tools.
- The student will demonstrate understanding and apply proper use of personal protective equipment.

Aligned Washington State Standards

Educational Technology

1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry.
2.1.1 Practice personal safety.

Grades 11-12 English Language Arts

Comprehension and Collaboration (Standards 2, 3)
Knowledge of Language (Standard 3)
Research to Build and Present Knowledge (Standards 7, 8, 9)

Health & Fitness

2.3 Acquire skills to live safety and reduce health risks.

	3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals).
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COMPONENTS AND COMPETENCIES		
Performance Assessments: <ul style="list-style-type: none"> Students will complete various measuring activities to demonstrate proper use of standard and metric rulers, tape measures, scales and calipers. Students will complete scaled drawings to demonstrate knowledge of reading and converting measurements 		
Leadership Alignment: <ul style="list-style-type: none"> Students will analyze and double check measurement and math skills of peers Students will have the opportunity to participate in a job shadow and apply for an internship Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex		
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions		
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand		
STANDARDS AND COMPETENCIES		
Unit 3: Manufacturing Math Skills and Precision Measurement		
Competencies		Total Learning Hours for Unit: 45
<ul style="list-style-type: none"> The student will know and demonstrate basic mathematic skills. The student will know and demonstrate decimal and fraction math skills. The student will know and demonstrate units of measurement skills. The student will know and apply basic tolerances to dimensions. The student will read and interpret blueprints and engineering drawings. The student will inspect and measure various holes for size and accuracy. The student will demonstrate basic measurement techniques The student will demonstrate geographic dimensioning and tolerance. The student will use Vernier scales – calipers and micrometers – to accurately measure objects. The student will measure various objects using 12 inch scales. The student will measure various objects using dial and digital calipers. The student will demonstrate the correct usage of height gauges. The student will demonstrate creating and using sketching and dimensional sketching. 		
Aligned Washington State Standards		
Math	N-CN-Perform arithmetic operations with complex numbers (Standards 1, 2, 3) G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4)	
Grades 11-12 English Language Arts	Key Ideas and Details (Standards 2, 3) Integration of Knowledge and Ideas (Standards 7, 9)	
Science	HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	

COMPONENTS AND COMPETENCIES		
Performance Assessments: <ul style="list-style-type: none"> Turbine engine theory and major component test incorporating sketching and identifying the components of turbine jet and turbofan engines, and explaining what happens in each stage of the engine. Multimedia presentation demonstrating knowledge of lift, drag, thrust, weight and fluid flow 		
Leadership Alignment: <ul style="list-style-type: none"> Students will peer review drawings for accuracy Students will research and then deliver a multimedia presentation to a group demonstrating fluid flow around vehicle bodies Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise		
STANDARDS AND COMPETENCIES		
Unit 4: Basics of Flight and Aerodynamics		
Competencies		Total Learning Hours for Unit: 15
<ul style="list-style-type: none"> The student will know and demonstrate the concepts of lift, drag, thrust, weight The student will know and demonstrate the concepts of fluid flow around vehicle bodies. The student will identify the major components of the turbine engine and explain its purpose. The student will explain the operational theory of turbine engine technology. 		
Aligned Washington State Standards		
Math	N-RN-Use properties of rational and irrational numbers (Standard 3) N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) N-CN-Perform arithmetic operations with complex numbers (Standards 1, 2, 3) N-VM-Represent and model with vector quantities. (Standards 1, 2, 3) A-SSE-Interpret the structure of expressions (Standards 1, 2) A-SSE-Write expressions in equivalent forms to solve problems (Standards 3, 4) A-APR-Rewrite rational expressions (Standards 6, 7) A-REI-Understand solving equations as a process of reasoning and explain the reasoning (Standards 1, 2)	
Science	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	

COMPONENTS AND COMPETENCIES	
<p>Performance Assessments:</p> <ul style="list-style-type: none"> Students will use engineering processes to formulate an airplane concept, design it, and manufacture a prototype for testing and to demonstrate manufacturing techniques Students will list common sources of FOD, and write out a practical method of inventory control of tools in an aerospace manufacturing environment. 	
<p>Leadership Alignment:</p> <ul style="list-style-type: none"> Team project manager and leadership roles for design & manufacturing project Demonstrate FOD (foreign object debris) prevention & inventory control to group Demonstrate shop and tool safety practices Students will have the opportunity to invite a guest speaker into the class <p>Work Creatively with Others</p> <p>1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes</p> <p>Make Judgments and Decisions</p> <p>2.C.1 Interpret information and draw conclusions based on the best analysis</p> <p>Solve Problems</p> <p>2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions</p> <p>Collaborate with Others</p> <p>3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal</p> <p>Use and Manage Information</p> <p>4.B.1 Use information accurately and creatively for the issue or problem at hand</p> <p>Be Self-Directed Learners</p> <p>8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise</p> <p>Produce Results</p> <p>10.B.1 Demonstrate additional attributes associated with producing high quality products</p>	
STANDARDS AND COMPETENCIES	
Unit 5: Aircraft Manufacturing Processes	
Competencies	Total Learning Hours for Unit: 55
<ul style="list-style-type: none"> Student will understand and demonstrate 5 stages of aircraft manufacturing processes: conception, design, manufacture, testing, quality, and inspections systems. Student will demonstrate engineering processes and product development Student will read, interpret and create production prints and engineering drawings. Students will understand and demonstrate basic logistics and supply chain. Students will explain and demonstrate inventory control and its importance to the manufacturing process. Students will understand importance of foreign object debris/damage (FOD) prevention Students will demonstrate understanding basics of inspection & quality control. Students will demonstrate understanding of root cause analysis. Students will demonstrate usage of precision measuring instruments. 	
Aligned Washington State Standards	

Educational Technology	1.1.2 Use models and simulations to explore systems, identify trends and forecast possibilities. 1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 2.4.1 Formulate and synthesize new knowledge.
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 1, 2) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6)
Science	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
Social Studies	Economics 1.1 Understand that the condition of scarcity requires people to choose among alternatives and bear the consequences of that choice. Economics 1.2 Understand that the availability and use of resources influences the production of goods and services to the economy. Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living.

COMPONENTS AND COMPETENCIES

Performance Assessments:

- Components of airline operations will be labeled to the appropriate sections on drawings of an airplane. The components relationships will be described with reference to the various sections of the airplane
- Presentation of airport emissions and their environmental impact

Leadership Alignment:

- As a group select a specific airport, research the airport's emissions and airline operations, prepare a multi-media presentation and then present findings to the class
- Students will have the opportunity to interview someone working at an airport or airplane manufacturing facility

Work Creatively with Others

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

2.C.4 Interpret information and draw conclusions based on the best analysis

Collaborate with Others

3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal

Use and Manage Information

4.B.1 Use information accurately and creatively for the issue or problem at hand

Be Self-Directed Learners

8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise

STANDARDS AND COMPETENCIES

Unit 6: Airline Operations Overview

Competencies

Total Learning Hours for Unit: 15

- Student will understand and demonstrate the basic components of airline operations: flight support, crew support, passenger sales & support, ground support, maintenance, aircraft ownership, etc.
- Student will demonstrate how components of airline operations relates to and interacts with airplane design and manufacture.
- Student will relate airport emissions to their effect on the local environment

Aligned Washington State Standards

Educational Technology	1.1.2 Use models and simulations to explore systems, identify trends and forecast possibilities. 1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 2.4.1 Formulate and synthesize new knowledge.
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 1, 2, 3) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6)
Science	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

COMPONENTS AND COMPETENCIES		
Performance Assessments: <ul style="list-style-type: none"> • Apply aircraft manufacturing testing principles to the quality assurances project • Summative testing of LEAN design, six sigma, 5S, ISO and FAA roles 		
Leadership Alignment: <ul style="list-style-type: none"> • Peer review of testing principles in a project demonstrating quality assurance and guide tools while selecting the correct fasteners 		
Work Creatively with Others 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes		
Make Judgments and Decisions 2.C.2 Interpret information and draw conclusions based on the best analysis		
Solve Problems 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions		
Collaborate with Others 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal		
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand		
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise		
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products		
STANDARDS AND COMPETENCIES		
Unit 7: Airplane Manufacturing Principles and Quality Control		
Competencies		Total Learning Hours for Unit: 35
<ul style="list-style-type: none"> • Students will understand the concepts of LEAN design, six sigma • Students will understand 5S principles. • Students will demonstrate understanding of aircraft manufacture testing. • Students will demonstrate understanding of ISO Standards and the role they play in manufacturing. • Students will analyze the role of the FAA with respect to airplane manufacture, maintenance, and quality control 		
Aligned Washington State Standards		
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 1.3.2 Locate and organize information from a variety of sources and media.	
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 1, 2) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 5, 6)	

Science	<p>HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.</p> <p>HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p> <p>HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.</p>
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COMPONENTS AND COMPETENCIES	
Performance Assessments: <ul style="list-style-type: none"> Simple stress analysis of stringer Stress, strain & fatigue labeling by components and its affects 	
Leadership Alignment: <ul style="list-style-type: none"> Research and explain the physics of stress, strain & fatigue an airplane endures under varying conditions to peers 	
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex	
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand	
STANDARDS AND COMPETENCIES	
Unit 8: Static & Dynamic Loads (Stress)	
Competencies	Total Learning Hours for Unit: 22
<ul style="list-style-type: none"> Students will understand and apply the physics behind stress and strain. Students will identify and explain the various forms of stress, strain, and fatigue experienced by airplane components. Students will understand and explain how fatigue and stress affect the materials used in airplane manufacture. 	
Aligned Washington State Standards	
Educational Technology	1.1.2 Use models and simulations to explore systems, identify trends and forecast possibilities. 1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 1.3.2 Locate and organize information from a variety of sources and media 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 2.4.1 Formulate and synthesize new knowledge.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) N-VM-Represent and model with vector quantities. (Standards 1, 2, 3) N-VM-Perform operations on vectors. (Standards 4, 5) A-SSE-Write expressions in equivalent forms to solve problems (Standards 3, 4)
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 1, 2) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6)
Science	HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

COMPONENTS AND COMPETENCIES

Performance Assessments:

- Students will complete various simulations demonstrating their ability to match performance characteristics and corrosion inhibitors to materials and identify major sources of stress in airplanes.

Leadership Alignment:

- Peer review of material performance characteristics and strength requirements for airplane components

Work Creatively with Others

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

2.C.4 Interpret information and draw conclusions based on the best analysis

Use and Manage Information

4.B.1 Use information accurately and creatively for the issue or problem at hand

Be Self-Directed Learners

8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise

Produce Results

10.B.1 Demonstrate additional attributes associated with producing high quality products

STANDARDS AND COMPETENCIES

Unit 9: Materials Selection & Use in Aerospace

Competencies

Total Learning Hours for Unit: 20

- Students will understand the characteristics of the key materials used in aerospace manufacture, including aluminum, steel, composites, ceramics, etc.
- Students will document the stress and fatigue characteristics of the key materials used in aerospace manufacture, including aluminum, steel, composites, ceramics, etc.
- Students will compare strength requirements and fatigue characteristics of the major components of an airplane and make recommendations for material usage.
- Students will document the forms of corrosion that occurs to common aerospace materials and what kind of coatings and corrosion prevention can be done to prevent it.

Aligned Washington State Standards

Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.1.2 Use models and simulations to explore systems, identify trends and forecast possibilities. 1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 2.4.1 Formulate and synthesize new knowledge.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) N-VM-Represent and model with vector quantities. (Standards 1, 2, 3) N-VM-Perform operations on vectors. (Standards 4, 5) A-SSE-Write expressions in equivalent forms to solve problems (Standards 3, 4)
Grades 11-12	Comprehension and Collaboration (Standards 2, 3)

English Language Arts	Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6)
Science	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

COMPONENTS AND COMPETENCIES

Performance Assessments:

- Students will demonstrate performance competencies for hand tools, pneumatic hand tools, drilling & countersinking techniques, power island equipment
- Students will design and implement a tool inventory & control plan

Leadership Alignment:

- With a partner, demonstrate safe use of powered and non-powered hand tools while drilling and & countersinking in various materials.

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)

Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Solve Problems

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

STANDARDS AND COMPETENCIES

Unit 10: Manufacturing Tools

Competencies

Total Learning Hours for Unit: 50

- Students will demonstrate safe usage of manufacturing hand tools (non-powered).
- Students will demonstrate safe usage of manufacturing pneumatic hand tools (powered).
- Students will demonstrate techniques for drilling & countersinking in various materials.
- Students will develop and demonstrate methods for tool inventory & control.
- Students will demonstrate safe usage of power island manufacturing equipment (heavy stationary equipment).

Aligned Washington State Standards

Educational Technology	2.1.1 Practice personal safety. 2.2.1 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.2.2 Use a variety of hardware to support learning. 2.4.1 Formulate and synthesize new knowledge.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3)
Grades 11-12	Knowledge of Language (Standard 3)
English Language Arts	Vocabulary Acquisition and Use (Standards 4, 5, 6)

Health & Fitness	<p>2.3 Acquire skills to live safety and reduce health risks.</p> <p>3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals).</p> <p>3.3 Use social skills to promote health and safety in a variety of situations.</p>
Science	<p>HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.</p> <p>HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.</p>

COMPONENTS AND COMPETENCIES	
Performance Assessments: <ul style="list-style-type: none"> Fastener labeling quiz (includes various bolts, washers, nuts, Hi-Lok fasteners, etc.) Demonstration of riveting and fastener competency 	
Leadership Activities <ul style="list-style-type: none"> Collaborating with a group of four, create a multimedia presentation identifying and describing various types of aircraft rivets, Hi-Lok fasteners, bolts, washers, and nuts used in aerospace manufacturing that will be shared with another group 	
Work Creatively with Others 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	
Make Judgments and Decisions 2.C.3 Interpret information and draw conclusions based on the best analysis	
Solve Problems 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	
Collaborate with Others 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal	
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand	
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise	
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products	
STANDARDS AND COMPETENCIES	
Unit 11: Fasteners and Introductory Projects	
Competencies	Total Learning Hours for Unit: 20
<ul style="list-style-type: none"> Students will understand and demonstrate types of aircraft fasteners. Students will identify, and describe how various types of aircraft rivets are used in aerospace manufacturing. Students will identify, and describe how various types of Hi-Lok fasteners are used in aerospace manufacturing. Students will identify, and describe how various types of bolts, washers and nuts are used in aerospace manufacturing. 	
Aligned Washington State Standards	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry 2.4.1 Formulate and synthesize new knowledge.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) A-SSE-Write expressions in equivalent forms to solve problems (Standards 3, 4)

Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 1, 2, 3) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6)
Science	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

COMPONENTS AND COMPETENCIES

Performance Assessments:

- Competency demonstrations for gas, MIG & TIG welding
- Competency demonstrations for layout, drilling and countersinking, and connecting steel sheets
- Competency demonstrations for layout, drilling and countersinking, and connecting and riveting aluminum sheets
- Students will maintain a journal detailing techniques, skills and knowledge learned in the course of completing all above projects.

Embedded leadership Activities

- Individually, students will work with a set of drawing to layout drill, countersink, and connect aluminum sheets using various aircraft fasteners
- In teams students will design a working set of drawings then utilize advanced manufacturing techniques to cut the templates, while examining the ethical and legal issues related to creating a unique piece of work
- Students will have the opportunity to attend and present at an advisory committee meeting
- Students will participate in their school elective fair to encourage exploration of the Aerospace program

Work Creatively with Others

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Implement Innovations

1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

Make Judgments and Decisions

2.C.4 Interpret information and draw conclusions based on the best analysis

Collaborate with Others

3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal

Use and Manage Information

4.B.1 Use information accurately and creatively for the issue or problem at hand

Be self-directed learners

8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise.

Adapt to change

7.A.1 Adapt to varied roles, jobs, responsibilities, schedules and contexts.

Produce Results

10.B.1 Demonstrate additional attributes associated with producing high quality products

STANDARDS AND COMPETENCIES

Unit 12: Advanced Manufacturing Projects

Competencies

Total Learning Hours for Unit: 218

- Students will use working set of drawings to layout, drill, countersink, and connect steel sheets and frame components using various welding techniques, including gas, MIG, and TIG in 4 different projects of increasing levels of difficulty.
- Students will use working set of drawings to layout aluminum, drill, countersink, and connect aluminum sheets using various aircraft fasteners, including rivets, hi-Loks, and various bolts, nuts and washers in 4 different projects of increasing levels of difficulty.
- Students will design working set of drawings, use advance manufacturing techniques to cut templates, and use the templates to layout and create 4 composite projects of increasing levels of difficulty.

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.2.2 Develop cultural understanding and global awareness by engaging with learners of many cultures. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions. 2.1.1 Practice personal safety. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.4.1 Formulate and synthesize new knowledge.
Health and Fitness	3.3 Use social skills to promote health and safety in a variety of situations.
Grades 11-12 English Language Arts	Comprehension and Collaboration (Standards 2, 3) Knowledge of Language (Standard 3) Vocabulary Acquisition and Use (Standards 4, 5, 6) Integration of Knowledge and Ideas (Standards 7, 8 9)
Science	HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

21st Century Skills

Check those that students will demonstrate in this course:

<p>LEARNING & INNOVATION</p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations <p>Critical Thinking and Problem Solving</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems <p>Communication and Collaboration</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others 	<p>INFORMATION, MEDIA & TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Access and /evaluate Information <input checked="" type="checkbox"/> Use and Manage Information <p>Media Literacy</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products <p>Information, Communications and Technology (ICT Literacy)</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Apply Technology Effectively 	<p>LIFE & CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible <p>Initiative and Self-Direction</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p>Social and Cross-Cultural</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams <p>Productivity and Accountability</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others
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Aerospace Manufacturing



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

Aerospace Manufacturing ** LEARNING AND INNOVATION SKILLS **	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences

	SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Aerospace Manufacturing

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy 6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

Aerospace Manufacturing

** LIFE AND CAREER SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer

9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests

Activity Descriptions

Architectural Drafting

Contestants will use their drafting skills to solve an Architectural problem. The problem includes a written test, a hand sketch, and drawings EITHER computer-generated or board drafted. *If board drafting, please bring all necessary equipment.* The contest tests the contestants' problem solving abilities, not simply their CAD skills.

Audio/Radio Production

The Audio/Radio Production contest is designed to challenge contestants in two-person teams to produce a 60-second to two-minute audio/radio production. Specific details for the production are determined by the technical committee based on the published technical standards and available production opportunities. The contestants are judged on the professionalism of their production, the quality of the audio and the conveyance of the information to the listener.

Automated Manufacturing Technology

The contest evaluates teams for employment in integrated manufacturing technology fields of computer aided drafting/design (CAD), computer aided manufacturing (CAM), and computer numerical controlled machining (CNC). CAD operators construct the part geometry; the CAM operator generates the tool paths; and the CNC operator sets up and machines the part. Plotting is not a scored event; however the contestants must be able to generate a plot file that will be used to send their data to the plotter.

Aviation Maintenance Technology

Contestants perform 12 tasks that represent the types of maintenance they will handle in the aircraft industry. The contest scope is consistent with the airframe and power plant mechanics certification guide published by the Federal Aviation Administration. Aviation maintenance is the only maintenance profession certified by the federal government.

CNC Milling

The contest will assess the ability to write the CNC program for a part drawing and materials, determine tool offsets, setting up the machine and producing a part on a milling machine. The contest will include a written test evaluating a contestant's knowledge of Computer Numeric Control machining in such areas as: basic machining skills, CNC programming, setting up a CNC machine, performing mathematical calculations related to CNC, communication and inspection.

CNC Turning

The contest will assess the ability to write the CNC program for a part drawing and materials, determine tool offsets, setting up the machine and producing a part on a lathe. The contest will include a written test evaluating a contestant's knowledge of Computer Numeric Control machining in such areas as: basic machining skills, knowledge of CNC programming, setting up a CNC machine, performing mathematical calculations related to CNC, communication and inspection.

Engineering Technology

A team of three students demonstrates their ability to design an innovative engineering project and present those ideas along with a display and live model. During the presentation, students are judged on their performance as a professional team, presentation of their project to a panel of judges from the engineering field, their storyboard presentation model, and the overall effect of the presentation.

Job Interview

Divided into three phases: completion of employment applications; preliminary interviews with receptionist; and, in-depth interviews. Contestants are evaluated on their understanding of employment procedures faced in applying for positions in the occupational areas for which they are training.

Job Skill Demonstration A

Contestants demonstrate and explain an entry-level skill used in the occupational area for which they are training. Competitors in Job Skill A must demonstrate a career objective in an occupational area that is included in one of the contest areas of the SkillsUSA Championships.

Job Skill Demonstration Open

Contestants demonstrate and explain an entry-level skill used in the occupational area for which they are training or outside of their training program. Any technical skill may be demonstrated.

Precision Machining Technology

Contestants will compete in NIMS Level I & II manual machining skills and knowledge areas including operation of manual milling machines, lathes, drill presses, and surface grinders. Contestant knowledge of CNC programming skills using a PC will be evaluated. Related knowledge and skill in the areas of engineering drawing interpretation, GD&T, technical math, machining practices, use of precision measuring/hand tools and ability to communicate verbally using proper industry terminology are also part of this competition.

Sheet Metal

Contestants are tested on their ability to perform such jobs as connecting sheet metal pieces with drive cleats, spot welding and riveting. Skills tested may include, but are not limited to, straight duct, transition fitting and 45-degree entry tap fitting. Professional sheet metal workers judge contestants on the use of hand tools, correctness of layout and shop safety procedures. Contestants will be judged on accuracy, completeness, and craftsmanship.

Technical Drafting

This contest evaluates contestant's preparation for employment and recognizes outstanding students for excellence and professionalism in the field of technical drafting. The contest will focus on the solution of industry-developed problems by applying appropriate technical drafting skills and tools including computer-aided drafting (CAD).

Welding

Competitors receive contest drawings and a set of welding procedure specifications. All drawings, welding symbols, and welding terms conform to the latest edition of the American Welding Society standards. Through a series of stations, contestants are tested on various aspects of welding: measuring weld replicas, using weld measuring gauges; laying out a plate and using oxy-acetylene equipment to cut several holes that are checked for accuracy and quality; Gas Metal Arc Welding (GMAW) on steel making welds in various positions using short circuiting transfers; Flux Cored Arc Welding (FCAW) using a shielding gas, making welds in various positions and, using a combination machine capable of providing the correct welding current for shielded metal arc (SMAW) and gas tungsten arc welding (GTAW). Competitors complete the steel project and weld an aluminum project in various positions using a variety of filler metals.

Welding Fabrication

A team competition that requires three students from each school to use their welding and fabrication skills to build a designed project from the given material. Each team is required to be skilled in the following welding and cutting processes: SMAW, GTAW, GMAW, FCAW and OFC. The students are also required to be proficient in using the common tools of a workshop. A theme-based project will be constructed by the students based on the prints drawn by each team.

Welding Art/Sculpture

The contest is designed to assess the ability of the competitor to design and produce a sculpture of that design, as well as give a presentation regarding all aspects of his or her creation of the design.



Course Name: Aerospace Manufacturing **Grade Level(s):** 9-12

POWER STANDARDS

Welding Technology (CIP 480508)

and

Aerospace Machining and Assembly (CIP 469998)

The Aerospace Manufacturing program, located at Auburn High School, is open to all district high school students' grades 9-12. Students interested in the Machining, Welding or the Engineering and Technology pathway should take this course. Topics covered include basic aircraft familiarization, aircraft drawings and work instructions, assembly hand tools, precision measuring and aviation materials and processes. Online course work through Tooling U is provided as part of the curriculum covering topics as shop essentials (math), safety, inspection (measuring), quality control, fasteners and supervisory essentials. Students acquire skills in measuring, print reading, manufacturing processes and leadership. Applicable safety requirements are also employed. Students taking this course will have an advantage in seeking employment in the aerospace assembly trades. Students may contract with the instructor to repeat this course for additional training and skill development.

The student will...

1. Identify and perform accepted safety shop practices, policies and procedures.
2. Perform trade specific math calculations.
3. Read engineering drawings specific to the trade.
4. Work individually and together using strategies in group dynamics, communication and leadership.
Work as a team in planning, learning and developing a product.
5. Develop shop skills, process planning and management strategies relative to assigned projects, machine operations, safety, and procedures.
6. Understand basic metal working properties and characteristics.
7. Read and demonstrate understanding of technical information, and vocabulary terms common to the trade.



COURSE OUTLINE

Course Name: Welding Technology **Grade Level(s):** 9-12

Students will learn and develop skills in a variety of welding and cutting processes. Students will complete exercises and projects in foundry casting, sheet metal development, forging, print reading, safety standards and leadership. This course offers students the opportunity to receive Tech Prep college credit. Students may contract with the instructor to repeat this course for additional training and skill development. Shared students from AMHS, ARHS, and WAHS must provide their own transportation to AHS.

1. Safety

- a. Shop Safety
- b. Tool and equipment Safety
- c. OSHA and LNI laws
- d. Causes of accidents and avoidance
- e. Safety Assessment

2. Oxygen/Acetylene Processes

- a. Equipment set up and safety
- b. Welding and cutting processes
- c. Quality control and workmanship
- d. Ox fuel metal preparation

3. Fabrication Process

- a. Blue print reading
- b. Metal preparation
- c. Assembly and fit up
- d. Cost calculation of jobs and material

4. MIG Welding

- a. Identify and explain GMAW and FCAW
- b. Welding Joints
- c. Weld inspecting
- d. MIG metal preparation
- e. GMAW of nonferrous welding

5. SMAW Welding

- a. Set up and operation of SMAW
- b. Welding joint and fit
- c. Metal preparation for SMAW
- d. Clamping and setup for welding operation
- e. Pipe welding and fitting

6. TIG Welding

- a. Set up GTAW equipment
- b. Quality workmanship for TIG welding.
- c. GTAW filler metals Current Assessment
- d. Identify and explain aluminum metallurgy
- e. Explain and identify characteristics of ferrous and nonferrous metals



INTRODUCTION

Course Name	<u>Welding Technology 1,2,3</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>Semester long class 90 hours , frame work written for 720 hours</u>	Course Code (s)	<u>CTE 443, CTE 444</u>

Course Description	Students will learn and develop skills in a variety of welding and cutting processes. Students will complete exercises and projects in foundry casting, sheet metal development, forging, print reading, safety standards and leadership. This course offers students the opportunity to receive Tech Prep college credit. Students may contract with the instructor to repeat this course for additional training and skill development. Shared students from AMHS, ARHS, and WAHS must provide their own transportation to AHS.
Pathway Connections	Manufacturing
Primary Connection	Production
Secondary Connection	Apprenticeship, Internships, Community and Technical College, Four-year College and University
Sample Sequence of Courses	Welding 1 Welding 2 Welding 3 repeatable
Cross Credit and/or College Credit	Currently there is no tech prep credits offered for this course this year but could be reinstated once the courses are realigned with local community colleges (Green River, Bates Tech, Clover Park and Tacoma Community College).
Basic Textbook	Essentials of Welding; Raymond J Sacks
Equipment	Welding and metal working equipment necessary to teach the course. For a detailed list look at the inventory sheet for classroom.
Software	MasterCam 5x or newer Autodesk sweet Rhino 9
Supplemental Materials	Nccer core curriculum 4 th edition Nccer welding curriculum 4 th edition



Skills Gap Data (CTE Courses only)

Job Outlook

Welders, Cutters, Solderers, and Brazers

Percent change in employment, projected 2012-22

Total, all occupations

11%

Welders, cutters, solderers, and brazers

6%

Production occupations

1%

Note: All Occupations includes all occupations in the U.S. Economy.

Source: U.S. Bureau of Labor Statistics, Employment Projections program

Employment of welders, cutters, solderers, and brazers is projected to grow 6 percent from 2012 to 2022, slower than the average for all occupations.

Employment growth reflects the need for welders in manufacturing because of the importance and versatility of welding as a manufacturing process. The basic skills of welding are similar across industries, so welders can easily shift from one industry to another, depending on where they are needed most. For example, welders laid off in the automotive manufacturing industry may be able to find work in the oil and gas industry.

The nation's aging infrastructure will require the expertise of welders, cutters, solderers, and brazers to help rebuild bridges, highways, and buildings. The construction of new power generation facilities and, specifically, pipelines transporting natural gas and oil will also result in new jobs.

Job Prospects

Overall job prospects will vary with the worker's skill level. Job prospects should be good for welders trained in the latest technologies. Welding schools report that graduates have little difficulty finding work, and many employers report difficulty finding properly skilled welders. However, welders who do not have up-to-date training may face strong competition for jobs.

For all welders, job prospects should be better for those willing to relocate.

Employment projections data for welders, cutters, solderers, and brazers, 2012-22

Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22 Percent	Change, 2012-22 Numeric	Employment by Industry
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SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

Welders, cutters, solderers, and brazers	51-4121	357,400	378,200	6	20,800	[XLS]
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SKILLS GAP/LABOR MARKET DATA
Welding

Welding Overall	
Welding	<p>Job Outlook</p> <p>Welders, Cutters, Solderers, and Brazers Percent change in employment, projected 2012-22 Total, all occupations 11% Welders, cutters, solderers, and brazers 6% Production occupations 1%</p> <p>Note: All Occupations includes all occupations in the U.S. Economy. Source: U.S. Bureau of Labor Statistics, Employment Projections program</p> <p>Employment of welders, cutters, solderers, and brazers is projected to grow 6 percent from 2012 to 2022, slower than the average for all occupations.</p> <p>Employment growth reflects the need for welders in manufacturing because of the importance and versatility of welding as a manufacturing process. The basic skills of welding are similar across industries, so welders can easily shift from one industry to another, depending on where they are needed most. For example, welders laid off in the automotive manufacturing industry may be able to find work in the oil and gas industry.</p> <p>The nation's aging infrastructure will require the expertise of welders, cutters, solderers, and brazers to help rebuild bridges, highways, and buildings. The construction of new power generation facilities and, specifically, pipelines transporting natural gas and oil will also result in new jobs.</p> <p>Job Prospects</p> <p>Overall job prospects will vary with the worker's skill level. Job prospects should be good for welders trained in the latest technologies. Welding schools report that graduates have little difficulty finding work, and many employers report difficulty finding properly skilled welders. However, welders who do not have up-to-date training may face strong competition for jobs.</p> <p>For all welders, job prospects should be better for those willing to relocate.</p>

Employment projections data for welders, cutters, solderers, and brazers, 2012-22						
Occupational Title	SOC Code	Employment, 2012	Projected Employment, 2022	Change, 2012-22 Percent	2012-22 Numeric	Employment by Industry
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program						
Welders, cutters, solderers, and brazers	51-4121	357,400	378,200	6	20,800	[XLS]

Welding Technology



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

Welding Technology ** LEARNING AND INNOVATION SKILLS **	
21st Century Skills Standards	Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Skills learned in welding will be applied to customer project requests.
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards Students will do a lab safety map and work in teams to evaluate how the facility could be better arranged for work flow.
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects will be taken on through the course. Unknown types at this time.
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Through classroom training and skills contest participation reasoning abilities will be stressed.

Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Community projects.
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests Class team building
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Class presentations on equipment safety
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests Team projects, community service

Welding Technology

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Career conference at Emerald Downs Women in the trades Career construction field trip Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development Boeing field trip allows for understanding of legal issues and public access of information.
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	Interact with community service people via text and e-mail in an appropriate manner.
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	Through SkillsUSA club learn to use PowerPoints and such media.
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy 6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests Learn and understand systems such as “MasterCam and Rhino for applications working with plasma cutters.

Welding Technology

** LIFE AND CAREER SKILLS **

21 st Century Skills Standards	Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	Through community service projects student will need to understand the ability of being self-directed learners
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project

new ideas and increase both innovation and quality of work	
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Serve as a chapter officer or state officer Through project selection and completion students will evaluate their results.
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards In class service chapter
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring (Skills Inc. in Auburn) Regional, State, & National Conferences & Contests

Activity Descriptions

Welding

Competitors receive contest drawings and a set of welding procedure specifications. All drawings, welding symbols, and welding terms conform to the latest edition of the American Welding Society standards. Through a series of stations, contestants are tested on various aspects of welding: measuring weld replicas, using weld measuring gauges; laying out a plate and using oxy-acetylene equipment to cut several holes that are checked for accuracy and quality; Gas Metal Arc Welding (GMAW) on steel making welds in various positions using short circuiting transfers; Flux Cored Arc Welding (FCAW) using a shielding gas, making welds in various positions and, using a combination machine capable of providing the correct welding current for shielded metal arc (SMAW) and gas tungsten arc welding (GTAW). Competitors complete the steel project and weld an aluminum project in various positions using a variety of filler metals.

Welding Fabrication

A team competition that requires three students from each school to use their welding and fabrication skills to build a designed project from the given material. Each team is required to be skilled in the following welding and cutting processes: SMAW, GTAW, GMAW, FCAW and OFC. The students are also required to be proficient in using the common tools of a workshop. A theme-based project will be constructed by the students based on the prints drawn by each team.

Welding Art/Sculpture

The contest is designed to assess the ability of the competitor to design and produce a sculpture of that design, as well as give a presentation regarding all aspects of his or her creation of the design.



Auburn School District

Course: Welding Technology Auburn - Welding	Total Framework Hours up to: 720
CIP Code: 480508 <input type="checkbox"/> Exploratory <input checked="" type="checkbox"/> Preparatory	Date Last Modified: 2-1-16
Career Cluster: Manufacturing	Cluster Pathway: Production

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Students will successfully complete safety tests for all equipment and demonstrate the ability to comply with all shop, state, and federal safety regulations.

Leadership Alignment:

- Students will complete a shop safety inspection
- Students will rotate clean up manager duties

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)

Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Solve Problems

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

Standards and Competencies

Unit 1: Basic Safety**Competencies****Total Learning Hours for Unit: 140**

- Apply the ability to interpret information and instructions presented in both written and verbal form.
- Explain the role that safety plays in the construction crafts.
- Describe the meaning of job-site safety.
- Describe the characteristics of a competent person and a qualified person.

- Explain the appropriate safety precautions to take around common job-site hazards.
- Apply the use and care of appropriate personal protective equipment (PPE).
- Properly don and remove personal protective equipment (safety goggles, hard hat, and personal fall protection).
- Follow the safety procedures required for lifting heavy objects.
- Describe safe behavior on and around ladders and scaffolds.
- Explain the importance of Hazard Communications (HazCom) and materials safety data sheets (MSDSs)
- Describe fire prevention and firefighting techniques.
- Define safe work procedures to use around electrical hazards.
- Apply correct use/operation of tools and equipment
- Avoid hazards caused by improper dress, jewelry, etc.
- Recognize and inform instructor of unsafe working conditions
- Apply the ability to comply with state and federal safety regulations
- Identify power tools commonly used in the construction trades.
- Use hand tools safely.
- Describe the basic procedures for taking care of hand tools.
- Basic machine and power tool safety
- Use power tools safely.
- Explain how to maintain power tools properly.
- Explain some of the causes of accidents.
- Be aware of workplace issues such as sexual harassment, stress, and substance abuse.

Aligned Washington State Standards

Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
English Language Arts	Grade 9-10 SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7, 9)
Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 2.1 Recognize patterns of growth and development. 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3)

Science	<p>SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.</p> <p>SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.</p> <p>INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>INQD: The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.</p> <p>INQF: Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.</p> <p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.</p>
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COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Students will perform oxyfuel cutting demonstrating the following:
 - Straight lines
 - Piercing and slot cutting
 - Bevels
 - Washing
- Students will perform oxyfuel welding demonstrating the following:
- Butt Joint
 - Lap Joint
 - T-Joint
- Students will perform plasma arc cutting

Leadership Alignment:

- Students will demonstrate safe behavior and safety awareness in the shop
- Students will set timely personal goals and work towards achieving them
- Students will work together in small groups learning to use the equipment and processes
- Students will mentor other students on proper equipment use and welding technique.

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)

Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Solve Problems

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

Standards and Competencies

Unit 2: Oxygen/Acetylene Processes

Competencies

Total Learning Hours for Unit: 100

- Apply critical thinking skills and the ability to solve problems
- Apply effective relationship skills with teammates and supervisors, the ability to work on a team.
- Identify some common hazards related to Oxy/acetylene welding and cutting processes.
- Explain and identify proper personal protection related to Oxy/acetylene welding and cutting processes..
- Apply how to avoid welding fumes related to Oxy/acetylene welding and cutting processes.
- Explain some of the causes of accidents. related to to Oxy/acetylene welding and cutting processes..

- Apply safety techniques for storing and handling cylinders.
- Apply proper material handling methods.
- Recognize and identify basic blueprint terms, components, and symbols.
- Relate information on blueprints to actual locations on the print.
- Interpret and use drawing dimensions.
- Check for joint misalignment and poor fit-up before and after welding.
- Set up oxyfuel equipment.
- Light and adjust an oxyfuel torch.
- Shut down oxyfuel cutting equipment.
- Disassemble oxyfuel equipment.
- Change empty cylinders.
- Perform oxyfuel cutting:
 - Straight lines
 - Piercing and slot cutting
 - Bevels
 - Washing
- Explain joint design considerations.
- Identify and explain codes governing welding.
- Identify and explain imperfections in Oxy/acetylene welding and cutting processes and their causes.
- Explain the importance of quality workmanship.
- Identify common destructive testing methods.
- Identify and understand plasma arc cutting processes.
- Prepare and set up plasma arc cutting equipment for various metals and application's
- Use plasma arc cutting equipment to make various types of cuts.
- Properly store equipment and clean the work area after use.

Aligned Washington State Standards

Art	2.1 Apply a creative process in the arts 3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
English Language Arts	Grade 9-10 SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7, 9)

Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals). 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) G-SRT-Define trigonometric ratios and solve problems involving right triangles (Standards 6, 7, 8) G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4) G-MG-Apply geometric concepts in modeling situations (Standards 1, 2, 3)
Science	SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system. SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible. INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge. INQD: The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation. INQF: Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light. APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.
Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

COMPONENTS AND ASSESSMENTS	
Performance Assessments: <ul style="list-style-type: none"> Given drawings students will demonstrate proper metal preparation and assembly fit up, correctly calculate quantity and cost of materials needed to complete the project, and verify the final product meets all specifications. 	
Leadership Alignment: <ul style="list-style-type: none"> Students will demonstrate safe behavior and safety awareness in the shop Students will set timely personal goals and work towards achieving them Students will work together in small groups learning to use the equipment and processes Students will mentor other students on proper equipment use and welding technique Students will work individually and in teams to ensure proper alignment of fabricated items Students will learn to ask for help and work in teams on complicated fabrication assemblies. 	
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)	
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs	
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways	
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products. (1a – 1h)	
Standards and Competencies	
Unit 3: Fabrication Process	
Competencies	Total Learning Hours for Unit: 140
<ul style="list-style-type: none"> Research post-secondary educational opportunities in the Puget Sound area Model negotiation and conflict resolution skills Apply an understanding of the importance of confidentiality Use proper writing style to accurately communicate thoughts, ideas, information, and messages (i.e. memos, letters, reports) State information in a clear, concise, and logical manner Read and explain simple and complex instructions from technical documents Model appropriate dress and behavior for the job Compose an application letter for employment Prepare a data sheet and resume Complete an employment application form Complete an interview demonstrating appropriate appearance and self-confidence 	

<ul style="list-style-type: none"> • Explain how to avoid electric shock when welding. • Using a nibbler, cutter, or grinder, mechanically prepare the edge of a mild steel plate ¼” to ¾” thick and 22 1/2’ (or 30’ depending on equipment available). • Using a nibbler, cutter, or grinder, mechanically prepare the edge of a pipe • Select the proper joint design based on a welding procedure specification (WPS) or instructor direction. • Identify and describe the use of slings and common rigging hardware. • Describe basic inspection techniques and rejection criteria used for slings and hardware. • Identify and explain codes governing welding. • Identify and explain weld imperfections and their causes. • Identify and explain nondestructive examination practices. • Identify and explain welder qualifications tests. • A-Explain the importance of quality workmanship. • Identify common destructive testing methods for more advanced applications • Use fit-up gauges and measuring devices to check joint fit-up. • Identify and explain distortion and how it is controlled. for more advanced applications 	
Aligned Washington State Standards	
Art	2.1 Apply a creative process in the arts 3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
English Language Arts	Grade 9-10 SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7,9)
Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 3.1 Understand how environmental factors affect one’s health. (Air, water, noise, chemicals). 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) G-SRT-Define trigonometric ratios and solve problems involving right triangles (Standards 6, 7, 8) G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4) G-MG-Apply geometric concepts in modeling situations (Standards 1, 2, 3)
Science	SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive

	<p>feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.</p> <p>SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.</p> <p>INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>INQD: The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.</p> <p>INQF: Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.</p> <p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.</p>
Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

COMPONENTS AND ASSESSMENTS	
<p>Performance Assessments:</p> <ul style="list-style-type: none">• Students will perform Mig Welding demonstrating the following:<ul style="list-style-type: none">– Butt Joint– Lap Joint– T-Joint	
<p>Leadership Alignment:</p> <ul style="list-style-type: none">• Students will demonstrate safe behavior and safety awareness in the shop• Students will set timely personal goals and work towards achieving them• Students will work together in small groups learning to use the equipment and processes• Students will mentor other students on proper equipment use and welding technique. <p>Think Creatively</p> <p>1.A.1 Use a wide range of idea creation techniques (such as brainstorming)</p> <p>1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)</p> <p>Work Creatively with Others</p> <p>1.B.1 Develop, implement and communicate new ideas to others effectively</p> <p>1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes</p> <p>Make Judgments and Decisions</p> <p>2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs</p> <p>Reason Effectively</p> <p>2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation</p> <p>Solve Problems</p> <p>2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways</p> <p>Produce Results</p> <p>10.B.1 Demonstrate additional attributes associated with producing high quality products. (1a – 1h)</p>	
Standards and Competencies	
Unit 4: MIG Welding	
Competencies	Total Learning Hours for Unit: 120
<ul style="list-style-type: none">• Identify and explain codes governing welding.• Identify and explain Mig weld imperfections and their causes.• Identify and explain nondestructive examination practices for Mig welding.• Identify and explain Mig welder qualifications tests.• Explain the importance of quality workmanship.• Identify common destructive testing methods for Mig welding• Identify and explain the various parts of a welding symbol.• Identify and explain fillet and groove weld symbols.• Read welding symbols on drawings, specifications, and welding procedure specifications.• Interpret welding symbols from a print.	

- Draw welding symbols based on the observation of actual welds.
- Explain gas metal arc welding (GMAW) and flux cored arc welding (FCAW) safety.
- Explain the characteristics of welding current and power sources.
- Identify and explain the use of GMAW and FCAW equipment:
 - Spray transfer
 - Globular
 - Short circuiting
 - Pulse
- Identify and explain the use of GMAW and FCAW shielding gases and filler metals.
- Set up GMAW and FCAW equipment and identify tools for weld cleaning.
- Perform GMAW multiple-pass fillet welds on plate, using solid or composite wire and shielding gas in multiple positions.
- Perform GMAW multiple-pass open-root V-groove welds on plate, using solid or composite wire and shielding gas, in multiple positions.
- Perform GMAW spray fillet and open-root V-groove welds on plate, using solid or composite wire and shielding gas, in flat and horizontal positions.
- Perform FCAW multiple-pass fillet welds on plate in multiple positions using flux cored wire and, if required, shielding gas.
- Perform FCAW multiple-pass open-root V-groove welds on plate in multiple positions using flux cored wire and, if required, shielding gas.

Aligned Washington State Standards	
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Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
English Language Arts	Grade 9-10 SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7, 9)
Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals). 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) G-SRT-Define trigonometric ratios and solve problems involving right triangles (Standards 6, 7, 8) G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4),

	G-MG-Apply geometric concepts in modeling situations (Standards 1, 2, 3)
Science	<p>SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.</p> <p>SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.</p> <p>INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>INQD: The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.</p> <p>INQF: Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.</p> <p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPC</p>
Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Students will demonstrate correct open-root V-groove welds in the:
 - Flat (1G) position
 - Horizontal (2G) position
 - Vertical (3G) position
 - Overhead (4G) position
- Students will prepare shielded metal arc welding (SMAW) equipment for open-root V-groove pipe welds and explain open-root V-groove pipe welds.
- Students will demonstrate correct SMAW for open-root V-groove pipe welds in the:
 - Flat (1G-ROTATED) position
 - Horizontal (2G) position
 - Multiple (5G) position
 - Multiple inclined (6G) position

Leadership Alignment:

- Students will demonstrate safe behavior and safety awareness in the shop
- Students will set timely personal goals and work towards achieving them
- Students will work together in small groups learning to use the equipment and processes
- Students will mentor other students on proper equipment use and welding technique.

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)

Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Solve Problems

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

Produce Results

- 10.B.1 Demonstrate additional attributes associated with producing high quality products. (1a – 1h)

Standards and Competencies

Unit 5: SMAW Welding

Competencies

Total Learning Hours for Unit: 120

- Identify and explain codes governing SMAW welding.
- Identify and explain SMAW weld imperfections and their causes.

- Identify and explain nondestructive examination practices for SMAW.
- Identify and explain SMAW welder qualifications tests.
- Explain the importance of quality workmanship for SMAW.
- Identify common destructive testing methods for SMAW..
- Explain setting up arc welding equipment.
- Identify factors that affect electrode selection.
- Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system.
- Identify different types of filler metals.
- Explain the storage and control of filler metals.
- Identify and select the proper electrode for an identified welding task.
- Set up shielded metal arc welding (SMAW) equipment.
- Describe causes of arc blow and wander.
- Make stringer, weave, and overlapping beads.
- Make fillet welds in the:
 - Horizontal (2F) position
 - Vertical (3F) position
 - Overhead (4F) position
- Identify and explain groove welds.
- Identify and explain groove welds with backing.
- Set up shielded metal arc welding (SMAW) equipment for making V-groove welds.
- Perform SMAW for F-groove welds with backing in the:
 - Flat (1G) position
 - Horizontal (2G) position
 - Vertical (3G) position
 - Overhead (4G) position
- Identify and explain distortion and how it is controlled.
- Fit-up joint using plate and pipe fit-up tools.
- Check for joint misalignment and poor fit-up before and after welding.
- Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove welds.
- Perform open-root V-groove welds in the:
 - Flat (1G) position
 - Horizontal (2G) position
 - Vertical (3G) position
 - Overhead (4G) position
- Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove pipe welds.
- Identify and explain open-root V-groove pipe welds.
- Perform SMAW for open-root V-groove pipe welds in the:
 - Flat (1G-ROTATED) position
 - Horizontal (2G) position
 - Multiple (5G) position
 - Multiple inclined (6G) position
- Identify and explain a welding detail drawing.
- Identify and explain lines, material fills, and sections.
- Identify and explain object views.

- Identify and explain notes and bill of materials.
- Develop basic welding drawings.
- Apply productive work habits and traits including attendance, punctuality, positive self-image, dependability, enthusiasm, cooperation, honesty, initiative, and safe consciousness
- Apply leadership skills including following written and oral directions, maintaining an organized work area, making independent decisions, working with others, managing time, handling criticism, and handling stress
- Plan, coordinate, and implement plans requiring teamwork
- Critique work of others and offer suggestions for improvement
- Lead group activities
- Delegate tasks and responsibilities

Aligned Washington State Standards	
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Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
English Language Arts	Grade 9-10 SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7, 9)
Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals). 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) G-SRT-Define trigonometric ratios and solve problems involving right triangles (Standards 6, 7, 8) G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4) G-MG-Apply geometric concepts in modeling situations (Standards 1, 2, 3)
Science	SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system. SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible. INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge.

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Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Students will:
 - Demonstrate a correct open-root V-groove weld on carbon steel plate in the 1G (flat) position using GTAW and carbon steel filler metal.
 - Demonstrate a correct multiple-pass open-root V-groove weld on carbon steel plate in the 2G (horizontal) position using GTAW and carbon steel filler metal.
 - Demonstrate a correct multiple-pass open-root V-groove weld on carbon steel plate in the 3G (vertical) position using GTAW and carbon steel filler metal.
 - Demonstrate a correct multiple-pass open-root V-groove weld on carbon steel plate in the 4G (overhead) position using GTAW and carbon steel filler metal.
 - Identify and explain aluminum metallurgy.
 - Explain and identify characteristics of aluminum.
 - Explain GTAW and set up equipment to weld aluminum plate.
 - Explain and practice GTAW techniques for plate, including padding in the flat position with stringer beads, using aluminum filler metal.
 - Demonstrate a correct fillet welds on aluminum plate in the following positions:
 - Flat (1F) position
 - Horizontal (2G) position
 - Vertical (3G) position
 - Overhead (4G) position

Leadership Alignment:

- Students will demonstrate safe behavior and safety awareness in the shop
- Students will set timely personal goals and work towards achieving them
- Students will work together in small groups learning to use the equipment and processes
- Students will mentor other students on proper equipment use and welding technique.

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)

Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Make Judgments and Decisions

- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs

Reason Effectively

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Solve Problems

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

Produce Results

- 10.B.1 Demonstrate additional attributes associated with producing high quality products. (1a – 1h)

Standards and Competencies

Unit 6: TIG Welding

Competencies		Total Learning Hours for Unit: 100
<ul style="list-style-type: none"> Identify and explain codes governing Tig welding. Identify and explain weld imperfections and their causes in Tig welding. Identify and explain nondestructive examination practices Tig welding. Identify and explain welder qualifications tests for Tig welding. Explain the importance of quality workmanship for Tig welding. Identify common destructive testing methods for Tig welding. Explain gas tungsten arc welding (GTAW) safety. Identify and explain the use of GTAW equipment. Identify and explain the use of GTAW filler metals. Identify and explain the use of GTAW shielding gases. Set up GTAW equipment. Build a pad in the flat position with stringer beads using GTAW and carbon steel filler metal. Make multiple-pass open-root V-groove welds on carbon steel plate in the 1G (flat) position using GTAW and carbon steel filler metal. Make multiple-pass open-root V-groove welds on carbon steel plate in the 2G (horizontal) position using GTAW and carbon steel filler metal. Make multiple-pass open-root V-groove welds on carbon steel plate in the 3G (vertical) position using GTAW and carbon steel filler metal. Make multiple-pass open-root V-groove welds on carbon steel plate in the 4G (overhead) position using GTAW and carbon steel filler metal. Identify and explain aluminum metallurgy. Explain and identify characteristics of aluminum. Explain GTAW and set up equipment to weld aluminum plate. Explain and practice GTAW techniques for plate, including padding in the flat position with stringer beads, using aluminum filler metal. Make fillet welds on aluminum plate in the following positions: <ul style="list-style-type: none"> Flat (1F) position Horizontal (2G) position Vertical (3G) position Overhead (4G) position Perform shielded metal arc welding (GTAW) on stainless steel open-root V-groove joints in the following positions: <ul style="list-style-type: none"> Flat (1G) position Horizontal (2G) position Vertical (3G) position Overhead (4G) position 		
Aligned Washington State Standards		
Art	2.1 Apply a creative process in the arts 3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose	
Educational Technology	1.2.1 Communicate and collaborate to learn with others. 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.	
English Language Arts	Grade 9-10	

	SL--Comprehension and Collaboration (Standards 1, 2) SL--Presentation of Knowledge and Ideas (Standard 6) L--Conventions of Standard English (Standards 1, 2) L--Vocabulary Acquisition and Use (Standard 6) RST--Craft and Structure (Standard 4) RST--Integration of Knowledge and Ideas (Standards 7, 9)
Health and Fitness	1.1 Develop fundamental and complex movement skills, as developmentally appropriate. 1.2 Safely participates in a variety of developmentally appropriate physical activities. 2.1 Recognize patterns of growth and development. 2.3 Acquire skills to live safely and reduce health risks. 3.1 Understand how environmental factors affect one's health. (Air, water, noise, chemicals). 3.3 Use social skills to promote health and safety in a variety of situations. 3.4 Understand how emotions influence decision-making. 4.1 Analyze health and safety information.
Math	N-Q-Reason quantitatively and use units to solve problems (Standards 1, 2, 3) G-SRTC, G-GMD-Visualize relationships between two-dimensional and three-dimensional objects (Standard 4) G-MG-Apply geometric concepts in modeling situations (Standards 1, 2, 3)
Science	SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system. SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible. INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge. INQD: The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation. INQF: Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light. APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.
Social Studies	Economics 2.4 Understand that investment in people, tools, and technology affect employment levels and standard of living

21st Century Skills

Check those that students will demonstrate in this course:

LEARNING & INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgments and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and /evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others



Automotive Technology



INTRODUCTION

Course Name	<u>Automotive Technology 1-2</u>	Grade Level(s)	<u>10-12</u>
Course Length	<u>360 Hours (2 hour block)</u>	Course Code (s)	<u>CTE 427, CTE 428, 470604</u>

Course Description	Beginning units will consist of mastery of the theory and repair procedures for most areas of the automobile with the use of classroom facilities, instructor demonstrations, and on-line training and research assignments. Students will progress to be provided and environment that closely simulates that of the auto repair industry and will make actual repairs on the vehicles under the supervision of the instructor. Students will be eligible to apply for an AYES Internship and study at AHS along with a paid position working with line technicians at local repair shops for their hands-on training. Students are required to participate in "professional development activities," and provide their own work shoes and coveralls. Shared students from ARHS, AMHS, and WAHS must provide their own transportation to AHS.
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Pathway Connections	
Primary Connection	Automotive Industry
Secondary Connection	Industry and Technology

Sample Sequence of Courses	Introduction to Automotive 1-2, Advanced Automotive 1-2, Advanced Automotive 3-4
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Cross Credit and/or College Credit	GRCC, Renton Tech, UTI
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Basic Textbook	Automotive Service: Inspection, Maintenance, Repair 4 th Edition, Tim Giles
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Equipment	Industry Equipment, hand tools, computer scanning equipment
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Software	Snap On Diagnostics
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Supplemental Materials	Periodicals
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Skills Gap Data (CTE Courses only)	Attached below
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INTRODUCTION

Course Name	<u>Automotive Technology 3-4</u>	Grade Level(s)	<u>10-12</u>
Course Length	<u>540 Hours (3 hour block)</u>	Course Code (s)	<u>CTE 429, CTE 430, 470604</u>

Course Description This course will allow students, upon completion of at least one year of Auto Technology, to further their mastery of tasks with an individualized course designed by the student with the instructor's assistance. Students are required to participate in "professional development activities," and will be encouraged to actively pursue career opportunities in the Automotive Service Industry. Students must provide their own work shoes and coveralls. Transfer students from ARH, AMHS and WAHS, must provide their own transportation to AHS. Students will be responsible for issued tools (if available) or provide their own tools for this class.

Pathway Connections

Primary Connection	Automotive Industry
Secondary Connection	Industry and Technology

Sample Sequence of Courses Introduction to Automotive 1-2, Advanced Automotive 1-2, Advanced Automotive 3-4

Cross Credit and/or College Credit GRCC, Renton Tech, UTI

Basic Textbook Automotive Service: Inspection, Maintenance, Repair 4th Edition, Tim Giles

Equipment Industry Equipment, hand tools, computer scanning equipment

Software Snap On Diagnostics

Supplemental Materials Periodicals

Skills Gap Data (CTE Courses only) **Skills Gap/Labor Market Data**
Automotive Technology
 Data taken from Bureau of Labor Statistics



Job Outlook

Employment of automotive service technicians and mechanics is projected to grow 9 percent from 2012 to 2022, about as fast as the average for all occupations.

As the number of vehicles in use continues to rise, more entry-level service technicians will be needed to do basic maintenance and repair, such as replacing brake pads and changing oil. The increasing lifespan of late-model cars and light trucks will further increase demand for qualified workers.

Job Prospects

With some employers reporting difficulty finding workers with the right skills and education, job opportunities for qualified applicants should be very good. Jobseekers who have completed formal postsecondary training programs—especially candidates with training in advanced automotive technology, such as hybrid fuel or computer systems—should enjoy the best job prospects.

Those without formal automotive training are likely to face strong competition for entry-level jobs.

More numerous openings will be in automobile dealerships and independent repair shops, where most service technicians currently work



COURSE OUTLINE

Course Name Automotive Technology **Grade Level(s)** 10-12

This course prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of automobiles. Includes instruction in brake systems, electrical systems, engine performance, engine repair, suspension and steering, automatic and manual transmissions and drive trains, and heating and air conditioning systems (Program is ASE/NATEF Master Certified).

1. Career Planning

- A. Employability skills
- B. High school and beyond plan
- C. Career searching

2. Personal Success

- A. Implement effective study skills for academic success
- B. Job placement
- C. Resume building

3. Employability and Entrepreneurship

- A. Career searching
- B. Training programs
- C. Application process

4. Engine Repair

- A. Inspect engine assembly for leaks, determine needed repairs
- B. Test, flush and service cooling systems
- C. Perform oil & filter service
- D. Inspect powertrain mounts and determine needed repairs

5. Automatic Transmission & Transaxle: General Transmission and Transaxle

- A. Inspect, leak test, flush and repair as needed
- B. Service
- C. Perform visual inspections



6. Manual Drive Train and Axles

- A. Diagnose fluid leakage or usage
- B. Drain and refill
- C. Inspect linkages, cables and adjusters, make needed adjustments and repairs
- D. Bleed clutch systems
- E. Inspect and repair constant-velocity joint boots
- F. Remove and replace rear drive shafts

7. Suspension and Steering

- A. Identify and Interpret suspension and steering concerns, determine needed repairs
- B. Inspect and diagnose power steering systems
- C. Lubricate systems
- D. Remove, inspect and install components.
- E. Perform inspections of components and systems
- F. Measure systems and determine needed repairs
- G. Inspect, repair and install tires and wheel assemblies

8. Brakes

- A. Inspect, diagnose, and determine needed repairs
- B. Replace and service
- C. Remove, clean and inspect brake systems
- D. Hydraulic systems
- E. Drum brakes
- F. Disk brakes
- G. ABS system

9. Electrical /Electronic Systems

- A. Diagnose system integrity of series, parallel and series-parallel circuits using principles of electricity
- B. Use diagrams during diagnostic evaluations
- C. Use DVOM and other test equipment available to diagnose system problems
- D. Measure systems using available equipment
- E. Diagnose and perform needed repairs and service
- F. Evaluate and service batteries and charging systems
- G. Evaluate and service starting systems
- H. Evaluate and differentiate between electrical and mechanical problems
- I. Evaluate and perform needed repairs to vehicle lighting systems



10. Heating and Air Conditioning.

- A. Identify and visually inspect A/C systems
- B. Locate refrigerant label and identify types.
- C. Perform preliminary performance of system, verify integrity and determine needed repairs

11. Engine Performance

- A. Locate and interpret vehicle and major equipment identification numbers such as VIN, certification labels and calibration decals.
- B. Perform engine absolute manifold tests.
- C. Perform engine integrity tests and evaluations.
- D. Perform 5 gas analyzer preliminary tests, determine system repairs.
- E. Retrieve and interpret OBD I diagnostic codes, clear codes.
- F. Retrieve and interpret OBD II diagnostic codes, clear codes.
- G. Compression test.

12. Shop and Personal Safety

- A. OSHA and LNI laws and rules
- B. Shop safety
- C. Hand tool
- D. Pneumatic tools
- E. Lifting of cars
- F. MSDS
- G. Fire hazards

13. Tools and Equipment

- A. Identify tools and there uses
- B. Identify standard and metric
- C. Safe use of tools
- D. Storage of tools
- E. Precision measuring tools

14. Preparing Vehicles

- A. Preparing vehicle for service
- B. Preparing vehicle for customer
- C. Repair estimates
- D. VIN identification

15. Preparing Vehicles for Customers

- A. Checking vehicle for safety
- B. Completing service invoice for billing
- C. Wash and vacuum



Course Name: Automotive Technology **Grade Level(s):** 10-12

POWER STANDARDS

This course prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of automobiles. Includes instruction in brake systems, electrical systems, engine performance, engine repair, suspension and steering, automatic and manual transmissions and drive trains, and heating and air conditioning systems (Program is ASE/NATEF Master Certified).

The student will...

1. For every task in Auto Technology, all students must comply with personal and environmental safety practices with current NATEF Standards.
2. All students will complete paperwork required for automobile repair.
3. All students will identify and demonstrate the proper use of general shop equipment, power and hand tools as identified as required by NATEF Industry Standards.
4. All students will describe vehicle system components to NATEF Industry Standards.
5. Students will describe all system functions and operations.

TRANSPORTATION OPERATIONS PATHWAY
OSPI Curriculum Re-approval
2015-2016



SKILLS GAP/LABOR MARKET DATA
Automotive Technology Program

Automotive Technology Overall	Data taken from Bureau of Labor Statistics
CTE 425, CTE 426 CTE 427, CTE 428 CTE 429, CTE 430	<p><u>Job Outlook;</u></p> <p>Employment of automotive service technicians and mechanics is projected to grow 9 percent from 2012 to 2022, about as fast as the average for all occupations.</p> <p>As the number of vehicles in use continues to rise, more entry-level service technicians will be needed to do basic maintenance and repair, such as replacing brake pads and changing oil. The increasing lifespan of late-model cars and light trucks will further increase demand for qualified workers.</p> <p><u>Job Prospects;</u></p> <p>With some employers reporting difficulty finding workers with the right skills and education, job opportunities for qualified applicants should be very good. Jobseekers who have completed formal postsecondary training programs—especially candidates with training in advanced automotive technology, such as hybrid fuel or computer systems—should enjoy the best job prospects.</p> <p>Those without formal automotive training are likely to face strong competition for entry-level jobs.</p> <p>More numerous openings will be in automobile dealerships and independent repair shops, where most service technicians currently work</p>

Automotive Technology



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

Automotive Techology ** LEARNING AND INNOVATION SKILLS **	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & sConferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences

	SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Automotive Technology

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy 6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

Automotive Technology

** LIFE AND CAREER SKILLS **

21st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles	Professional Development Program (PDP) Total Quality Curriculum

<p>and competing pressures</p> <p>10.A.2 Prioritize, plan and manage work to achieve the intended result</p>	<p>SkillsUSA Championships Technical Standards</p> <p>Leadership Handbook</p> <p>Regional, State, & National Conferences & Contests</p>
<p>Produce Results</p> <p>10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to:</p> <p>10.B.1.a Work positively and ethically</p> <p>10.B.1.b Manage time and projects effectively</p> <p>10.B.1.c Multi-task</p> <p>10.B.1.d Participate actively, as well as be reliable and punctual</p> <p>10.B.1.e Present oneself professionally and with proper etiquette</p> <p>10.B.1.f Collaborate and cooperate effectively with teams</p> <p>10.B.1.g Respect and appreciate team diversity</p> <p>10.B.1.h Be accountable for results</p>	<p>Professional Development Program (PDP)</p> <p>SkillsUSA Championships Technical Standards</p> <p>Leadership Handbook</p> <p>Regional, State, & National Conferences & Contests</p> <p>Serve as a chapter officer or state officer</p>
<p>Guide and Lead Others</p> <p>11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal</p> <p>11.A.2 Leverage strengths of others to accomplish a common goal</p> <p>11.A.3 Inspire others to reach their very best via example and selflessness</p> <p>11.A.4 Demonstrate integrity and ethical behavior in using influence and power</p>	<p>Professional Development Program (PDP)</p> <p>Leadership Handbook</p> <p>Serve as a chapter officer or state officer</p> <p>Regional, State, & National Meetings & Conferences</p> <p>SkillsUSA Championships Technical Standards</p>
<p>Be Responsible to Others</p> <p>11.B.1 Act responsibly with the interests of the larger community in mind</p>	<p>Professional Development Program (PDP)</p> <p>Shadowing & Mentoring</p> <p>Regional, State, & National Conferences & Contests</p>

SKILLS GAP/LABOR MARKET DATA
Automotive Technology

Aerospace Manufacturing	
Automotive Technology	Job Outlook Employment of automotive service technicians and mechanics is projected to grow 9 percent from 2012 to 2022, about as fast as the average for all occupations. As the number of vehicles in use continues to rise, more entry-level service technicians will be needed to do basic maintenance and repair, such as replacing brake pads and changing oil. The increasing lifespan of late-model cars and light trucks will further increase demand for qualified workers.
	Job Prospects With some employers reporting difficulty finding workers with the right skills and education, job opportunities for qualified applicants should be very good. Jobseekers who have completed formal postsecondary training programs—especially candidates with training in advanced automotive technology, such as hybrid fuel or computer systems—should enjoy the best job prospects. Those without formal automotive training are likely to face strong competition for entry-level jobs. More numerous openings will be in automobile dealerships and independent repair shops, where most service technicians currently work

Auburn School District Framework: Intro to Auto 1-2, Automotive Technology Advanced 1-2 & 3-4	
Course: NATEF/ASE Automotive Technician	Total Framework Hours: 1080 Hours
CIP Code: 470604	Type: Preparatory
Career Cluster: Transportation Distribution and Logistics	Date Last Modified: Monday, December 28, 2015
Resources and Standard used in Framework Development: Standards used in this framework are from the ASE Student Certification Test Specifications and Task Lists for the 2012 NATEF Standards - Automobile Series.	
Unit 1 CAREER PLANNING	Hours: 60
Performance Assessment(s):	
Performance Assessments: Create a High School and beyond plan and a portfolio for a career in an area of choice. Using a career research tools (such as Career Cruising, ASVAB, WOIS), students will prepare a report covering their personal interest, aptitudes and abilities and cross reference potential career pathways that appeal to them. The report should include an assessment of personal strengths for success in that particular field.	
Leadership Alignment:	
Create and present student Professional Portfolio, electronic or hard copy, to advisory board members, community, or employers from industry. •Using Skills USA Professional Development Portfolio (PDP) work books, complete level 1,2,4,5,7,8,11 •Successfully go through mock interview process with committee members and employers from industry. •Using Skills USA Contest guidelines and rubrics, to complete a portfolio that will be showcased to the advisory board.	
Standards and Competencies	
Standard WR 1: Career Planning WR-1.1 Complete, discuss, and analyze the results of personality, career interest, and aptitude assessments; WR-1.2 Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest; WR-1.3 Create a personal career portfolio including academic, certification and technical-skill requirement, career opportunities, expected wages, skills and aptitude necessary and the impact of technology on careers of personal interest. WR-1.4 Determine academic/training or certification requirements for transition from one learning level to the next and explore opportunities for earning credit/certifications in high school such as advanced placement, tech prep, International Baccalaureate, college in the high school, military and apprenticeship opportunities. WR-1.5 Develop and analyze tables, charts, and graphs related to career interests and make oral presentation regarding the career pathway of your choice. WR-1.6 Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning. WR-1.7 Identify how performance on assessments such as the SAT®, ACT®, ASVAB®, COMPASS® and ACCUPLACER® impact personal academic and career goals. WR-1.8 Prepare a personal budget reflecting desired lifestyle and compare and contrast at least three careers of interest in regards to salary expectations and education/training costs. WR-1.9 Prepare a program of study for at least one career of interest WR-1.10 Apply knowledge gained from individual assessment to a set of goals and a career plan WR-1.11 Develop strategies to make an effective transition from school to career WR-1.13 Identify industry certification opportunities	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
<u>Comprehension and Collaboration (11-12)</u>	

- 1 - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues,
 - 1a - Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on
 - 1b - Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
 - 1c - Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify,
 - 1d - Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine
- 2 - Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems,
- 3 - Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 4 - Model with mathematics.
- 5 - Use appropriate tools strategically.
- 6 - Attend to precision.
- 7 - Look for and make use of structure.

Reading

CC: Reading for Literacy in Science and Technical Subjects

Key Ideas and Details (11-12)

- 2 - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate

Craft and Structure (11-12)

- 4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12

Science

Social Studies

Writing

CC: Writing (11-12)

- 2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and

Production and Distribution of Writing

- 4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types

6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or

Research to Build and Present Knowledge

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

**Information, Communications, and Technology
(ICT Literacy)**

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 2 PERSONAL SUCCESS		Hours: 50
Performance Assessment(s):		
<p>Show up to class on time and ready to work and will generate a resume and keep a portfolio of quality work.</p> <p>Research positions open within a variety of companies and compare/contrast their descriptions, duties, and expectations. Prepare responses to standard interview question.</p> <p>Participate in a WOIS or other Career Research assignment.</p>		
Leadership Alignment:		
<p>Leadership activity embedded in curriculum and instruction. (Examples: CTSO project or activity, locally developed leadership project or activity, embedded 21st Century interdisciplinary theme activity such as global awareness, financial, economic, business & entrepreneurial literacy, civic literacy, health & safety, environmental literacy)</p> <ul style="list-style-type: none"> •Create and present student Professional Portfolio, electronic or hard copy, to advisory board members, community, or employers from industry. •Using SkillsUSA Professional Development Portfolio (PDP) work books, complete level 1,2,4,5,7,8,11 •Successfully go through mock interview process with committee members and employers from industry. •Using SkillsUSA Contest guidelines and rubrics, to complete a portfolio that will be showcased to the advisory board. 		
Standards and Competencies		
<p>Standard WR 1: Career Planning</p> <p>WR-1.1 Complete, discuss, and analyze the results of personality, career interest, and aptitude assessments;</p> <p>WR-1.2 Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest;</p> <p>WR-1.3 Create a personal career portfolio including academic, certification and technical-skill requirement, career opportunities, expected wages, skills and aptitude necessary and the impact of technology on careers of personal interest.</p> <p>WR-1.4 Determine academic/training or certification requirements for transition from one learning level to the next and explore opportunities for earning credit/certifications in high school such as advanced placement, tech prep, International Baccalaureate, college in the high school, military and apprenticeship opportunities.</p> <p>WR-1.5 Develop and analyze tables, charts, and graphs related to career interests and make oral presentation regarding the career pathway of your choice.</p> <p>WR-1.6 Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning.</p> <p>WR-1.7 Identify how performance on assessments such as the SAT®, ACT®, ASVAB®, COMPASS® and ACCUPLACER® impact personal academic and career goals.</p> <p>WR-1.8 Prepare a personal budget reflecting desired lifestyle and compare and contrast at least three careers of interest in regards to salary expectations and education/training costs.</p> <p>WR-1.9 Prepare a program of study for at least one career of interest</p> <p>WR-1.10 Apply knowledge gained from individual assessment to a set of goals and a career plan</p> <p>WR-1.11 Develop strategies to make an effective transition from school to career</p> <p>WR-1.13 Identify industry certification opportunities</p>		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
<p><u>CC: College and Career Readiness Anchor Standards for Language</u></p> <p><u>Conventions of Standard English</u></p> <p>1 - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</p> <p><u>Vocabulary Acquisition and Use</u></p>		

4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and

Mathematics

Reading

CC: College and Career Readiness Anchor Standards for Reading

Key Ideas and Details

1 - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn

Craft and Structure

4 - Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape

Range of Reading and Level of Text Complexity

10 - Read and comprehend complex literary and informational texts independently and proficiently.

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

Research to Build and Present Knowledge

7 - Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

21st Century Skills

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations <p>Creative Thinking and Problem Solving</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems <p>Communication and Collaboration</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others 	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information <p>Media Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p>Information, Communications, and Technology (ICT Literacy)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Apply Technology Effectively 	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible <p>Initiative and Self-Direction</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Mange Goals and Time <input type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners <p>Social and Cross-Cultural</p> <ul style="list-style-type: none"> <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams <p>Productivity and Accountability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <ul style="list-style-type: none"> <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others
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Unit 3 EMPLOYABILITY & ENTREPRENEURSHIP	Hours: 70
Performance Assessment(s):	
Using a career research tool (such as Career Cruising, ASVAB, WOIS), students will prepare a report covering the requirements for training, certification, licensing and the personal characteristics required for employment in that career. The report should include an assessment of personal strengths for success in that particular field	
Leadership Alignment:	
<p>Create and present student Professional Portfolio, electronic or hard copy, to advisory board members, community, or employers from industry.</p> <ul style="list-style-type: none"> •Using Skills USA Professional Development Portfolio (PDP) work books, complete level 1,2,4,5,7,8,11 •Successfully go through mock interview process with committee members and employers from industry. •Using Skills USA Contest guidelines and rubrics for Job Interview Leadership Contest, to complete a professional industry-specific job application and resume that will be used as part of the mock interview process with committee and employers from industry. 	
Standards and Competencies	
<p>Standard WR 3: Employability and Entrepreneurship</p> <p>WR-3.1 Demonstrate effective verbal, nonverbal, written, and electronic communication skills;</p> <p>WR-3.2 Evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites;</p> <p>WR-3.3 Model characteristics of effective leadership, teamwork, and conflict management;</p> <p>WR-3.4 Recognize the importance of a healthy lifestyle, including the ability to manage stress;</p> <p>WR-3.5 Explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population; and</p> <p>WR-3.6 Complete activities using project- and time-management techniques.</p> <p>WR-3.7 Identify and model appropriate grooming and appearance for the workplace;</p> <p>WR-3.8 Demonstrate dependability, punctuality, and initiative;</p> <p>WR-3.9 Research positive interpersonal skills, including respect for diversity;</p> <p>WR-3.10 Model appropriate business and personal etiquette in the workplace;</p> <p>WR-3.11 Exhibit productive work habits, ethical practices, and a positive attitude;</p> <p>WR-3.12 Demonstrate the ability to work with the other employees to support the organization and complete assigned tasks;</p> <p>WR-3.13 Demonstrate willingness to learn and further develop skills</p> <p>WR-3.14 Describe the importance of having a positive attitude and techniques that boost morale</p> <p>WR-3.15 Show initiative by coming up with unique solutions and taking on extra responsibilities</p> <p>WR-3.16 Explain the importance of setting goals and demonstrate the ability to set, reach, and evaluate goals</p> <p>WR-3.17 Explain the importance of taking pride in work accomplished and extrinsic and intrinsic motivators that can be used to increase pride</p> <p>WR-3.18 Identify how to prioritize work to fulfill responsibilities and meet deadlines;</p> <p>WR-3.19 Research and compare published workplace policies and procedures;</p> <p>WR-3.20 Summarize provisions of the Fair Labor Standards Act;</p> <p>WR-3.21 Describe the consequences of breach of confidentiality;</p>	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
<p><u>CC: College and Career Readiness Anchor Standards for Speaking and Listening</u></p> <p><u>Comprehension and Collaboration</u></p> <p>1 - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and</p>	

Presentation of Knowledge and Ideas

6 - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Health and Fitness

Language

Mathematics

Reading

CC: Reading for Literacy in Science and Technical Subjects

Key Ideas and Details (9-10)

1 - Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

Craft and Structure (9-10)

4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10

Range of Reading and Level of Text Complexity (9-10)

10 - By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently

Key Ideas and Details (11-12)

1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the

Integration of Knowledge and Ideas (11-12)

7 - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

Text Types and Purposes

1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Production and Distribution of Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Research to Build and Present Knowledge

8 - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

21st Century Skills

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>
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Unit 4 ENGINE REPAIR	Hours: 110
Performance Assessment(s):	
<p>Assessments include self, peer or instructor review and validation of each competency listed below. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.</p> <p>Students will listen to and verify the operator's concern(s), review past maintenance and repair documents, and determine necessary action.</p>	
Leadership Alignment:	
<p>Skills USA CRC item: Lessons: Trust Matters (95 Minutes); Leading and Following (125 Minutes); Cooperation Get the Job done (90Minutes); Capitalizing on Strengths (100 Minutes) – 7hrs Teamwork;</p>	
Standards and Competencies	
<p>ENGINE REPAIR (ER)</p> <p>ER - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Verify operation of the instrument panel engine warning indicators. 3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. 4. Install engine covers using gaskets, seals, and sealers as required. 5. Remove and replace timing belt; verify correct camshaft timing. 6. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. 7. Identify hybrid vehicle internal combustion engine service precautions. <p>ER - B. Cylinder Head and Valve Train</p> <ol style="list-style-type: none"> 1. Adjust valves (mechanical or hydraulic lifters). <p>ER - C. Lubrication and Cooling Systems</p> <ol style="list-style-type: none"> 1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action. 2. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. 3. Remove, inspect, and replace thermostat and gasket/seal. 4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. 5. Perform engine oil and filter change. 	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 2 - Reason abstractly and quantitatively.
- 3 - Construct viable arguments and critique the reasoning of others.
- 4 - Model with mathematics.
- 5 - Use appropriate tools strategically.
- 6 - Attend to precision.
- 7 - Look for and make use of structure.
- 8 - Look for and express regularity in repeated reasoning.

Reading

CC: Reading Informational Text

Craft and Structure (9-10)

- 4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word

Key Ideas and Details (11-12)

- 3 - Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure (11-12)

- 4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the

Integration of Knowledge and Ideas (11-12)

- 7 - Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

Text Types and Purposes

- 1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

Production and Distribution of Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 5 AUTOMATIC TRANSMISSION & TRANSAXLE: GENERAL TRANSMISSION AND TRANSAXLE		Hours: 80
Performance Assessment(s):		
Assessments include self, peer or instructor review and validation of each competency listed below. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.		
Leadership Alignment:		
Skills USA Capitalizing on Strengths (100 Minutes) – 7hrs Teamwork;		
Standards and Competencies		
AUTOMATIC TRANSMISSION AND TRANSAXLE (AT) AT - A. General 1. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins. 2. Check fluid level in a transmission or a transaxle equipped with a dip-stick. 3. Check fluid level in a transmission or a transaxle not equipped with a dip-stick. 4. Check transmission fluid condition; check for leaks AT - B. In-Vehicle Transmission/Transaxle 1. Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. 2. Inspect for leakage at external seals, gaskets, and bushings. 3. Inspect power train mounts. 4. Drain and replace fluid and filter(s). AT - C. Off-Vehicle Transmission and Transaxle 1. Describe the operational characteristics of a continuously variable transmission (CVT). 2. Describe the operational characteristics of a hybrid vehicle drive train.		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading Informational Text</u> <u>Key Ideas and Details (9-10)</u> 1 - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. <u>Craft and Structure (9-10)</u> 4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word		

Science

Physical Science

Force and Motion (Newton's Laws)

9-11 PS1A: Average velocity is defined as a change in position with respect to time. Velocity includes both speed and direction.

Matter Properties and Change (Chemical Reactions)

9-11 PS2E: Molecular compounds are composed of two or more elements bonded together in a fixed proportion by sharing electrons between atoms, forming covalent bonds. Such

Energy Transfer, Transformation, and Conservation

9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

Text Types and Purposes

2d - Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable

Production and Distribution of Writing

6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or

Research to Build and Present Knowledge

9 - Draw evidence from informational texts to support analysis, reflection, and research.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 6 MANUAL DRIVE TRAIN AND AXLES		Hours: 75
Performance Assessment(s):		
<p>Assessments include self, peer or instructor review and validation of each competency listed below. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.</p> <ul style="list-style-type: none"> •NATEF Task Sheets 3A1-3F3 •Module Tests •Pass/Fail live work •Parts identification •Oral/Written explanations of theory applications. 		
Leadership Alignment:		
Skills Usa activity : Assessments include self, peer or instructor review.		
Standards and Competencies		
<p>MANUAL DRIVE TRAIN AND AXLES (MD)</p> <p>MD - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins. 2. Drain and refill manual transmission/transaxle and final drive unit. 3. Check fluid condition; check for leaks. <p>MD - B. Clutch</p> <ol style="list-style-type: none"> 1. Check and adjust clutch master cylinder fluid level. 2. Check for system leaks. <p>MD - C. Transmission/Transaxle</p> <ol style="list-style-type: none"> 1. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. <p>MD - D. Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints</p> <ol style="list-style-type: none"> 1. Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals. 2. Inspect, service, and replace shafts, yokes, boots, and universal/CV joints. <p>MD - E. Differential Case Assembly</p> <ol style="list-style-type: none"> 1. Clean and inspect differential housing; check for leaks; inspect housing vent. 2. Check and adjust differential housing fluid level. 3. Drain and refill differential housing. <p>MD - F. Drive Axles</p> <ol style="list-style-type: none"> 1. Inspect and replace drive axle wheel studs. <p>MD - G. Four-wheel Drive/All-wheel Drive</p> <ol style="list-style-type: none"> 1. Inspect front-wheel bearings and locking hubs. 2. Check for leaks at drive assembly seals; check vents; check lube level. 		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
<p><u>Presentation of Knowledge and Ideas (11-12)</u></p> <p>5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence</p>		

Health and Fitness
Language
Mathematics
<p><u>CC: Mathematical Practices (MP)</u> 2 - Reason abstractly and quantitatively. 4 - Model with mathematics.</p> <p><u>CC: Functions (F)</u> <u>Interpreting Functions (F-IF)</u> 1 - Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a</p> <p><u>CC: Mathematical Practices (MP)</u> 1 - Make sense of problems and persevere in solving them. 4 - Model with mathematics. 8 - Look for and express regularity in repeated reasoning.</p>
Reading
<p><u>CC: Reading for Literacy in Science and Technical Subjects</u> <u>Key Ideas and Details (9-10)</u> 3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions</p> <p><u>Key Ideas and Details (11-12)</u> 3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on</p> <p><u>Integration of Knowledge and Ideas (11-12)</u></p>
Science
Social Studies
Writing
<p><u>CC: College and Career Readiness Anchor Standards for Writing</u> <u>Text Types and Purposes</u> 1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p><u>Production and Distribution of Writing</u> 6 - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p>

21st Century Skills

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations <p>Creative Thinking and Problem Solving</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems <p>Communication and Collaboration</p> <ul style="list-style-type: none"> <input type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others 	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information <p>Media Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p>Information, Communications, and Technology (ICT Literacy)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Apply Technology Effectively 	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible <p>Initiative and Self-Direction</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mange Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p>Social and Cross-Cultural</p> <ul style="list-style-type: none"> <input type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams <p>Productivity and Accountability</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <ul style="list-style-type: none"> <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others
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Unit 7 SUSPENSION AND STEERING	Hours: 80
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will think creatively, problem solve, access and evaluate information and be responsible to others in a Skills USA or local leadership activity, what is the problem.	
Standards and Competencies	
<p>SUSPENSION AND STEERING SYSTEMS (SS)</p> <p>SS - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Disable and enable supplemental restraint system (SRS). <p>SS - B. Related Suspension and Steering Service</p> <ol style="list-style-type: none"> 1. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. 2. Determine proper power steering fluid type; inspect fluid level and condition. 3. Flush, fill, and bleed power steering system. 4. Inspect for power steering fluid leakage; determine necessary action. 5. Remove, inspect, replace, and adjust power steering pump drive belt. 6. Inspect and replace power steering hoses and fittings. 7. Replace power steering pump filter(s). 8. Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. 9. Inspect tie rod ends (sockets), tie rod sleeves, and clamps. 10. Inspect upper and lower control arms, bushings, and shafts. 11. Inspect and replace rebound and jounce bumpers. 12. Inspect track bar, strut rods/radius arms, and related mounts and bushings. 13. Inspect upper and lower ball joints (with or without wear indicators). 14. Inspect suspension system coil springs and spring insulators (silencers). 15. Inspect suspension system torsion bars and mounts. 16. Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links. 17. Inspect strut cartridge or assembly. 18. Inspect front strut bearing and mount. 19. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. 20. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts 21. Inspect, remove, and replace shock absorbers; inspect mounts and bushings. 22. Inspect electric power-assisted steering. 23. Identify hybrid vehicle power steering system electrical circuits and safety precautions. 24. Describe the function of the power steering pressure switch. <p>SS - C. Wheel Alignment</p> <ol style="list-style-type: none"> 1. Perform prealignment inspection and measure vehicle ride height; determine necessary action. <p>SS - D. Wheels and Tires</p> <ol style="list-style-type: none"> 1. Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action. 2. Rotate tires according to manufacturer's recommendations. 	

3. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).
4. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
5. Inspect tire and wheel assembly for air loss; perform necessary action.
6. Repair tire using internal patch.
7. Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.
8. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Geometry (G)

Expressing Geometric Properties with Equations (G-GPE)

4 - For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at

6 - Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

7 - Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*

Geometric Measurement and Dimension (G-GMD)

1 - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's

4 - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Modeling with Geometry (G-MG)

1 - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

CC: Mathematical Practices (MP)

4 - Model with mathematics.

Reading

Science

Physical Science

Matter Properties and Change (Chemical Reactions)

9-11 PS2A: Atoms are composed of protons, neutrons, and electrons. The nucleus of an atom takes up very little of the atom's volume but makes up almost all of the mass. The nucleus contains protons and neutrons, which are much more massive than the electrons surrounding the nucleus. Protons have a positive charge, electrons are negative in charge,

9-11 PS2B: Atoms of the same element have the same number of protons. The number and arrangement of electrons determines how the atom interacts with other atoms to form

9-11 PS2D: Ions are produced when atoms or molecules lose or gain electrons, thereby gaining a positive or negative electrical charge. Ions of opposite charge are attracted to each

Energy Transfer, Transformation, and Conservation

9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

**Information, Communications, and Technology
(ICT Literacy)**

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 8 BRAKES	Hours: 70
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will think creatively, reason effectively, collaborate with others, apply technology effectively, adapt to change and produce results in a Lesson: Attitude is everything (180 Minutes), Growing My Career (80 Minutes), Showing Initiative (90 Minutes): Self-Motivated:	
Standards and Competencies	
<p>BRAKES (BR)</p> <p>BR - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). <p>BR - B. Hydraulic System</p> <ol style="list-style-type: none"> 1. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. 2. Check master cylinder for external leaks and proper operation. 3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action. 4. Select, handle, store, and fill brake fluids to proper level. 5. Identify components of brake warning light system. 6. Bleed and/or flush brake system. 7. Test brake fluid for contamination. <p>BR - C. Drum Brakes</p> <ol style="list-style-type: none"> 1. Remove, clean, inspect, and measure brake drum diameter; determine necessary action. 2. Refinish brake drum and measure final drum diameter; compare with specifications. 3. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. 4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. 5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. 6. Install wheel and torque lug nuts. <p>BR - D. Disc Brakes</p> <ol style="list-style-type: none"> 1. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. 2. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. 3. Remove, inspect, and replace pads and retaining hardware; determine necessary action. 4. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. 5. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. 6. Remove and reinstall rotor. 7. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications. 8. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. 9. Retract and re-adjust caliper piston on an integral parking brake system. 10. Check brake pad wear indicator; determine necessary action. 11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. <p>BR - E. Power-Assist Units</p> <ol style="list-style-type: none"> 1. Check brake pedal travel with, and without, engine running to verify proper power booster operation. 2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. 	

BR - F. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.)

1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
2. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
3. Check parking brake operation and parking brake indicator light system operation; determine necessary action.
4. Check operation of brake stop light system.
5. Replace wheel bearing and race.

BR - G. Electronic Brakes, and Traction and Stability Control Systems

1. Identify traction control/vehicle stability control system components.
2. Describe the operation of a regenerative braking system.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

4 - Model with mathematics.

CC: Geometry (G)

Geometric Measurement and Dimension (G-GMD)

1 - Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's

4 - Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Modeling with Geometry (G-MG)

1 - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

Reading

Science

Physical Science

Force and Motion (Newton's Laws)

9-11 PS1C: An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by

Matter Properties and Change (Chemical Reactions)

9-11 PS2A: Atoms are composed of protons, neutrons, and electrons. The nucleus of an atom takes up very little of the atom's volume but makes up almost all of the mass. The nucleus contains protons and neutrons, which are much more massive than the electrons surrounding the nucleus. Protons have a positive charge, electrons are negative in charge,

9-11 PS2B: Atoms of the same element have the same number of protons. The number and arrangement of electrons determines how the atom interacts with other atoms to form

9-11 PS2D: Ions are produced when atoms or molecules lose or gain electrons, thereby gaining a positive or negative electrical charge. Ions of opposite charge are attracted to each other.

9-11 PS2G: Chemical reactions change the arrangement of atoms in the molecules of substances. Chemical reactions release or acquire energy from their surroundings and result in Energy Transfer, Transformation, and Conservation.

9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is conserved.

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 9 ELECTRICAL /ELECTRONIC SYSTEMS	Hours: 90
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will implement innovations, communicate clearly, collaborate with others, access and evaluate information and adapt to change in a Skills USA CRC item: Lessons: Growing My Career (80 Minutes), Self-Motivated.	
Standards and Competencies	
<p>ELECTRICAL/ELECTRONIC SYSTEMS (EE)</p> <p>EE - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). 3. Use wiring diagrams to trace electrical/electronic circuits. 4. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. 5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. 6. Check operation of electrical circuits with a test light. 7. Check operation of electrical circuits with fused jumper wires. 8. Measure key-off battery drain (parasitic draw). 9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. 10. Perform solder repair of electrical wiring. 11. Replace electrical connectors and terminal ends. <p>EE - B. Battery Service</p> <ol style="list-style-type: none"> 1. Perform battery state-of-charge test; determine necessary action. 2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action. 3. Maintain or restore electronic memory functions. 4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. 5. Perform slow/fast battery charge according to manufacturer's recommendations. 6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. 7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions. 8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery. 9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. <p>EE - C. Starting System</p> <ol style="list-style-type: none"> 1. Perform starter current draw test; determine necessary action. 2. Perform starter circuit voltage drop tests; determine necessary action. 3. Inspect and test starter relays and solenoids; determine necessary action. 4. Remove and install starter in a vehicle. 5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action. <p>EE - D. Charging System</p> <ol style="list-style-type: none"> 1. Perform charging system output test; determine necessary action. 2. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. 3. Remove, inspect, and re-install generator (alternator). 4. Perform charging circuit voltage drop tests; determine necessary action. 	

EE - E. Lighting Systems

1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
2. Aim headlights.
3. Identify system voltage and safety precautions associated with high-intensity discharge headlights.

EE - F. Accessories

1. Disable and enable airbag system for vehicle service; verify indicator lamp operation.
2. Remove and reinstall door panel.
3. Describe the operation of keyless entry/remote-start systems.
4. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
5. Verify windshield wiper and washer operation; replace wiper blades.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Comprehension and Collaboration (11-12)

Presentation of Knowledge and Ideas (11-12)

- 5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 2 - Reason abstractly and quantitatively.
4 - Model with mathematics.

Reading

CC: Reading for Literacy in Science and Technical Subjects

Integration of Knowledge and Ideas (9-10)

- 7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically

Science

Physical Science

Force and Motion (Newton's Laws)

- 9-11 PS1A: Average velocity is defined as a change in position with respect to time. Velocity includes both speed and direction.

Matter Properties and Change (Chemical Reactions)

- 9-11 PS2D: Ions are produced when atoms or molecules lose or gain electrons, thereby gaining a positive or negative electrical charge. Ions of opposite charge are attracted to each

- 9-11 PS2E: Molecular compounds are composed of two or more elements bonded together in a fixed proportion by sharing electrons between atoms, forming covalent bonds. Such

9-11 PS2G: Chemical reactions change the arrangement of atoms in the molecules of substances. Chemical reactions release or acquire energy from their surroundings and result in

Energy Transfer, Transformation, and Conservation

9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is

9-11 PS3B: Kinetic energy is the energy of motion. The kinetic energy of an object is defined by the equation: $EK = \frac{1}{2} MV^2$

Social Studies

Writing

CC: Writing (11-12)

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 10 HEATING AND AIR CONDITIONING: GENERAL A/C SYSTEMS DIAGNOSIS AND REPAIR		Hours: 65
Performance Assessment(s):		
<p>Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.</p> <p>NATEF Task Sheets 7A1-7A4</p> <p>Module Tests</p> <p>Pass/Fail live work, parts identification</p> <p>Oral/Written explanations of theory applications.</p>		
Leadership Alignment:		
<p>Students will think creatively, solve problems, communicate clearly, apply technology effectively, manage goals and time and work effectively in diverse teams in a Skills USA CRC item: Lessons: Showing Initiative (90 Minutes): Self-Motivated:</p>		
Standards and Competencies		
<p>HEATING AND AIR CONDITIONING (AC)</p> <p>AC - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Identify vehicle's A/C components. <p>AC - B. Refrigeration System Components</p> <ol style="list-style-type: none"> 1. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action. 2. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. 3. Inspect A/C condenser for airflow restrictions; determine necessary action. <p>AC - C. Heating, Ventilation, and Engine Cooling Systems</p> <ol style="list-style-type: none"> 1. Inspect engine cooling and heater systems hoses; perform necessary action. <p>AC - D. Operating Systems and Related Controls</p> <ol style="list-style-type: none"> 1. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action. 2. Identify the source of A/C system odors. 		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
<p><u>Presentation of Knowledge and Ideas (11-12)</u></p> <p>5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence</p>		
Health and Fitness		
Language		
Mathematics		
<p><u>CC: Mathematical Practices (MP)</u></p> <p>2 - Reason abstractly and quantitatively.</p> <p>4 - Model with mathematics.</p>		

Reading

CC: Reading for Literacy in Science and Technical Subjects

Integration of Knowledge and Ideas (9-10)

7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically

Key Ideas and Details (11-12)

1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the

Science

Physical Science

Matter Properties and Change (Chemical Reactions)

9-11 PS2I: The rate of a physical or chemical change may be affected by factors such as temperature, surface area, and pressure.

Energy Transfer, Transformation, and Conservation

9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is

Inquiry (Conducting Analysis and Thinking Logically)

9-12 INQA: Scientists generate and evaluate questions to investigate the natural world.

9-12 INQB: Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to

Application (Science, Technology, and Society)

9-12 APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

**Information, Communications, and Technology
(ICT Literacy)**

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 11 ENGINE PERFORMANCE	Hours: 70
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will work creatively with others, communicate clearly, access and evaluate information, manage goals and time and produce results in a Skills USA CRC Lesson: Fostering Diversity (75 Minutes)	
Standards and Competencies	
<p>ENGINE PERFORMANCE (EP)</p> <p>EP - A. General</p> <ol style="list-style-type: none"> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action 3. Perform cylinder power balance test; determine necessary action. 4. Perform cylinder cranking and running compression tests; determine necessary action. 5. Perform cylinder leakage test; determine necessary action. 6. Verify engine operating temperature. 7. Remove and replace spark plugs; inspect secondary ignition components for wear and damage. <p>EP - B. Computerized Engine Controls</p> <ol style="list-style-type: none"> 1. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 2. Describe the importance of operating all OBDII monitors for repair verification. <p>EP - C. Fuel, Air Induction, and Exhaust Systems</p> <ol style="list-style-type: none"> 1. Replace fuel filter(s). 2. Inspect, service, or replace air filters, filter housings, and intake duct work. 3. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. 4. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed. 5. Check and refill diesel exhaust fluid (DEF) <p>EP - D. Emissions Control Systems</p> <ol style="list-style-type: none"> 1. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. 	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
<p>Presentation of Knowledge and Ideas (11-12)</p> <ol style="list-style-type: none"> 5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence 	

Health and Fitness
Language
Mathematics
<p><u>CC: Mathematical Practices (MP)</u> 2 - Reason abstractly and quantitatively. 4 - Model with mathematics.</p> <p><u>CC: Number and Quantity (N)</u> <u>Quantities (N-Q)</u> 1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and 2 - Define appropriate quantities for the purpose of descriptive modeling.* 3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*</p>
Reading
<p><u>CC: Reading for Literacy in Science and Technical Subjects</u> <u>Integration of Knowledge and Ideas (9-10)</u> 7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically</p> <p><u>Key Ideas and Details (11-12)</u> 1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the</p>
Science
<p><u>Physical Science</u> <u>Force and Motion (Newton's Laws)</u> 9-11 PS1A: Average velocity is defined as a change in position with respect to time. Velocity includes both speed and direction. <u>Energy Transfer, Transformation, and Conservation</u> 9-11 PS3A: Although energy can be transferred from one object to another and can be transformed from one form of energy to another form, the total energy in a closed system is</p> <p><u>Systems (Predictability and Feedback)</u> 9-12 SYSA: Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a 9-12 SYSB: Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.</p>
Social Studies
Writing
<p><u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u> <u>Research to Build and Present Knowledge</u> 7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when</p>

8 - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 12 SHOP AND PERSONAL SAFETY	Hours: 80
Performance Assessment(s):	
<p>Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed. Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.</p>	
Leadership Alignment:	
<p>Students will reason effectively, communicate clearly, use and manage information and guide and lead others in Skills USA Lesson: Message is Clear (150 Minutes), Putting your Best Communication Forward (123 Minutes)</p> <p>The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry experiences.</p> <p>The student will identify and analyze the characteristics of family, community, business, and industry leaders.</p> <p>The student will demonstrate oral, interpersonal, written and electronic communication and presentation skills and understands how to apply those skills.</p> <p>The student will be involved in activities that require applying theory, problem-solving and using critical thinking skills while understanding the outcomes of related decisions.</p> <p>The student will demonstrate self-advocacy skills by achieving planned, individual goals.</p>	
Standards and Competencies	
<p>REQUIRED SUPPLEMENTAL TASKS (GT)</p> <p>GT - A. Shop and Personal Safety</p> <ol style="list-style-type: none"> 1. Identify general shop safety rules and procedures. 2. Utilize safe procedures for handling of tools and equipment. 3. Identify and use proper placement of floor jacks and jack stands. 4. Identify and use proper procedures for safe lift operation. 5. Utilize proper ventilation procedures for working within the lab/shop area. 6. Identify marked safety areas. 7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. 8. Identify the location and use of eye wash stations. 9. Identify the location of the posted evacuation routes. 10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. 11. Identify and wear appropriate clothing for lab/shop activities. 12. Secure hair and jewelry for lab/shop activities. 13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. 14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). 15. Locate and demonstrate knowledge of material safety data sheets (MSDS). 	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading for Literacy in Science and Technical Subjects

3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on

Craft and Structure (11-12)

4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12

Science

Social Studies

Writing

CC: Writing (11-12)

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and

Production and Distribution of Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types

6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or

21st Century Skills

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations <p>Creative Thinking and Problem Solving</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems <p>Communication and Collaboration</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others 	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information <p>Media Literacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p>Information, Communications, and Technology (ICT Literacy)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Apply Technology Effectively 	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible <p>Initiative and Self-Direction</p> <ul style="list-style-type: none"> <input type="checkbox"/> Mange Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p>Social and Cross-Cultural</p> <ul style="list-style-type: none"> <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams <p>Productivity and Accountability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others
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Unit 13 TOOLS AND EQUIPMENT		Hours: 80
Performance Assessment(s):		
NATEF tasks Sheets OB1-OB5 Pass/Fail Demonstrations Module Test.		
Leadership Alignment:		
Students will reason effectively communicate clearly access and evaluate information, manage goals and time in a Skills USA Lesson: Putting your Best Communication Forward (123 Minutes) Communications		
Standards and Competencies		
REQUIRED SUPPLEMENTAL TASKS (GT) GT - B. Tools and Equipment 1. Identify tools and their usage in automotive applications. 2. Identify standard and metric designation. 3. Demonstrate safe handling and use of appropriate tools. 4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. 5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<u>CC: Number and Quantity (N)</u> <u>Quantities (N-Q)</u> 3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.* <u>Vector and Matrix Quantities (N-VM)</u> 9 (+) - Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive		
<u>CC: Algebra (A)</u> <u>Reasoning with Equations and Inequalities (A-REI)</u>		
<u>CC: Functions (F)</u> <u>Interpreting Functions (F-IF)</u> 9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of		

Reading

CC: Reading for Literacy in Science and Technical Subjects

Key Ideas and Details (11-12)

1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the

Range of Reading and Level of Text Complexity (11-12)

10 - By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 14 PREPARING VEHICLE FOR SERVICE	Hours: 50
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will make judgments and decisions, collaborate with others, access and evaluate information, adapt to change and work effectively in diverse teams in a Skills USA Lesson: Lesson: Making Informed Decision (70 Minutes) Decision Making	
Standards and Competencies	
REQUIRED SUPPLEMENTAL TASKS (GT) GT - C. Preparing Vehicle for Service 1. Identify information needed and the service requested on a repair order. 2. Identify purpose and demonstrate proper use of fender covers, mats. 3. Demonstrate use of the three C's (concern, cause, and correction). 4. Review vehicle service history. 5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u> 3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions <u>Craft and Structure (9-10)</u> 4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10	
Science	
Social Studies	
Writing	
<u>CC: Writing (11-12)</u>	

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and

Production and Distribution of Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types

6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 15 PREPARING VEHICLE FOR CUSTOMER	Hours: 50
Performance Assessment(s):	
Assessments include self, peer or instructor review and validation of each competency listed above. In addition instructor may have worksheets, quizzes and tests on same items. These competencies are industry task list for possible student certification and are the actual assessment for the task listed.	
Leadership Alignment:	
Students will reason effectively, use and manage information, manage goals be responsible and interact effectively with others in a Skills USA Lesson: Get It Done (75 Minutes) Work Ethic	
Standards and Competencies	
REQUIRED SUPPLEMENTAL TASKS (GT) GT - D. Preparing Vehicle for Customer 1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
Science	
Social Studies	
Writing	
<u>CC: Writing (11-12)</u> 2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and	
<u>Production and Distribution of Writing</u> 4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types	
6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or	
<u>Research to Build and Present Knowledge</u>	

21st Century Skills

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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Computer Systems Engineering 1/2



INTRODUCTION

Course Name	<u>Computer Systems Engineering 1/2</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>180 hours</u>	Course Code(s)	<u>CTE-411, CTE-412</u>

Course Description This course is intended for students with a strong interest in computers and information technology. Students will learn to service, upgrade, troubleshoot, and repair computers. They will cover both hardware and software standards. The goal of this course is to prepare students for industry standard PC Pro and A+ Certification.

Pathway Connections Skilled and Technical Sciences, STEM
Primary Connection Computer Installation and Repair Technology/Technician
Secondary Connection Computer Systems Networking and Telecommunications

Sample Sequence of Courses

1. Basic Algebra
2. Electronics Technology
3. Computer Systems Engineering 1/2
4. Computer Systems Engineering 3/4

Cross Credit and/or College Credit

- Tech Prep Credit

Basic Textbook None

Equipment

- District Surplus Computers
- Routers, switches and other networking hardware
- Cables and cable making tools and connectors
- Multimeters, Power supply testers and other test equipment

Software TestOut Labsim curriculum (PC Pro)

Supplemental Materials

- Videos
- Industry related websites
- Other web resources

Skills Gap Data (CTE Courses only)

United States Department of Labor:

- Computer Support Specialist: 123,000 new jobs, 17% growth
- Computer Systems Analyst: 127,700 new jobs, 25% growth
- Network and Computer Systems Administrator: 42,900 new jobs, 12% growth
- Computer Network Architect: 20,900 new jobs, 15% growth
- Information Security Analyst: 27,400 new jobs 37% growth



Employment Security Department Washington State:

- Computer Occupations: Estimated employment statewide: Short term and Long term trends; growth - 4,792. Average annual growth rate (2013-2023): 2.9%
- Computer User Support Specialists: Estimated employment statewide: Short term and Long term trends; growth - 14,412. Average annual growth rate (2013-2023): 3.1%
- Computer Systems Analysts: Estimated employment statewide: Short term and Long term trends; growth - 314. Average annual growth rate (2013-2023): 1.7%
- Network and Computer System Administrators: Estimated employment statewide: Short term and Long term trends; growth - 7,680. Average annual growth rate (2013-2023): 2.7%
- Computer Network Architects: Estimated employment statewide: Short term and Long term trends; growth - 1,511. Average annual growth rate (2013-2023): 1.3%



COURSE OUTLINE

Course Name Computer Systems Engineer 1-2 (TestOut PC Pro) **Grade Level(s)** 9-12

This hands-on course is intended for students with a strong interest in a career in computer technology. Students will learn to service, upgrade, troubleshoot, and repair computers. Interested students will have the opportunity to apply for intern and mentoring opportunities. The goal of this course is to prepare students for industry standard TestOut LabSim PC Pro certification.

1. Computing Overview

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

2. PC Technician

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

3. System Components

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

4. Peripheral Devices

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

5. Storage

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment



6. Networking

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

7. Printing

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

8. Windows System Management

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

9. Security

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

10. Troubleshooting & Capstone Exercises

- A. TestOut LabSim PC Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment



Course Name Computer Systems Engineer 1-2 (TestOut Net Pro) **Grade Level(s)** 9-12

POWER STANDARDS

This hands-on course is intended for students with a strong interest in a career in computer technology. Students will learn to service, upgrade, troubleshoot, and repair computers. Interested students will have the opportunity to apply for intern and mentoring opportunities. The goal of this course is to prepare students for industry standard TestOut LabSim PC Pro certification.

The student will...

1. **Computer Systems** - Students will evaluate computer system components and applications and understand their functions
2. **Safety and Workplace Behaviors** - Students will demonstrate industry safety, leadership and professional workplace behaviors
3. **Tools & Technology Applications** - Students will apply the correct tools, techniques and vocabulary in their work
4. **Career Readiness** - Students understand, apply, and evaluate, technology career fields

SKILLS GAP/LABOR MARKET DATA
Computer Systems Engineering 1-2

Computer Systems Engineering Overall	
Computer Systems Engineering 1-2	<p>United States Department of Labor:</p> <ul style="list-style-type: none">• Computer Support Specialist: 123,000 new jobs, 17% growth• Computer Systems Analyst: 127,700 new jobs, 25% growth• Network and Computer Systems Administrator: 42,900 new jobs, 12% growth• Computer Network Architect: 20,900 new jobs, 15% growth• Information Security Analyst: 27,400 new jobs 37% growth <p>Employment Security Department Washington State:</p> <ul style="list-style-type: none">• Computer Occupations: Estimated employment statewide: Short term and Long term trends; growth - 4,792. Average annual growth rate (2013-2023): 2.9%• Computer User Support Specialists: Estimated employment statewide: Short term and Long term trends; growth - 14,412. Average annual growth rate (2013-2023): 3.1%• Computer Systems Analysts: Estimated employment statewide: Short term and Long term trends; growth - 314. Average annual growth rate (2013-2023): 1.7%• Network and Computer System Administrators: Estimated employment statewide: Short term and Long term trends; growth - 7,680. Average annual growth rate (2013-2023): 2.7%• Computer Network Architects: Estimated employment statewide: Short term and Long term trends; growth - 1,511. Average annual growth rate (2013-2023): 1.3%

Auburn School District #408 Framework: Computer Systems Engineering 1

Course: Computer Installation and Repair Technology/Technician

Total Framework Hours: 90 Hours

CIP Code: 470104

Type: Preparatory

Career Cluster: Information Technology

Date Last Modified: Wednesday, November 18, 2015

Resources and Standard used in Framework Development:

Standards used for this framework are from the OSPI Model Framework for 470104 Computer Installation and Repair Technology/Technician

Unit 1 COMPUTING OVERVIEW

Hours: 10

Performance Assessment(s):

Testout LabSim PC Pro Unit 1 Exams
 Testout LabSim PC Pro Unit 1 Lab Simulations
 Testout LabSim PC Pro Unit 1 Final Assessment
 Technology Careers Presentation

Leadership Alignment:

SkillsUSA Computer Maintenance and Technology:
 CMT 1.0 - Perform maintenance on personal computers and computer components
 CMT 8.0 - Display communication and professionalism while working in computer maintenance technology
 SkillsUSA Committee Identified Academic Skills:
 Language Arts Skills:
 - Organize and synthesize information for use in written and oral presentations
 - Demonstrate knowledge of appropriate reference materials

Standards and Competencies

Standard: Computer Hardware
 Standard: Operational Procedure
 Standard WR 1: Career Planning
 Standard WR 3: Employability and Entrepreneurship

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

CC: Reading Informational Text

Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☒ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 2 PC TECHNICIAN		Hours: 10
Performance Assessment(s):		
Testout LabSim PC Pro Unit 2 Exams Testout LabSim PC Pro Unit 2 Lab Simulations Testout LabSim PC Pro Unit 2 Final Assessment Shop Safety Assessment		
Leadership Alignment:		
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 7.0 - Apply awareness of safety and environmental concerns surrounding computer maintenance technology CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials Science Skills: - Use knowledge of static electricity, current electricity and circuits		
Standards and Competencies		
Standard: General and Computer Safety Standard: General and Computer Safety <ul style="list-style-type: none"> - Understand and apply concepts related to computers and electronics - Identify general safety hazards and correctly report them - Identify and resolve electrical equipment safety hazards. - Understand and implement general classroom safety regarding: Horse Play, Throwing Items, Safety Glasses, Lifting Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 7: Ethics and Legal responsibilities		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		

Science		
<u>Physical Science</u>		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 3 SYSTEM COMPONENTS		Hours: 50
Performance Assessment(s):		
Testout LabSim PC Pro Unit 3 Exams Testout LabSim PC Pro Unit 3 Lab Simulations Testout LabSim PC Pro Unit 3 Final Assessment In Class Hardware Lab Activities		
Leadership Alignment:		
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 7.0 - Apply awareness of safety and environmental concerns surrounding computer maintenance technology CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials Science Skills: - Use knowledge of static electricity, current electricity and circuits		
Standards and Competencies		
Standard: General and Computer Safety Standard: Computer Hardware Standard: Computer Troubleshooting, Repair and Maintenance Standard: Information Systems Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 6: Teamwork and Cooperation		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading Informational Text</u>		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 4 PERIPHERAL DEVICES	Hours: 10
Performance Assessment(s):	
Testout LabSim PC Pro Unit 4 Exams Testout LabSim PC Pro Unit 4 Lab Simulations Testout LabSim PC Pro Unit 4 Final Assessment	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 7.0 - Apply awareness of safety and environmental concerns surrounding computer maintenance technology CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: General and Computer Safety Standard: Computer Hardware Standard WR 4: Problem Solving Standard WR 5: Health and Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 5 STORAGE	Hours: 10
Performance Assessment(s):	
Testout LabSim PC Pro Unit 5 Exams Testout LabSim PC Pro Unit 5 Lab Simulations Testout LabSim PC Pro Unit 5 Final Assessment In Class Hardware Lab Activities	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 7.0 - Apply awareness of safety and environmental concerns surrounding computer maintenance technology CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials Science Skills: - Use knowledge of static electricity, current electricity and circuits	
Standards and Competencies	
Standard: General and Computer Safety Standard: Computer Hardware Standard: Computer Troubleshooting, Repair and Maintenance Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 6: Teamwork and Cooperation Standard WR 7: Ethics and Legal responsibilities	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Auburn School District #408 Framework: Computer Systems Engineering 2

Course: Computer Installation and Repair Technology/Technician

Total Framework Hours: 90 Hours

CIP Code: 470104

Type: Preparatory

Career Cluster: Information Technology

Date Last Modified: Wednesday, November 18, 2015

Resources and Standard used in Framework Development:

Standards used for this framework are from the OSPI Model Framework for 470104 Computer Installation and Repair Technology/Technician

Unit 5 STORAGE

Hours: 10

Performance Assessment(s):

Testout LabSim PC Pro Unit 5 Exams
 Testout LabSim PC Pro Unit 5 Lab Simulations
 Testout LabSim PC Pro Unit 5 Final Assessment

Leadership Alignment:

SkillsUSA Computer Maintenance and Technology:
 CMT 1.0 - Perform maintenance on personal computers and computer components
 CMT 8.0 - Display communication and professionalism while working in computer maintenance technology
 SkillsUSA Committee Identified Academic Skills:
 Language Arts Skills:
 - Organize and synthesize information for use in written and oral presentations
 - Demonstrate knowledge of appropriate reference materials

Standards and Competencies

Standard: General and Computer Safety
 Standard: Computer Hardware
 Standard: Computer Troubleshooting, Repair and Maintenance
 Standard: Hardware: Operation System Technology
 Standard WR 2: Personal Success
 Standard WR 4: Problem Solving
 Standard WR 5: Health and Safety

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening
--

Health and Fitness

Language

Mathematics

Reading

<u>CC: Reading Informational Text</u>

Science

Social Studies

Writing

<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>

<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>
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21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 6 NETWORKING	Hours: 20
Performance Assessment(s):	
Testout LabSim PC Pro Unit 6 Exams Testout LabSim PC Pro Unit 6 Lab Simulations Testout LabSim PC Pro Unit 6 Final Assessment	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: Networking Standard: Network Media and Topologies Standard: Network tools Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 7 PRINTING	Hours: 10
Performance Assessment(s):	
Testout LabSim PC Pro Unit 7 Exams Testout LabSim PC Pro Unit 7 Lab Simulations Testout LabSim PC Pro Unit 7 Final Assessment	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: General and Computer Safety Standard: Computer Hardware Standard: Computer Troubleshooting, Repair and Maintenance Standard: Network Devices Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 8 WINDOWS SYSTEM MANAGEMENT	Hours: 15
Performance Assessment(s):	
Testout LabSim PC Pro Unit 8 Exams Testout LabSim PC Pro Unit 8 Lab Simulations Testout LabSim PC Pro Unit 8 Final Assessment	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: General and Computer Safety Standard: Computer Operating Systems and Software Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 9 SECURITY	Hours: 10
Performance Assessment(s):	
Testout LabSim PC Pro Unit 9 Exams Testout LabSim PC Pro Unit 9 Lab Simulations Testout LabSim PC Pro Unit 9 Final Assessment	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: General and Computer Safety Standard: Network Security Standard: Operating Systems - Security Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 10 TROUBLESHOOTING & CAPSTONE EXERCISES	Hours: 25
Performance Assessment(s):	
Testout LabSim PC Pro Unit 10 Exams Testout LabSim PC Pro Unit 10 Lab Simulations Testout LabSim PC Pro Unit 10 Final Assessment PC Pro Certificaton Exam	
Leadership Alignment:	
SkillsUSA Computer Maintenance and Technology: CMT 1.0 - Perform maintenance on personal computers and computer components CMT 8.0 - Display communication and professionalism while working in computer maintenance technology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials	
Standards and Competencies	
Standard: General and Computer Safety Standard: Computer Hardware Standard: Computer Troubleshooting, Repair and Maintenance Standard: Computer Operating Systems and Software Standard: Networking Standard: Hardware: Operation System Technology Standard: Network Devices Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 6: Teamwork and Cooperation	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Computer Systems

Engineering 1-4



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

<h2 style="text-align: center; color: red; text-decoration: underline;">Computer Systems Engineering 1-4</h2> <h3 style="text-align: center;">** LEARNING AND INNOVATION SKILLS **</h3>	
21 st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & sConferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings &

	Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Computer Systems Engineering 1-4

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information	Local Program Resource Guide (Current Edition)

4.A.1 Access information efficiently (time) and effectively (sources)	Connecting Career Development Event (Local, State, and National Level)
4.A.2 Evaluate information critically and competently	Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information	Local Program Resource Guide (Current Edition)
4.B.1 Use information accurately and creatively for the issue or problem at hand	Connecting Career Development Event (Local, State, and National Level)
4.B.2 Manage the flow of information from a wide variety of sources	Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	
Analyze Media	
5.A.1 Understand both how and why media messages are constructed, and for what purposes	
5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors	
5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products	
5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions	
5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively	Professional Development Program (PDP)
6.A.1 Use technology as a tool to research, organize, evaluate and communicate information	SkillsUSA Championships Technical Standards—Leadership Contests
6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy	Leadership Handbook Regional, State, & National Conferences & Contests
6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	

Computer Systems Engineering 1-4

** LIFE AND CAREER SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change	Professional Development Program (PDP)
7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts	SkillsUSA Championships Technical Standards Leadership Handbook
7.A.2 Work effectively in a climate of ambiguity and changing priorities	Chapter, Regional, State, & National Meetings & Conferences

	Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with	Professional Development Program (PDP) SkillsUSA Championships Technical Standards

<p>producing high quality products including the abilities to:</p> <p>10.B.1.a Work positively and ethically</p> <p>10.B.1.b Manage time and projects effectively</p> <p>10.B.1.c Multi-task</p> <p>10.B.1.d Participate actively, as well as be reliable and punctual</p> <p>10.B.1.e Present oneself professionally and with proper etiquette</p> <p>10.B.1.f Collaborate and cooperate effectively with teams</p> <p>10.B.1.g Respect and appreciate team diversity</p> <p>10.B.1.h Be accountable for results</p>	<p>Leadership Handbook</p> <p>Regional, State, & National Conferences & Contests</p> <p>Serve as a chapter officer or state officer</p>
<p>Guide and Lead Others</p> <p>11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal</p> <p>11.A.2 Leverage strengths of others to accomplish a common goal</p> <p>11.A.3 Inspire others to reach their very best via example and selflessness</p> <p>11.A.4 Demonstrate integrity and ethical behavior in using influence and power</p>	<p>Professional Development Program (PDP)</p> <p>Leadership Handbook</p> <p>Serve as a chapter officer or state officer</p> <p>Regional, State, & National Meetings & Conferences</p> <p>SkillsUSA Championships Technical Standards</p>
<p>Be Responsible to Others</p> <p>11.B.1 Act responsibly with the interests of the larger community in mind</p>	<p>Professional Development Program (PDP)</p> <p>Shadowing & Mentoring</p> <p>Regional, State, & National Conferences & Contests</p>

Activity Descriptions

Computer Maintenance Technology

The CMT contest requires contestants to identify and repair computer hardware malfunctions, solve configuration problems, and install common components. In addition, the contestants take the A+ Certification exam. Their score on this exam is used as the basis for the written portion of the contest, and contestants who pass the exam receive their A+ Certification.

Internetworking

The contest consists of three main parts--networking design, general networking knowledge and hands-on evaluations. The networking design problem tests a contestant's ability to design functionality, scalability, adaptability and manageability of an internetworking system. The online written portion tests the student's complete knowledge of internetworking concepts. The hands-on component demonstrates the abilities of the contestant to make cables, trouble shoot network systems, configure routers, switches and servers, to deliver customer service in a technical assistant center environment. The contestants will find errors in WAN and LAN networks; do an ISP configuration using routers and switches; talk a technician through an error they are having on their network; and, take an online, certification type test. The national contest is based on the most current CCNA certification. In today's job market system administration skills are needed, therefore the server skills listed here will be scored: Install DNS, create a record, install active directory service, and DHCP. In addition, contestants should have knowledge of creating user and group accounts on Windows Server 2008. Use this link to receive a 180 day trial version of server 2008: www.microsoft.com/windowsserver2008/en/us/try-it.aspx

Technical Computer Applications

Contestants will be expected to demonstrate installation, configuration and use of Windows, Mac OSX and Linux Professional Operating Systems and one or more integrated office suite packages including email, word processing, spreadsheet applications, database applications, web page development, money management applications, presentations applications, internet browser applications, etc. The use of Open source software such as OpenOffice will be preferable. Microsoft Office and other integrated office suites could be used. The utilization of instant messaging, collaboration and social networking software will be required during the contest. Contestants will be expected to perform in teams while demonstrating individual technical skills. The contest will include an oral presentation demonstrating the student's ability to communicate with others, a hands-on skills demonstration, and a one hour time allotted written examination.



Computer Systems Engineering 3/4



INTRODUCTION

Course Name	<u>Computer Systems Engineering 3/4</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>180 hours</u>	Course Code (s)	<u>CTE-413, CTE-414</u>

Course Description This course is intended for students with a strong interest in computer networking, security and information technology. Students will learn to service, upgrade, troubleshoot, and repair computers and networks, and implement computer and information security. They will cover both hardware and software standards. The goal of this course is to prepare students for Net Pro, Net Plus, Security Pro and/or Security Plus industry certifications.

Pathway Connections Skilled and Technical Sciences, STEM
Primary Connection Computer Installation and Repair Technology/Technician
Secondary Connection Computer Systems Networking and Telecommunications

Sample Sequence of Courses

1. Basic Algebra
2. Electronics Technology
3. Computer Systems Engineering 1/2
4. Computer Systems Engineering 3/4

Cross Credit and/or College Credit

- Tech Prep Credit
- Concurrent Enrollment with GRCC

Basic Textbook None

Equipment

- District Surplus Computers
- Routers, switches and other networking hardware
- Cables and cable making tools and connectors
- Multimeters, Power supply testers and other test equipment

Software TestOut Labsim curriculum (Net Pro, Security Pro)

Supplemental Materials

- **Videos**
- **Industry related websites**
- **Other web resources**

Skills Gap Data (CTE Courses only)

United States Department of Labor:

- Computer Support Specialist: 123,000 new jobs, 17% growth
- Computer Systems Analyst: 127,700 new jobs, 25% growth
- Network and Computer Systems Administrator: 42,900 new jobs, 12% growth
- Computer Network Architect: 20,900 new jobs, 15% growth
- Information Security Analyst: 27,400 new jobs 37% growth



Employment Security Department Washington State:

- Computer Occupations: Estimated employment statewide: Short term and Long term trends; growth - 4,792. Average annual growth rate (2013-2023): 2.9%
- Computer User Support Specialists: Estimated employment statewide: Short term and Long term trends; growth - 14,412. Average annual growth rate (2013-2023): 3.1%
- Computer Systems Analysts: Estimated employment statewide: Short term and Long term trends; growth - 314. Average annual growth rate (2013-2023): 1.7%
- Network and Computer System Administrators: Estimated employment statewide: Short term and Long term trends; growth - 7,680. Average annual growth rate (2013-2023): 2.7%
- Computer Network Architects: Estimated employment statewide: Short term and Long term trends; growth - 1,511. Average annual growth rate (2013-2023): 1.3%



COURSE OUTLINE

Course Name Computer Systems Engineer 3-4 (TestOut Net Pro) **Grade Level(s)** 9-12

This hands-on course is intended for students with a strong interest in a career in computer information systems. They will learn networking and network server technologies with a goal of preparing for TestOut Net Pro industry certification exams. Interested students will have the opportunity to apply for intern and mentoring opportunities.

1. Networking Basics

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

2. Cables and Connectors

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

3. Networking Devices

- A. TestOut LabSim NetPro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

4. Ethernet

- A. TestOut LabSim NetPro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

5. IP Configuration

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment



6. Switch Management

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

7. Routing

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

8. Firewalls

- A. TestOut LabSim NetPro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

9. Customization

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

10. Wireless Networking

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

11. Wide Area Networking (WANs)

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment



12. Network Policies and Procedures

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

13. Network Security

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

14. Network Hardening

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

15. Network Management

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment

16. Network Optimization

- A. TestOut LabSim Net Pro
 - I. Demonstration
 - II. Lab/Simulation
 - III. Videos
 - IV. Assessment



Course Name Computer Systems Engineer 3-4 (TestOut Net Pro) **Grade Level(s)** 9-12

POWER STANDARDS

This hands-on course is intended for students with a strong interest in a career in computer information systems. They will learn networking and network server technologies with a goal of preparing for TestOut Net Pro industry certification exams. Interested students will have the opportunity to apply for intern and mentoring opportunities.

The student will...

1. **Computer Systems** - Students will evaluate computer system components and applications and understand their functions
2. **Safety and Workplace Behaviors** - Students will demonstrate industry safety, leadership and professional workplace behaviors
3. **Tools & Technology Applications** - Students will apply the correct tools, techniques and vocabulary in their work
4. **Career Readiness** - Students understand, apply, and evaluate, technology career fields

Auburn School District #408 Framework: Computer Systems Engineering 3

Course: Computer Installation and Repair Technology/Technician

Total Framework Hours: 90 Hours

CIP Code: 470104

Type: Preparatory

Career Cluster: Information Technology

Date Last Modified: Wednesday, November 18, 2015

Resources and Standard used in Framework Development:

Standards used for this framework are from the OSPI Model Framework for 470104 Computer Installation and Repair Technology/Technician

Unit 1 NETWORKING BASICS

Hours: 10

Performance Assessment(s):

Testout LabSim Net Pro Unit 1 Exams
 Testout LabSim Net Pro Unit 1 Lab Simulations
 Testout LabSim Net Pro Unit 1 Final Assessment
 Shop Safety Assessment

Leadership Alignment:

SkillsUSA Internetworking
 WORK 1.0: Explain common networking concepts and terminology
 WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity
 WORK 3.0: Compare and contrast various types of media used for networking
 WORK 4.0: Explain the fundamental concepts associated with media access techniques (Ethernet operation, MAC, LLC, CSMA/CD)
 WORK 8.0: Define the Layers of the OSI model
 WORK 15.0: Configure routing protocols

SkillsUSA Committee Identified Academic Skills:

Math Skills: Binary number systems

Language Arts Skills:

- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Standards and Competencies

Standard: General and Computer Safety

- Understand and apply concepts related to computers and electronics
- Identify general safety hazards and correctly report them
- Identify and resolve electrical equipment safety hazards.
- Describe symptoms of and treatment for electrical shock, burns.
- React safely during an emergency by quickly following procedures and verbal instructions
- Adhere to established safety & security policies/procedures (e.g. firewalls, web page policies, internet & student photo policies, etc.)
- Understand and implement general classroom safety regarding: Horse Play, Throwing Items, Safety Glasses, Lifting

Standard: Networking

- Summarize the basics of networking fundamentals, including technologies, devices and protocols
- Compare and contrast the different network types
- Interpret basic networking terminology.

- Differentiate between LANs, MANs and WANs.
- Identify the basic point-to-point network topologies (e.g., star, ring, tree, network, irregular).
- Identify the basic broadcast topologies (e.g., star ring, bus).
- Differentiate between a physical and logical topology.
- Demonstrate knowledge of LAN transmission methods, standards and protocols.

Standard: Network Media and Topologies

- Identify common physical network topologies
- Explain common logical network topologies and their characteristics

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

- 4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific
- 2 - Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a
- 3 - Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

CC: Reading for Literacy in Science and Technical Subjects

- 3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions
- 4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades
- 6 - Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- 7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or
- 10 - By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently
- 1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the
- 3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on
- 4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades
- 6 - Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
- 7 - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or

10 - By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 2 CABLES AND CONNECTORS	Hours: 10
Performance Assessment(s):	
Testout LabSim Net Pro Unit 2 Exams Testout LabSim Net Pro Unit 2 Lab Simulations Testout LabSim Net Pro Unit 2 Final Assessment Create and test Cat 5 Ethernet cables	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 3.0: Compare and contrast various types of media used for networking SkillsUSA Committee Identified Academic Skills: Math Skills: Binary number systems Language Arts Skills: - Organize and synthesize information for use in written and oral presentations - Demonstrate knowledge of appropriate reference materials - Use print, electronic databases and online resources to access information in books and articles	
Standards and Competencies	
Standard: Networking <ul style="list-style-type: none"> - Categorize network cables and connectors and their implementations - Interpret basic networking terminology. Standard: Network Media and Topologies <ul style="list-style-type: none"> - Categorize standard cable types and their properties - Identify common connector types Standard: Network tools <ul style="list-style-type: none"> - Given a scenario, utilize the appropriate hardware tools Standard WR 4: Problem Solving	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 3 NETWORKING DEVICES	Hours: 25
Performance Assessment(s):	
Testout LabSim Net Pro Unit 3 Exams Testout LabSim Net Pro Unit 3 Lab Simulations Testout LabSim Net Pro Unit 3 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking - Interpret basic networking terminology. - Demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, firewall). Standard: Network Devices - Install, configure and differentiate between common network devices - Identify the functions of specialized network devices Standard: Network tools - Given a scenario, utilize the appropriate hardware tools	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 4 ETHERNET	Hours: 20
Performance Assessment(s):	
Testout LabSim Net Pro Unit 4 Exams Testout LabSim Net Pro Unit 4Lab Simulations Testout LabSim Net Pro Unit 4Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Media and Topologies Standard: Network tools - Given a scenario, utilize the appropriate hardware tools	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 5 IP CONFIGURATION		Hours: 15
Performance Assessment(s):		
Testout LabSim Net Pro Unit 5 Exams Testout LabSim Net Pro Unit 5 Lab Simulations Testout LabSim Net Pro Unit 5 Final Assessment		
Leadership Alignment:		
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 6.0: Implement and correct problems associated with basic IP addressing and sub netting schemes WORK 8.0: Define the Layers of the OSI model SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)		
Standards and Competencies		
Standard: Networking - Summarize the basics of networking fundamentals, including technologies, devices and protocols Standard: Network Devices Standard WR 3: Employability and Entrepreneurship		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>		
Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 6 WIRELESS NETWORKING	Hours: 10
Performance Assessment(s):	
Testout LabSim Net Pro Unit 6 Exams Testout LabSim Net Pro Unit 6 Lab Simulations Testout LabSim Net Pro Unit 6 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity WORK 3.0: Compare and contrast various types of media used for networking WORK 7.0: Describe fundamental concepts of switching and routing WORK 25.0: Understand how switching operates switching concepts SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Devices Standard WR 2: Personal Success Standard WR 4: Problem Solving	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovatio</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Other</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboratio</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Other</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Auburn School District #408 Framework: Computer Systems Engineering 4

Course: Computer Installation and Repair Technology/Technician

Total Framework Hours: 90 Hours

CIP Code: 470104

Type: Preparatory

Career Cluster: Information Technology

Date Last Modified: Wednesday, November 18, 2015

Resources and Standard used in Framework Development:

Standards used for this framework are from the OSPI Model Framework for 470104 Computer Installation and Repair Technology/Technician

Unit 7 FIREWALLS

Hours: 15

Performance Assessment(s):

Testout LabSim Net Pro Unit 7 Exams
Testout LabSim Net Pro Unit 7 Lab Simulations
Testout LabSim Net Pro Unit 7 Final Assessment

Leadership Alignment:

SkillsUSA Internetworking
WORK 1.0: Explain common networking concepts and terminology
SkillsUSA Committee Identified Academic Skills:
Language Arts Standards - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Standards and Competencies

Standard: Networking
Standard: Network Security
Standard WR 2: Personal Success

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

CC: Reading for Literacy in Science and Technical Subjects

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 8 NETWORK CUSTOMIZATION	Hours: 15
Performance Assessment(s):	
Testout LabSim Net Pro Unit 8 Exams Testout LabSim Net Pro Unit 8 Lab Simulations Testout LabSim Net Pro Unit 8 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity WORK 3.0: Compare and contrast various types of media used for networking SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Devices Standard: Network tools Standard WR 2: Personal Success	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 9 WIRELESS NETWORKING	Hours: 20
Performance Assessment(s):	
Testout LabSim Net Pro Unit 9 Exams Testout LabSim Net Pro Unit 9 Lab Simulations Testout LabSim Net Pro Unit 9 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity WORK 3.0: Compare and contrast various types of media used for networking WORK 29.0: Describe how virtual LANs help to control broadcast domains and how this benefits the LAN network SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Security Standard: Network Media and Topologies Standard: Network Devices Standard: Network tools Standard WR 2: Personal Success	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovatio</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Other</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboratio</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Other</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Unit 10 NETWORK SECURITY	Hours: 10
Performance Assessment(s):	
Testout LabSim Net Pro Unit10 Exams Testout LabSim Net Pro Unit 10 Lab Simulations Testout LabSim Net Pro Unit 10 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 3.0: Compare and contrast various types of media used for networking SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Security Standard WR 2: Personal Success Standard WR 4: Problem Solving	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 11 NETWORK MANAGEMENT	Hours: 10
Performance Assessment(s):	
Testout LabSim Net Pro Unit 11 Exams Testout LabSim Net Pro Unit 11 Lab Simulations Testout LabSim Net Pro Unit 11 Final Assessment	
Leadership Alignment:	
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)	
Standards and Competencies	
Standard: Networking Standard: Network Management Standard WR 2: Personal Success	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u> <u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

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- ☒ Think Creatively
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Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 12 TROUBLESHOOTING & CAPSTONE EXERCISES		Hours: 20
Performance Assessment(s):		
Testout LabSim Net Pro Unit 12 Exams Testout LabSim Net Pro Unit 12 Lab Simulations Testout LabSim Net Pro Unit 12 Final Assessment NetPro Certification Exam		
Leadership Alignment:		
SkillsUSA Internetworking WORK 1.0: Explain common networking concepts and terminology WORK 2.0: Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity WORK 3.0: Compare and contrast various types of media used for networking WORK 5.0: Optimize network design in regard to segmentation, collision domains and broadcast domains WORK 8.0: Define the Layers of the OSI model WORK 35.0: Network Systems Administration SkillsUSA Committee Identified Academic Skills: Language Arts Skills: - Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)		
Standards and Competencies		
Standard: Networking Standard: Network Security Standard: Network Media and Topologies Standard: Network Devices Standard: Network tools Standard WR 2: Personal Success Standard WR 4: Problem Solving		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>		

Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others



Electronics Technology



INTRODUCTION

Course Name:	Electronics Technology	Grade Levels:	9-12
Course Length:	180 hours	Course Codes:	CTE-381, CTE-382

Course Description Students will learn the theory and fundamentals of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).

Pathway Connections Skilled and Technical Sciences, STEM
Primary Connection Electrical and Electronic Equipment Repair
Secondary Connection Electrician

Sample Sequence of Courses

1. Basic Algebra
2. Electronics Technology
3. Advanced Electronics Technology
4. Computer Systems Engineering

Cross Credit and/or College Credit

- Third year math or Advanced Algebra/Trig
- Lab Science
- Tech Prep Credit

Basic Textbook Introduction to Electronics 6th Edition by Earl Gates

Equipment

- Digital Multimeters
- Soldering Irons and related support equipment
- DC & AC Regulated Power Supplies
- Oscilloscopes and related support equipment
- Frequency Generators
- Audio Generators

Software:

- ETCAI Products: Electricity and Electronics Interactive Software
 - Basic Circuits Challenge
 - DC Circuits Challenge
 - AC Circuit Challenge
 - Ohmmeter Challenge
 - Voltmeter Challenge



Supplemental Materials:

- Electronic Courseware Interactive (EKI) workbooks
- Chaney Training Course
- International Society of Certified Electronics Technician Online Learning
- Newspapers, Magazines, and Professional Journals
- Internet
- Videos



Skills Gap Data

United States Department of Labor:

- Electrical & Electronics Engineer 4% growth; 12,600 jobs
- Electrician 20% growth; 114,700 jobs
- Broadcast and Sound Technician 9% growth; 10,600 jobs
- Medical Equipment Repair 30% growth; 12,800 jobs
- Assembler Fabricator 4% growth; 64,200 jobs

Employment Security Department Washington State:

- Electrical Equipment and Appliance short-term-industry-projections (2yr): 2014-2016, 5% growth, 4900 to 5400. Long-term-industry-projections (10yr):2014-2023, 3.5%
- Electrical Engineers short term Occupational-employment projections (2yr): 2014-2016, 1.7%, 1,501 - 1567. Long -term-occupational projections (10yr): 2014-2023, 0.87%
- Electricians short term Occupational-employment projections (2yr): 2014-16, 4.5% growth 15,720 - 17,161. Long -term-occupational projections (10yr): 2014-2023, 3.66%
- Electronic Home Entertainment Equipment Installers and Repairers short term Occupational-employment projections (2 yr): 2014-2016, 2.21%, 515 - 538. Long -term-occupational projections (10yr): 2014-2023, 2.17%



COURSE OUTLINE

Course Name: Electronics Technology 1-2 **Grade Level(s):** 9-12

Students will learn the theory and fundamentals of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).

1. Safety

- A. Safety Video
- B. Classroom Safety
- C. International Society of Certified Electronics Technicians (ISCET) Safety Lesson
- D. Safety Assessment

2. Fundamentals of Soldering

- A. ISCET Modules
- B. Soldering Videos
- C. Soldering Assessment

3. Fundamentals of Electricity

- A. ISCET modules
- B. Gates book work
- C. Basic Circuits Challenge activities
- D. Fundamentals of Electricity Assessment

4. Number Notation

- A. Gates book work
- B. ISCET modules
- C. Basic Circuit Challenge
- D. Notation Assessment

5. Introduction to Resistance

- A. Gates book work
- B. ISCET modules
- C. Basic Circuit Challenge
- D. Resistance Assessment



6. Introduction to Current

- A. Gates book work
- B. ISCET modules
- C. Basic Circuit Challenge
- D. Current Assessment

7. Introduction to Voltage

- A. Gates book work
- B. ISCET modules
- C. Basic Circuit Challenge
- D. Voltage Assessment

8. Introduction to Ohm's Law

- A. Gates book work
- B. ISCET modules
- C. Basic Circuit Challenge
- D. Ohm's Law Assessment

9. Introduction to Bread-boarding

- A. Autodesk 123D Circuits Simulation
- B. Bread-boarding from directions
- C. Bread-boarding from schematics

10. Introduction to Electrical Measurements

- A. Gates book work
- B. ISCET modules
- C. Ohm & Volt Meter Circuits Challenge
- D. Measurement Labs
- E. Measurement Assessment

11. Introduction to Power

- A. Gates book work
- B. ISCET modules
- C. Video
- D. Basic Circuits Challenge
- E. DC Circuits Challenge
- F. Power Assessment



12. Introduction to DC Circuits

- A. Gates Chapter 8 DC Circuits
- B. ISCET modules
- C. Basic Circuits Challenge
- D. DC Circuits Challenge
- E. Lab work
- F. DC Circuits Assessment

13. Introduction to Magnetism

- A. ISCET modules
- B. Gates book work
- C. Magnetism Lab
- D. Magnetism Assessment

14. Inductance

- A. ISCET modules
- B. Gates book work
- C. DC Circuits Challenge
- D. Inductance Assessment

15. Capacitance

- A. ISCET modules
- B. Gates book work
- C. DC Circuits Challenge
- D. Capacitance Assessment

16. Leadership

- A. Introduction to leadership
- B. Establish Leadership strategies
- C. Establish a Plan for Individual Goals

17. Projects

- A. Component Identifications
- B. Tool Use
- C. Following Procedures
- D. Workplace Behaviors

18. Final Assessment



Course Name Electronics Technology

Grade Level(s) 9-12

POWER STANDARDS

Students will learn the theory and fundamentals of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).

The student will...

1. Circuit Analysis - Students will apply mathematical and problem solving skills and science principles to electronic circuits.
2. Safety and Workplace Behaviors - Students will demonstrate industry safety, leadership and professional workplace behaviors.
3. Tools & Technology Applications - Students will apply the correct tools, techniques and vocabulary in their work.
4. Career Readiness - Students understand, apply, and evaluate, technology career fields.

SKILLS GAP/LABOR MARKET DATA
Electronics Technology

Electronics Technology Overall	
Electronics Technology 1-2	<p>United States Department of Labor:</p> <ul style="list-style-type: none">• Electrical & Electronics Engineer 4% growth; 12,600 jobs• Electrician 20% growth; 114,700 jobs• Broadcast and Sound Technician 9% growth; 10,600 jobs• Medical Equipment Repair 30% growth; 12,800 jobs• Assembler Fabricator 4% growth; 64,200 jobs <p>Employment Security Department Washington State:</p> <ul style="list-style-type: none">• Electrical Equipment and Appliance short-term-industry-projections (2yr): 2014-2016, 5% growth, 4900 to 5400. Long-term-industry-projections (10yr):2014-2023, 3.5%• Electrical Engineers short term Occupational-employment projections (2yr): 2014-2016, 1.7%, 1,501 - 1567. Long -term-occupational projections (10yr): 2014-2023, 0.87%• Electricians short term Occupational-employment projections (2yr): 2014-16, 4.5% growth 15,720 - 17,161. Long -term-occupational projections (10yr): 2014-2023, 3.66%• Electronic Home Entertainment Equipment Installers and Repairers short term Occupational-employment projections (2 yr): 2014-2016, 2.21%, 515 - 538. Long -term-occupational projections (10yr): 2014-2023, 2.17%

Auburn School District #408 Framework: Electronics Technology (1-2)	
Course: Electrical Equipment Installation and Repair	Total Framework Hours: 180 Hours
CIP Code: 470101	Type: Preparatory
Career Cluster: IManufacturing	Date Last Modified: Tuesday, December 15, 2015
Resources and Standard used in Framework Development: Standards used for this framework are from the OSPI Model Framework for 470101 Computer Installation and Repair Technology/Technician	
Unit 1 SAFETY	Hours: 10
Performance Assessment(s):	
Textbook assignment Safety assignment Safety Exam	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard WR 2: Personal Success WR-2.7 Identify skills that can be transferable among a variety of careers. Standard WR 5: Health and Safety International Society of Certifited Electronics Technicians (ISCET) 7 7.4. Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u>	

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 2 FUNDAMENTALS OF SOLDERING	Hours: 10
Performance Assessment(s):	
Textbook assignment Soldering Assignment Soldering Project Soldering Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: General and Computer Safety <ul style="list-style-type: none"> - Understand and apply concepts related to computers and electronics - Identify general safety hazards and correctly report them - Identify and resolve electrical equipment safety hazards. - Understand and implement general classroom safety regarding: Horse Play, Throwing Items, Safety Glasses, Lifting Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certifited Electronics Technicians (ISCET) 1-3 2.8. Electrical Safety International Society of Certifited Electronics Technicians (ISCET) 7	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Other
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 3 FUNDAMENTALS OF ELECTRICITY	Hours: 10
Performance Assessment(s):	
Textbook assignment Fundamentals assignment Circuit Challenge activity Fundamentals assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 4: Problem Solving Standard WR 6: Teamwork and Cooperation International Society of Certificited Electronics Technicians (ISCET) 1-3 2.1. Atoms 2.2. Electrical Charge 2.3. Voltage 2.4. Current 2.5. Resistance 2.6. The Electric Circuit	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u> <u>Quantities (N-Q)</u>	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 4 NUMBER NOTATION		Hours: 10
Performance Assessment(s):		
Textbook assignment ISCET assignment Circuit Challenge activity Notation assessment		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET) 1-3 1.2. Scientific Notation 1.3. Engineering Notation and Metric Prefixes 1.4. Metric Unit Conversions		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<u>CC: Number and Quantity (N)</u>		
<u>CC: Mathematical Practices (MP)</u>		
Reading		
<u>CC: Reading Informational Text</u>		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		
Science		
<u>Physical Science</u>		

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 5 INTRODUCTION TO RESISTANCE	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Resistance lab Circuit Challenge activity Resistance project Resistance assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 6: Teamwork and Cooperation International Society of Certifited Electronics Technicians (ISCET) 1-3 1.4. Metric Unit Conversions 2.5. Resistance 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 2.8. Electrical Safety 3.5. The Power Rating of Resistors International Society of Certifited Electronics Technicians (ISCET) 4-6 4.1. Resistors in series 4.3. Total Series Resistance 5.1. Resistors in Parallel 5.3. Total Parallel Resistance 6.1. Identifying Series-Parallel Relationships International Society of Certifited Electronics Technicians (ISCET) 7 7.1. Solder 7.2. Soldering Equipment 7.3. Desoldering Equipment 7.4. Safety	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Number and Quantity (N)

CC: Mathematical Practices (MP)

CC: Algebra (A)

Reading

CC: Reading Informational Text

CC: Reading for Literacy in Science and Technical Subjects

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 6 INTRODUCTION TO CURRENT	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Current assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certifited Electronics Technicians (ISCET) 1-3 1.4. Metric Unit Conversions 2.2. Electrical Charge 2.4. Current 2.6. The Electric Circuit International Society of Certifited Electronics Technicians (ISCET) 4-6 4.2. Current in a Series Circuit	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 7 INTRODUCTION TO VOLTAGE		Hours: 10
Performance Assessment(s):		
ISCET assignment Textbook assignment Circuit Challenge activity Voltage assessment		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 1-3 1.4. Metric Unit Conversions 2.3. Voltage 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 2.8. Electrical Safety International Society of Certified Electronics Technicians (ISCET) 4-6 4.5. Voltage Sources in Series 4.7. Circuit Ground 5.2. Voltage in Parallel Circuits 6.1. Identifying Series-Parallel Relationships		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<u>CC: Number and Quantity (N)</u>		
<u>CC: Algebra (A)</u>		
<u>CC: Mathematical Practices (MP)</u>		

Reading

CC: Reading Informational Text

CC: Reading for Literacy in Science and Technical Subjects

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☒ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 8 INTRODUCTION TO OHM'S LAW	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Circuit Challenge activity Ohm's Law assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 1-3 1.1. Electrical Components and Measuring Instruments 1.3. Engineering Notation and Metric Prefixes 1.4. Metric Unit Conversions 2.3. Voltage 2.4. Current 2.5. Resistance 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 2.8. Electrical Safety 3.1. Ohm's Law 3.2. Application of Ohm's Law International Society of Certified Electronics Technicians (ISCET) 4-6 4.1. Resistors in series 4.2. Current in a Series Circuit 4.4. Ohm's Law in Series Circuits 5.4. Ohm's Law in Parallel Circuits	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Number and Quantity (N)

CC: Algebra (A)

CC: Mathematical Practices (MP)

Reading

CC: Reading Informational Text

CC: Reading for Literacy in Science and Technical Subjects

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☒ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 9 INTRODUCTION TO BREAD-BOARDING	Hours: 10
Performance Assessment(s):	
Breadboarding activity Breadboarding assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety Standard WR 6: Teamwork and Cooperation International Society of Certifited Electronics Technicians (ISCET) 1-3 1.1. Electrical Components and Measuring Instruments 1.4. Metric Unit Conversions 2.3. Voltage 2.4. Current 2.5. Resistance 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 2.8. Electrical Safety 3.8. Introduction to Troubleshooting International Society of Certifited Electronics Technicians (ISCET) 4-6 4.7. Circuit Ground 4.8. Troubleshooting 5.6. Troubleshooting 6.3. Troubleshooting	

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading for Literacy in Science and Technical Subjects

CC: Reading Informational Text

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☒ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 10 INTRODUCTION TO ELECTRICAL MEASUREMENTS		Hours: 10
Performance Assessment(s):		
ISCET assignment Textbook assignment Circuit Challenge activity Electrical measurement assessment Electrical measurement lab activity		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 4-6 4.1. Resistors in series 4.3. Total Series Resistance 4.4. Ohm's Law in Series Circuits 5.2. Voltage in Parallel Circuits 5.3. Total Parallel Resistance 5.4. Ohm's Law in Parallel Circuits		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<u>CC: Number and Quantity (N)</u>		
<u>CC: Mathematical Practices (MP)</u>		
Reading		
<u>CC: Reading Informational Text</u>		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		

Science		
<u>Physical Science</u>		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Other <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Other <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 11 INTRODUCTION TO POWER	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Circuit Challenge activity Power assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 1-3 3.3. Energy and Power 3.4. Power in an Electric Circuit 3.7. Power Supplies International Society of Certified Electronics Technicians (ISCET) 4-6 4.6. Power in a Series Circuit 5.5. Power in a Parallel Circuit 6.3. Troubleshooting	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 12 INTRODUCTION TO DC CIRCUITS		Hours: 10
Performance Assessment(s):		
ISCET assignment Textbook assignment Circuit Challenge activity Introduction to DC assessment Introduction to DC lab activity		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 5: Health and Safety International Society of Certificited Electronics Technicians (ISCET) 1-3 1.1. Electrical Components and Measuring Instruments 1.3. Engineering Notation and Metric Prefixes 2.3. Voltage 2.4. Current 2.5. Resistance 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 3.1. Ohm's Law 3.2. Application of Ohm's Law 3.3. Energy and Power 3.4. Power in an Electric Circuit 3.6. Energy Conversion and Voltage Drop in a Resistance 3.8. Introduction to Troubleshooting International Society of Certificited Electronics Technicians (ISCET) 4-6 4.1. Resistors in series 4.2. Current in a Series Circuit 4.3. Total Series Resistance 4.4. Ohm's Law in Series Circuits 4.5. Voltage Sources in Series 4.6. Power in a Series Circuit 4.7. Circuit Ground 4.8. Troubleshooting 5.1. Resistors in Parallel 5.2. Voltage in Parallel Circuits 5.3. Total Parallel Resistance 5.4. Ohm's Law in Parallel Circuits		

5.5. Power in a Parallel Circuit
5.6. Troubleshooting
6.1. Identifying Series-Parallel Relationships
6.2. The Wheatstone Bridge
6.3. Troubleshooting

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Number and Quantity (N)

CC: Mathematical Practices (MP)

Reading

CC: Reading Informational Text

CC: Reading for Literacy in Science and Technical Subjects

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 13 INTRODUCTION TO MAGNETISM	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Circuit Challenge activity Introduction to Magnetism assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety - Understand and apply concepts related to computers and electronics Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 1-3 International Society of Certified Electronics Technicians (ISCET) 4-6	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 14 INDUCTANCE	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Circuit Challenge activity Inductance assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certifited Electronics Technicians (ISCET) 1-3 International Society of Certifited Electronics Technicians (ISCET) 4-6	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u> <u>CC: Number and Quantity (N)</u>	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 15 CAPACITANCE	Hours: 10
Performance Assessment(s):	
ISCET assignment Textbook assignment Circuit Challenge activity Capacitance assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 1-3 International Society of Certified Electronics Technicians (ISCET) 4-6	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u> <u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u> <u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 16 LEADERSHIP	Hours: 5
Performance Assessment(s):	
SkillsUSA Professional Development Program Activities In Class Leadership Opportunities Professional Behaviour Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 3: Employability and Entrepreneurship Standard WR 6: Teamwork and Cooperation	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing (9-10)</u>	
<u>CC: Writing (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 17 PROJECTS	Hours: 20
Performance Assessment(s):	
Soldering Projects and Kits	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET) 7 7.1. Solder 7.2. Soldering Equipment 7.3. Desoldering Equipment 7.4. Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 18 FINAL ASSESSMENT		Hours: 5
Performance Assessment(s):		
Final Assessment		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certificited Electronics Technicians (ISCET) 1-3 1.1. Electrical Components and Measuring Instruments 1.2. Scientific Notation 1.3. Engineering Notation and Metric Prefixes 1.4. Metric Unit Conversions 2.1. Atoms 2.2. Electrical Charge 2.3. Voltage 2.4. Current 2.5. Resistance 2.6. The Electric Circuit 2.7. Basic Circuit Measurements 2.8. Electrical Safety 3.1. Ohm's Law 3.2. Application of Ohm's Law 3.3. Energy and Power 3.4. Power in an Electric Circuit 3.5. The Power Rating of Resistors 3.6. Energy Conversion and Voltage Drop in a Resistance 3.7. Power Supplies 3.8. Introduction to Troubleshooting International Society of Certificited Electronics Technicians (ISCET) 4-6 4.1. Resistors in series 4.2. Current in a Series Circuit 4.3. Total Series Resistance 4.4. Ohm's Law in Series Circuits 4.5. Voltage Sources in Series 4.6. Power in a Series Circuit 4.7. Circuit Ground 4.8. Troubleshooting		

5.1. Resistors in Parallel
 5.2. Voltage in Parallel Circuits
 5.3. Total Parallel Resistance
 5.4. Ohm's Law in Parallel Circuits
 5.5. Power in a Parallel Circuit
 5.6. Troubleshooting
 6.1. Identifying Series-Parallel Relationships
 6.2. The Wheatstone Bridge
 6.3. Troubleshooting
 International Society of Certified Electronics Technicians (ISCET) 7
 7.1. Solder
 7.2. Soldering Equipment
 7.3. Desoldering Equipment
 7.4. Safety

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

CC: Algebra (A)

CC: Number and Quantity (N)

Reading

CC: Reading for Literacy in Science and Technical Subjects

CC: Reading Informational Text

Science

Physical Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☒ Think Creatively
- ☒ Work Creatively with Other
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others



Advanced Electronics Technology (3-4)



INTRODUCTION

Course Name	Advanced Electronics Technology	Grade Levels	10-12
Course Length	180 hours	Course Codes	CTE-383, CTE-384

Course Description	Students will learn more advanced theory and applications of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. They will design and fabricate circuits using classroom resources. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).
Pathway Connections Primary Connection Secondary Connection	Skilled and Technical Sciences, STEM Electrical and Electronic Equipment Repair Electrician
Sample Sequence of Courses	<ol style="list-style-type: none">1. Basic Algebra2. Electronics Technology3. Advanced Electronics Technology4. Computer Systems Engineering
Cross Credit and/or College Credit	<ul style="list-style-type: none">• Third year math or Advanced Algebra/Trig• Lab Science• Tech Prep Credit
Basic Textbook	Introduction to Electronics 6th Edition by Earl Gates
Equipment	<ul style="list-style-type: none">• Digital Multimeters• Soldering Irons and related support equipment• DC & AC Regulated Power Supplies• Oscilloscopes and related support equipment• Frequency Generators• Audio Generators
Software	<ul style="list-style-type: none">• ETCAI Products: Electricity and Electronics Interactive Software<ul style="list-style-type: none">○ Basic Circuits Challenge○ DC Circuits Challenge○ AC Circuit Challenge○ Ohmmeter Challenge○ Voltmeter Challenge○ Other application specific software

**Supplemental Materials**

- Electronic Courseware Interactive (EKI) workbooks
- Chaney Training Course
- International Society of Certified Electronics Technician Online Learning
- Newspapers, Magazines, and Professional Journals
- Internet
- Videos



Skills Gap Data (CTE Courses only)

United States Department of Labor:

- Electrical & Electronics Engineer 4% growth; 12,600 jobs
- Electrician 20% growth; 114,700 jobs
- Broadcast and Sound Technician 9% growth; 10,600 jobs
- Medical Equipment Repair 30% growth; 12,800 jobs
- Assembler Fabricator 4% growth; 64,200 jobs

Employment Security Department Washington State:

- Electrical Equipment and Appliance short-term-industry-projections (2yr): 2014-2016, 5% growth, 4900 to 5400. Long-term-industry-projections (10yr):2014-2023, 3.5%
- Electrical Engineers short term Occupational-employment projections (2yr): 2014-2016
- Electricians short term Occupational-employment projections (2yr): 2014-16, 4.5% growth 15,720 - 17,161. Long -term-industry projections (10yr): 2014-2023,
- Electronic Home Entertainment Equipment Installers and Repairers short term Occupational-employment projections (2 yr): 2014-2016, 2.21%, 515 - 538. Long -term-occupational projections (10yr): 2014-2023, 2.17%



COURSE OUTLINE

Course Name Advanced Electronics Technology **Grade Levels** 10-12

Students will learn more advanced theory and applications of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. They will design and fabricate circuits using classroom resources. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).

1. Safety

- A. Safety Video
- B. Classroom Safety
- C. International Society of Certified Electronics Technicians (ISCET) Safety Lesson
- D. Safety Assessment

2. DC Electronics Review

- A. ISCET modules
- B. Gates book work
- C. Basic Circuits Challenge activities
- D. DC Circuits Challenge activities
- E. Breadboarding
- F. DC Electronics Review Assessment

3. Introduction to Surface Mount Technology

- A. Chaney supplemental curriculum
- B. SMT project
- C. SMT Assessment

4. Introduction to Alternating Current

- A. Gates book work
- B. ISCET modules
- C. AC Circuit Challenge
- D. Lab work
- E. AC Assessment



5. Capacitance

- A. Gates book work
- B. ISCET modules
- C. DC Circuits Challenge
- D. AC Circuits Challenge
- E. Capacitance Labs
- F. Capacitance Assessment

6. Inductance

- A. Gates book work
- B. ISCET modules
- C. DC Circuits Challenge
- D. AC Circuits Challenge
- E. Inductance Labs
- F. Inductance Assessment

7. RLC and Resonance Circuits

- A. Gates book work
- B. ISCET modules
- C. AC Circuits Challenge
- D. RLC and Resonance Labs
- E. RLC and Resonance Assessment

8. Transformers

- A. Gates book work
- B. ISCET modules
- C. AC Circuits Challenge
- D. Transformer Labs
- E. Transformer Assessment

9. Introduction to Semiconductors

- A. Gates book work
- B. ISCET modules
- C. ETCAI Challenge Exercises
- D. Semiconductor Labs
- E. Semiconductor Assessment



10. Introduction Digital

- A. Gates book work
- B. ISCET modules
- C. Digital Challenge
- D. Digital Assessment

11. Digital Logic Gates

- A. Gates book work
- B. ISCET modules
- C. Digital Challenge
- D. Lab work
- E. Logic Gates Assessment

12. Sequential and Combinational Logic

- A. ISCET modules
- B. Gates book work
- C. Lab work
- D. Sequential and Combinational Assessment

13. Introduction to microcontrollers

- A. ISCET modules
- B. Gates book work
- C. Lab work
- D. Microcontroller Assessment

14. Leadership

- A. Introduction to leadership
- B. Establish Leadership strategies
- C. Establish a Plan for Individual Goals

15. Projects

- A. Component Identifications
- B. Tool Use
- C. Following Procedures
- D. Workplace Behaviors

16. Final Assessment



Course Name	Advanced Electronics Technology	Grade Level(s)	9-12
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POWER STANDARDS

Students will learn more advanced theory and applications of electricity and electronics through building electronics kits and completing projects. They will be taught Electrical and Electronic safety, as they learn to use test equipment and apply classroom theory, while constructing, testing and troubleshooting circuits. They will design and fabricate circuits using classroom resources. The goal for this course is to prepare students to achieve International Society of Certified Electronic Technicians (ISCET) Certification(s).

The student will...

1. Circuit Analysis - Students will apply mathematical and problem solving skills and science principles to electronic circuits.
2. Safety and Workplace Behaviors - Students will demonstrate industry safety, leadership and professional workplace behaviors.
3. Tools & Technology Applications - Students will apply the correct tools, techniques and vocabulary in their work.
4. Career Readiness - Students understand, apply, and evaluate, technology career fields.

SKILLS GAP/LABOR MARKET DATA
Advanced Electronics Technology

Electronics Technology Overall	
Advanced Electronics Technology	<p>United States Department of Labor:</p> <ul style="list-style-type: none">• Electrical & Electronics Engineer 4% growth; 12,600 jobs• Electrician 20% growth; 114,700 jobs• Broadcast and Sound Technician 9% growth; 10,600 jobs• Medical Equipment Repair 30% growth; 12,800 jobs• Assembler Fabricator 4% growth; 64,200 jobs <p>Employment Security Department Washington State:</p> <ul style="list-style-type: none">• Electrical Equipment and Appliance short-term-industry-projections (2yr): 2014-2016, 5% growth, 4900 to 5400. Long-term-industry-projections (10yr):2014-2023, 3.5%• Electrical Engineers short term Occupational-employment projections (2yr): 2014-2016• Electricians short term Occupational-employment projections (2yr): 2014-16, 4.5% growth 15,720 - 17,161. Long -term-industry projections (10yr): 2014-2023,• Electronic Home Entertainment Equipments Installers and Repairers short term Occupational-employment projections (2 yr): 2014-2016, 2.21%, 515 - 538. Long -term-occupational projections (10yr): 2014-2023, 2.17%

Electronics Technology & Advanced Electronics Technology



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

Electronics Technology & Advanced Electronics Technology ** LEARNING AND INNOVATION SKILLS **	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & sConferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences

	SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Electronics Technology & Advanced Electronics Technology

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy 6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

Electronics Technology & Advanced Electronics Technology

** LIFE AND CAREER SKILLS **

21st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles	Professional Development Program (PDP) Total Quality Curriculum

and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests

Activity Descriptions

Electronics Technology

The contest is divided into five sections: customer service exam, written exam, soldering, breadboarding and troubleshooting. Contestants' will demonstrate their knowledge of analog and digital circuitry; ability to troubleshoot electronic circuits; ability to construct and test experimental circuits; and, ability to design and select circuit components. All aspects of the competition test contestants' abilities to use and calibrate electronic equipment, record and organize data, and demonstrate proper safety practices.

Auburn School District #408 Framework: Advanced Electronics Technology (3-4)

Course: Electrial Equipment Installation and Repair

Total Framework Hours: 180 Hours

CIP Code: 470101

Type: Preparatory

Career Cluster: Manufacturing

Date Last Modified: Tuesday, December 15, 2015

Resources and Standard used in Framework Development:

Standards used for this framework are from the OSPI Model Framework for 470101 Computer Installation and Repair Technology/Technician

Unit 1 SAFETY

Hours: 5

Performance Assessment(s):

Textbook assignment
Safety assignment
Safety Exam

Leadership Alignment:

SkillsUSA Electronics Technology
Professional Development Program (PDP)

Standards and Competencies

Standard: General and Computer Safety
Standard WR 2: Personal Success
Standard WR 5: Health and Safety
International Society of Certifited Electronics Technicians (ISCET) 7
7.4. Safety

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading for Literacy in Science and Technical Subjects

CC: Reading Informational Text

Science		
Social Studies		
Writing		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)		
CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 2 DIRECT CURRENT REVIEW	Hours: 10
Performance Assessment(s):	
Textbook assignment Direct Current assignment Circuit Challenge activity Direct assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard WR 2: Personal Success Standard WR 5: Health and Safety International Society of Certifited Electronics Technicians (ISCET) 1-3 International Society of Certifited Electronics Technicians (ISCET) 4-6 International Society of Certifited Electronics Technicians (ISCET) 7 7.4. Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
<u>CC: Reading Informational Text</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☒ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 3 INTRODUCTION TO SURFACE MOUNT TECHNOLOGY		Hours: 10
Performance Assessment(s):		
Textbook assignment Introduction to Surface Mount Technology assignment Introduction to Surface Mount Technology assessment		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard: General and Computer Safety Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certified Electronics Technicians (ISCET) 7 7.1. Solder 7.2. Soldering Equipment 7.3. Desoldering Equipment 7.4. Safety		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		
<u>CC: Reading Informational Text</u>		
Science		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 4 INTRODUCTION TO ALTERNATING CURRENT (AC)	Hours: 10
Performance Assessment(s):	
Textbook assignment Introduction to Alternating Current assignment Circuit Challenge activity Introduction to Alternating Current assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certificited Electronics Technicians (ISCET ESA2) Alternating Current and Voltage AC and Ohm's Law	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Algebra (A)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 5 CAPACITANCE	Hours: 15
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA2) Capacitors Capacitors and AC RC Circuits	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u>	
<u>CC: Algebra (A)</u>	
<u>CC: Number and Quantity (N)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 6 INDUCTANCE	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA2) Inductors Inductors and AC Magnetism and Electromagnetism Magnetic Devices RL Circuits	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u>	
<u>CC: Algebra (A)</u>	
<u>CC: Number and Quantity (N)</u>	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
<u>CC: Reading Informational Text</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 7 RLC AND RESONANCE CIRCUITS		Hours: 15
Performance Assessment(s):		
Textbook assignment Circuit Challenge activity Assessment		
Leadership Alignment:		
SkillsUSA Electronics Technology Professional Development Program (PDP)		
Standards and Competencies		
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA2) RLC Circuits Resonance		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<u>CC: Mathematical Practices (MP)</u>		
<u>CC: Number and Quantity (N)</u>		
<u>CC: Algebra (A)</u>		
Reading		
<u>CC: Reading for Literacy in Science and Technical Subjects</u>		
<u>CC: Reading Informational Text</u>		
Science		
<u>Physical Science</u>		

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 8 TRANSFORMERS	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA2) Transformers International Society of Certified Electronics Technicians (ISCET ESA3) Power Supplies	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u>	
<u>CC: Algebra (A)</u>	
<u>CC: Number and Quantity (N)</u>	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
<u>CC: Reading Informational Text</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 9 INTRODUCTION TO SEMICONDUCTORS	Hours: 25
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA3) Semiconductors Special Diodes Bipolar Junction Transistors Bipolar Transistor Amplifiers Field Effect Transistors Operational Amplifiers and Oscillators Power Supplies	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u>	
<u>CC: Number and Quantity (N)</u>	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
<u>CC: Reading Informational Text</u>	
Science	
<u>Physical Science</u>	

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 10 INTRODUCTION TO DIGITAL	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA4) Digital Concepts and Number Systems	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 11 DIGITAL LOGIC GATES	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA4) Logic Gates and Boolean Algebra	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 12 SEQUENTIAL AND COMBINATIONAL LOGIC	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA4) Logic Gates and Boolean Algebra Clocked Logic	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 13 INTRODUCTION TO MICROCONTROLLERS	Hours: 10
Performance Assessment(s):	
Textbook assignment Circuit Challenge activity Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certified Electronics Technicians (ISCET ESA4) Computers and the Data Bus	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 14 LEADERSHIP	Hours: 10
Performance Assessment(s):	
SkillsUSA Professional Development Program Activities In Class Leadership Opportunities Professional Behaviour Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 6: Teamwork and Cooperation	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading Informational Text</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 15 PROJECTS	Hours: 15
Performance Assessment(s):	
Soldering Projects and Kits	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving International Society of Certificited Electronics Technicians (ISCET ESA1) 7 7.1. Solder 7.2. Soldering Equipment 7.3. Desoldering Equipment 7.4. Safety	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	
 <u>CC: Reading Informational Text</u>	
Science	
Social Studies	
Writing	
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>	
 <u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>	

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovatio

- ☐ Think Creatively
- ☐ Work Creatively with Other
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboratio

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Other
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 16 FINAL ASSESSMENT	Hours: 5
Performance Assessment(s):	
Final Assessment	
Leadership Alignment:	
SkillsUSA Electronics Technology Professional Development Program (PDP)	
Standards and Competencies	
Standard: General and Computer Safety Standard: Electronics - Units, Notations, Properties and Quantities Standard WR 2: Personal Success Standard WR 4: Problem Solving Standard WR 5: Health and Safety International Society of Certifited Electronics Technicians (ISCET ESA1) 1-3 International Society of Certifited Electronics Technicians (ISCET ESA1) 4-6 International Society of Certifited Electronics Technicians (ISCET ESA2) International Society of Certifited Electronics Technicians (ISCET ESA3) International Society of Certifited Electronics Technicians (ISCET ESA4) International Society of Certifited Electronics Technicians (ISCET ESA1) 7	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Number and Quantity (N)</u>	
<u>CC: Algebra (A)</u>	
<u>CC: Mathematical Practices (MP)</u>	
Reading	
<u>CC: Reading Informational Text</u>	
<u>CC: Reading for Literacy in Science and Technical Subjects</u>	

Science		
<u>Physical Science</u>		
Social Studies		
Writing		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</u>		
<u>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovatio <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Other <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboratio <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Other <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others



Web Design



INTRODUCTION

Course Name	Web Design	Grade Level(s)	9-12
Course Length	360 hours	Course Code(s)	CTE 391, CTE 392, CTE 393, CTE 394

Course Description	Students will learn the fundamentals of Web Design by learning basic programming and multimedia production skills. They will focus on producing written and graphic content for the internet in HTML and through the use of Adobe Creative Suite. Students will also strengthen their research, writing, and group-work skills in order to apply them to a web publishing environment. Building on the knowledge from WWW Publishing I, WWW Publishing II will teach students other web support languages, e-commerce strategies, and sophisticated graphics and layout design.
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Pathway Connections	Skilled and Technical Sciences, STEM
Primary Connection	Electrical and Electronic Equipment Repair
Secondary Connection	Electrician

Sample Sequence of Courses	<ol style="list-style-type: none"> 1) Basic Algebra 2) Electronics Technology 3) Advanced Electronics Technology 4) Computer Systems Engineering
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Cross Credit and/or College Credit	<ol style="list-style-type: none"> 1) Third year math or Advanced Algebra/Trig 2) Lab Science 3) Tech Prep Credit
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Basic Textbook	Introduction to Electronics 6th Edition by Earl Gates
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Equipment	Internet enabled computers with Adobe Suite
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Software	Adobe Creative Suite 6
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Supplemental Materials	<ol style="list-style-type: none"> 1) Edulaunch website 2) Newspapers, Magazines, and Professional Journals 3) Internet 4) Videos
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Skills Gap Data (CTE Courses only)	United States Department of Labor: <ul style="list-style-type: none"> ● Electrical & Electronics Engineer 4% growth; 12,600 jobs ● Electrician 20% growth; 114,700 jobs ● Broadcast and Sound Technician 9% growth; 10,600 jobs ● Medical Equipment Repair 30% growth; 12,800 jobs ● Assembler Fabricator 4% growth; 64,200 jobs
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Employment Security Department Washington State:

- Electrical Equipment and Appliance short-term-industry-projections (2yr): 2014-2016, 5% growth, 4900 to 5400. Long-term-industry-projections (10yr):2014-2023, 3.5%
- Electrical Engineers short term Occupational-employment projections (2yr): 2014-2016, 1.7%, 1,501 - 1567. Long -term-occupational projections (10yr): 2014-2023, 0.87%
- Electricians short term Occupational-employment projections (2yr): 2014-16, 4.5% growth 15,720 - 17,161. Long -term-occupational projections (10yr): 2014-2023, 3.66%
- Electronic Home Entertainment Equipment Installers and Repairers short term Occupational-employment projections (2 yr): 2014-2016, 2.21%, 515 - 538. Long -term-occupational projections (10yr): 2014-2023, 2.17%



COURSE OUTLINE

Course Name _____ **Web Design 1-2** _____ **Grade Level(s)** _____ **9-12** _____

Students will learn the theory and fundamentals of Web design through building sites using HTML, Dreamweaver, CSS and Java. They will be taught graphic design, proper workplace behavior and collaboration. The goal for this course is to give the skills necessary to successfully create and manage a website.

1. Internet/ Web Design Intro

- A. Aspects of a good site
- B. Designer vs Developer
- C. Fundamentals of Design
- D. Web Etiquette
- E. Viruses and Malware
- F. Design Assessment

2. HTML Coding

- A. Foundations of HTML
- B. Basic HTML Components
- C. Code Assessment
- D. HTML Exercises and Projects:
 - I. Equestrian Website Exercise
 - II. Business Storefront Website Project

3. Cascading Style Sheets

- A. CSS syntax
- B. Supporting code
- C. Design tools and application

4. Graphic Design

- A. Photoshop Basics
- B. Photo repair
- C. Image design
- D. Colorization
- E. Drawing using Photoshop
- F. Enhancements and Sizing for web use

5. Electronic Portfolios

- A. Usability and Accessibility
- B. Interface technique
- C. File Management



6. Adobe Dreamweaver and Fireworks

- A. Web Authoring tools
- B. Web site management
- C. Dreamweaver tools
- D. Website Projects:
 - I. Mount Rushmore website project
 - II. Superhero website project
- E. Intro to Java

7. Practical Application/Website planning

- A. Work Application Project
- B. Editing
- C. Collaborate

8. Review, Feedback and Final

- A. Peer evaluation
- B. Final Exam
- C. Course evaluation



Course Name Web Design 1-2

Grade Level(s) 9-12

POWER STANDARDS

Students will learn the fundamentals of Web Design by learning basic programming and multimedia production skills. They will focus on producing written and graphic content for the internet in HTML and through the use of Adobe Creative Suite. Students will also strengthen their research, writing, and group-work skills in order to apply them to a web publishing environment. Building on the knowledge from WWW Publishing I, WWW Publishing II will teach students other web support languages, e-commerce strategies, and sophisticated graphics and layout design.

The student will...

1. Understand the history and development of the web
2. Identify and use HTML tags
3. Use appropriate web principles in designing web pages
4. Use appropriate graphics and graphical programs to enhance web pages
5. Use web authoring tools to create web pages
6. Practice and demonstrate good workplace behavior

Web Design 1-4



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

<h2 style="text-align: center; color: red; margin: 0;">Web Design 1-4</h2> <h3 style="text-align: center; margin: 0;">** LEARNING AND INNOVATION SKILLS **</h3>	
21 st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & sConferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings &

	Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Web Design 1-4

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information	Local Program Resource Guide (Current Edition)

4.A.1 Access information efficiently (time) and effectively (sources)	Connecting Career Development Event (Local, State, and National Level)
4.A.2 Evaluate information critically and competently	Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information	Local Program Resource Guide (Current Edition)
4.B.1 Use information accurately and creatively for the issue or problem at hand	Connecting Career Development Event (Local, State, and National Level)
4.B.2 Manage the flow of information from a wide variety of sources	Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	
Analyze Media	
5.A.1 Understand both how and why media messages are constructed, and for what purposes	
5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors	
5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products	
5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions	
5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively	Professional Development Program (PDP)
6.A.1 Use technology as a tool to research, organize, evaluate and communicate information	SkillsUSA Championships Technical Standards— Leadership Contests
6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy	Leadership Handbook Regional, State, & National Conferences & Contests
6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	

Web Design 1-4

** LIFE AND CAREER SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change	Professional Development Program (PDP)
7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts	SkillsUSA Championships Technical Standards Leadership Handbook
7.A.2 Work effectively in a climate of ambiguity and changing priorities	Chapter, Regional, State, & National Meetings & Conferences

	Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with	Professional Development Program (PDP) SkillsUSA Championships Technical Standards

<p>producing high quality products including the abilities to:</p> <p>10.B.1.a Work positively and ethically</p> <p>10.B.1.b Manage time and projects effectively</p> <p>10.B.1.c Multi-task</p> <p>10.B.1.d Participate actively, as well as be reliable and punctual</p> <p>10.B.1.e Present oneself professionally and with proper etiquette</p> <p>10.B.1.f Collaborate and cooperate effectively with teams</p> <p>10.B.1.g Respect and appreciate team diversity</p> <p>10.B.1.h Be accountable for results</p>	<p>Leadership Handbook</p> <p>Regional, State, & National Conferences & Contests</p> <p>Serve as a chapter officer or state officer</p>
<p>Guide and Lead Others</p> <p>11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal</p> <p>11.A.2 Leverage strengths of others to accomplish a common goal</p> <p>11.A.3 Inspire others to reach their very best via example and selflessness</p> <p>11.A.4 Demonstrate integrity and ethical behavior in using influence and power</p>	<p>Professional Development Program (PDP)</p> <p>Leadership Handbook</p> <p>Serve as a chapter officer or state officer</p> <p>Regional, State, & National Meetings & Conferences</p> <p>SkillsUSA Championships Technical Standards</p>
<p>Be Responsible to Others</p> <p>11.B.1 Act responsibly with the interests of the larger community in mind</p>	<p>Professional Development Program (PDP)</p> <p>Shadowing & Mentoring</p> <p>Regional, State, & National Conferences & Contests</p>

Activity Descriptions

Web Design

The project will be for each team's to complete a series of challenges, with a focus on web site usability and accessibility with at least one challenge related to scripting. Each challenge must be documented, clearly demonstrating the skills as outlined in the SkillsUSA Championships Technical Standards 2010.

SKILLS GAP/LABOR MARKET DATA
Web Design

Web Design overall																	
Web Design	<p>United States Department of Labor:</p> <ul style="list-style-type: none"> Web developer 20% growth 28,500 jobs (2012-22); \$62,500 per year, \$30.05 per hour; number of jobs 141,000 <p>Employment Security Department Washington State:</p> <ul style="list-style-type: none"> Web developer 3.4% growth 405 jobs (2013-23); \$87,429 per year, \$42.03 per hour; estimated employment 6,957 <p>Web developers are responsible for both the look of a website and its technical aspects.</p> <table border="1"> <thead> <tr> <th colspan="2">Quick Facts: Web Developers</th></tr> </thead> <tbody> <tr> <td>2014 Median Pay</td><td>\$63,490 per year \$30.52 per hour</td></tr> <tr> <td>Typical Entry-Level Education</td><td>Associate's degree</td></tr> <tr> <td>Work Experience in a Related Occupation</td><td>None</td></tr> <tr> <td>On-the-job Training</td><td>None</td></tr> <tr> <td>Number of Jobs, 2014</td><td>148,500</td></tr> <tr> <td>Job Outlook, 2014-24</td><td>27% (Much faster than average)</td></tr> <tr> <td>Employment Change, 2014-24</td><td>39,500</td></tr> </tbody> </table>	Quick Facts: Web Developers		2014 Median Pay	\$63,490 per year \$30.52 per hour	Typical Entry-Level Education	Associate's degree	Work Experience in a Related Occupation	None	On-the-job Training	None	Number of Jobs, 2014	148,500	Job Outlook, 2014-24	27% (Much faster than average)	Employment Change, 2014-24	39,500
Quick Facts: Web Developers																	
2014 Median Pay	\$63,490 per year \$30.52 per hour																
Typical Entry-Level Education	Associate's degree																
Work Experience in a Related Occupation	None																
On-the-job Training	None																
Number of Jobs, 2014	148,500																
Job Outlook, 2014-24	27% (Much faster than average)																
Employment Change, 2014-24	39,500																

Computer and information systems managers learn about new technology and look for ways to upgrade their organization's computer systems.

Quick Facts: Computer and Information Systems Managers

2014 Median Pay	\$127,640 per year \$61.37 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	5 years or more
On-the-job Training	None
Number of Jobs, 2014	348,500
Job Outlook, 2014-24	15% (Much faster than average)
Employment Change, 2014-24	53,700

Multimedia artists and animators create animation and visual effects for television, movies, video games, and other media.

Quick Facts: Multimedia Artists and Animators

2014 Median Pay	\$63,630 per year \$30.59 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	Moderate-term on-the-job training
Number of Jobs, 2014	64,400
Job Outlook, 2014-24	6% (As fast as average)
Employment Change, 2014-24	3,900



Auburn School District

Course: Web Publishing		Total Framework Hours up to: 180
CIP Code: 110801	<input type="checkbox"/> Exploratory <input checked="" type="checkbox"/> Preparatory	Date Last Modified: January, 2016
Career Cluster: Information Technology		Career Pathway: Programming and Software Development

Power Standards

Unit Outline

	<u>Hours</u>
Unit 1: Introduction to Internet Concepts	10
Unit 2: HTML	40
Unit 3: Cascading Style Sheets	10
Unit 4: Graphic Design – Photoshop or other software	40
Unit 5: Electronic Portfolios – Plan, Design, and Create	10
Unit 6: Dreamweaver and Fireworks Creating Websites	40
Unit 7: Website Planning (Practical Application/ Project)	20
Unit 8: Review/Revise and Feedback	10
Total Hours	180

UNIT 1 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students are introduced to the history of the internet, societal impacts, copyright and fair use as they apply to the internet and web searches and browsers.

Embedded Leadership Activities

- Students will use copyright and fair use policies when developing web sites.
- Students will search for current cases reporting misuse of copyright, intellectual property or internet use. They will present findings throughout semester to discuss and consider possible solutions to these problems.
- Students will do research and create a web page(s) on different legal issues that directly impact web designers.

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 1: INTRODUCTION TO INTERNET CONCEPTS

Competencies

Total Learning Hours for Unit: 10

Project and Process Management Skills

- Recognize the computer as a communication skill and a way of connecting with people and information
- Students consider the development of the internet and assess advantages and disadvantages
- Discuss security principles, vulnerability and threats
- Explain principles of secure password strategies
- Illustrate what fundamental legal issues involved with security management
- Identify and explain copyright issues as they pertain to websites
- Describe sourcing requirements of borrowed works

Technical Skills

- Search Engines

Research and Communication Skills

- Responsibilities of Internet use
- History of the Internet

NWCET

- Compare/contrast the features of major Internet browsers
- Explain the history, structure, and relevance of the Internet
- Identify the benefits and downfalls of various search engines

ALIGNED WASHINGTON STATE STANDARDS

Art

- 1.2 Develop arts skills and techniques
- 3.1 Use the arts to express and present ideas and feelings

	3.2 Use the arts to communicate for a specific purpose
Communications COMMON CORE Speaking and Listening Standards	SL4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
Reading COMMON CORE	RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
Writing COMMON CORE	W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.) W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.) W8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
Language Standards COMMON CORE	L2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. a. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. b. Use a colon to introduce a list or quotation.

UNIT 2 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students will learn the basics of HTML coding in creating web pages.

Embedded Leadership Activities

- Students will build different web sites throughout the semester focusing on industry standards and professional appearance. Work will be produced using HTML tagging. Sites must be working flawlessly, have appropriate text and images to support contents purpose. (Students will have an opportunity to select from options presented by instructor.)

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 2 – HTML – HYPERTEXT MARK-UP LANGUAGE

Competencies

Total Learning Hours for Unit: 40

Project and Process Management Skills

- Work with multiple HTML coding applications
- Launch HTML document in a browser

Technical Skills

- Identify HTML tags and syntax in accordance with W3C standards
- Describe using tables for page layout and tabular data
- Create anchors, absolute, and relative hypertext links
- Evaluate the use of frames and I-frames in web design and identify and offer alternatives
- Implement interactivity using a form
- Employ appropriate tags to incorporate multimedia components
- List the industry standard web authoring tools available
- Identify various browsers and their associated operating systems
- Apply design debugging techniques
- Create tables, lists, formatting, links, backgrounds, images, sound in HTML code

Research and Communication Skills

- Internet HTML support websites
- Error resolution

NWCET

- Supporting code
- Select programming languages, design tools and applications
- Develop and perform test procedures

ALIGNED WASHINGTON STATE STANDARDS

Art	<p>1.2 Develop arts skills and techniques</p> <p>3.1 Use the arts to express and present ideas and feelings</p> <p>3.2 Use the arts to communicate for a specific purpose</p>
Communications COMMON CORE Speaking and Listening Standards	SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	<p>1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.</p> <p>1.2.1 Communicate and collaborate to learn with others.</p> <p>1.3.2 Locate and organize information from a variety of sources and media.</p> <p>2.1.2 Practice ethical and respectful behavior.</p> <p>2.2.1 Develop skills to use technology effectively.</p> <p>2.3.1 Select and use common applications.</p> <p>2.3.2 Select and use online applications.</p> <p>2.4.1 Formulate and synthesize new knowledge.</p>
Reading COMMON CORE	<p>RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p>RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.</p>
Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Science	<p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p>
Writing COMMON CORE	<p>W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)</p> <p>W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p>
Language Standards COMMON CORE	<p>L2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <p>c. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.</p> <p>d. Use a colon to introduce a list or quotation.</p>

UNIT 3 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students will learn the basics of CSS in formatting web pages.

Embedded Leadership Activities

- Students will learn the concepts of CSS and how it is used when developing web pages.
- Students will use these strategies and evaluate these features and its use in automated software such as Adobe Dream Weaver, etc.

STANDARDS AND COMPETENCIES

Standard/Unit:**UNIT 3 – CASCADING STYLE SHEETS****Competencies****Total Learning Hours for Unit: 10****Project and Process Management Skills**

- Work with multiple HTML coding applications
- Launch HTML document in a browser

Technical Skills

- Define CSS in accordance with W3C standards
- Explain the use of selectors, declarations, properties and values
- Demonstrate CSS syntax
- Differentiate between in-line, internal, and external style sheets
- Explain the importance of class, id, div, span attributes
- Differentiate between relative and absolute positioning

Research and Communication Skills

- Internet HTML support websites
- Error resolution

NWCET

- Supporting code
- Select programming languages, design tools and applications
- Develop and perform test procedures

ALIGNED WASHINGTON STATE STANDARDS

Art

- 1.2 Develop arts skills and techniques
- 3.1 Use the arts to express and present ideas and feelings

	3.2 Use the arts to communicate for a specific purpose
Communications COMMON CORE Speaking and Listening Standards	SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	1.1.1Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.2.1 Develop skills to use technology effectively. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
Reading COMMON CORE	RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Science	APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Language Standards COMMON CORE	L2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. e. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. f. Use a colon to introduce a list or quotation.

UNIT 4 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students will demonstrate basics of web graphics and proper design principles, scanning, saving files, importing/exporting, correct naming conventions, use of digital cameras, optimizing images.

Embedded Leadership Activities

- Students will locate, demonstrate, and produce “free use” images from the internet that meets the needs of specific web projects they are developing.
- Students will take personal snapshots of specific items to manipulate and produce quality images for professional web sites based on techniques required by graphic designers.
- Students will develop their skills regarding image (picture) manipulation, rule of thirds, composition, contrast, and balance over time.

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 4 - GRAPHIC DESIGN – (PHOTOSHOP OR OTHER GRAPHIC DESIGN SOFTWARE.)

Competencies

Total Learning Hours for Unit: 40

Project and Process Management Skills

- Project Planning
- Storyboarding
- Review and redesign
- File management and naming conventions
- Copyright and image standard practices

Design Skills

- Optimizing JPEGs and GIFs
- Composition, contrast and balance
- Emphasis
- Line
- Unity and color
- Editing images
- Rule of Thirds
- Proximity and patterns
- Shape
- Typography

Technical Skills

- Scanning photographs, objects, and drawings
- Using a digital camera
- Panel elements and structure

- Export window and settings
- Effects
- Drawing
- Text

Research and Communication Skills

- Graphics file types
- Copyright issues
- Redesign and peer review

NWCET

- Investigate and apply effective communication components for an effective web page
- Research the impact of the digital design web page and implications for having a successful web presence
- Create and set up local site and root folders
- Infuse original design and graphics where layout is functionally sound
- Optimize graphics for optimal performance for Internet site
- Incorporate design concepts for typography, composition, movement, line, shape, color, texture and space.

ALIGNED WASHINGTON STATE STANDARDS

Art	1.2 Develop arts skills and techniques 3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose
Communications COMMON CORE Speaking and Listening Standards	SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
Reading COMMON CORE	RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the

	information or ideas.
Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Science	<p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.</p> <p>APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p>
Writing COMMON CORE	W8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

UNIT 5 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students will plan, design, and create a portfolio, link pages and a navigation bar. They will examine usability and accessibility; assure quality assurance via technical testing and user testing, and implement redesign techniques as appropriate.

Embedded Leadership Activities

- Based on projects assigned students will demonstrate proper file management and naming conventions based on industry standards.
- Students will hear and discuss the different website platforms and how each platform can present different problems based on what the web designer is trying to do.
- Students will develop and design acceptable useable websites based on teacher expectations and industry standards.
- Students will work on solutions based on web design flaws, miscommunication, poor image use, linking issues, and other problems that could exist.

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 5 – ELECTRONIC PORTFOLIOS – NAMING, ORGANIZING, AND FILE MANAGEMENT

Competencies

Total Learning Hours for Unit: 10

Project and Process Management Skills

- Categorizing files in folders
- Page construction
- Designing for usability and accessibility
- Managing a quality assurance test
- Factoring user response into redesign

Design Skills

- Investigate and incorporate color and layout consistently
- User interface techniques
- Screen size considerations
- Consistent website pages
- Rebuilding web pages based on user feedback

Technical Skills

- Layout
- Creating a root folder and site
- Tables
- Inserting images and text
- Links – relative and absolute

- Alt Tags
- Importing
- Interactive images
- Text
- Alignment
- Buttons
- Head section
- Formatting tags
- Layout tags
- Backgrounds
- Email
- Columns and borders
- Music

Research and Communication Skills

- Content validity investigation
- Navigation web investigation
- Design a quality assurance test
- Include copyright information for images

NWCET

- Plan and create a storyboard for project with checkpoints and layout for preliminary design
- Understand, create and apply navigation links, ideas and concepts
- Develop a web that focuses on user-centered design of site visually organized with graphics, text, and hyperlinks
- Create text that is readable and appropriately sized for the Internet
- Complete an electronic portfolio that contains team projects and individual projects posted to the intranet

ALIGNED WASHINGTON STATE STANDARDS

Art	1.2 Develop arts skills and techniques 3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.1 Practice personal safety. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.

Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Writing COMMON CORE	W8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

UNIT 6 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students will learn the basics of JavaScript coding in automating web pages.

Embedded Leadership Activities

- Students will learn basic Java Scripting as it applies to automated software.
- Students will understand the importance of computer interaction, motion, and sound as it applies to the audience.
- Students will select specific features that would create the best effect based on the sites purpose and the impact on the audience.

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 6 – JAVA SCRIPTING IN CREATING WEBSITES (DREAMWEAVER OR OTHER AUTOMATED SOFTWARE)

Competencies

Total Learning Hours for Unit: 40

Project and Process Management Skills

- Work with multiple HTML coding applications
- Launch HTML document in a browser

Technical Skills

- Summarize JavaScript syntax and the placement of code
- Define objects, properties and methods
- Employ interactive events with event handlers
- Define and invoke functions
- Implement common JavaScript (pop-up windows, rollovers, slideshow arrays, form verifications)
- Create and link external JavaScript page to website
- Explain basic DHTML techniques (time/date, moving objects, etc)
- Apply JavaScript debugging techniques

Research and Communication Skills

- Internet HTML support websites
- Error resolution

NWCET

- Supporting code
- Select programming languages, design tools and applications
- Develop and perform test procedures

ALIGNED WASHINGTON STATE STANDARDS

Art

- 1.2 Develop arts skills and techniques
- 3.1 Use the arts to express and present ideas and feelings
- 3.2 Use the arts to communicate for a specific purpose

Communications COMMON CORE Speaking and Listening Standards	SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 1.3.2 Locate and organize information from a variety of sources and media. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications. 2.4.1 Formulate and synthesize new knowledge.
Reading COMMON CORE	RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Science	APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions. APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design. APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Writing COMMON CORE	W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.) W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.) W8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
Language Standards COMMON CORE	L2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. g. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. h. Use a colon to introduce a list or quotation.

UNIT 7 COMPONENTS AND COMPETENCIES

Performance Assessments:

Through developing a project plan, the students will create a user specified website.

Embedded Leadership Activities

- Students will create several websites throughout the semester focusing on specific requirements for the “company” they are creating a web site for. A rubric with specific expectations along with professional appearance and industry standards will be observed. (Projects will require a storyboard, target audience considerations, appropriate use of color, font, and size, as well as, image, specialty features, appropriate content, and must be completely functional without complications.)

STANDARDS AND COMPETENCIES**Standard/Unit:****UNIT 7 – WEBSITE PLANNING (FROM DEVELOPMENT TO LAUNCH)****Competencies****Total Learning Hours for Unit: 20****Project and Process Management Skills**

- Write and follow a task list and schedule
- Collaboratively build a project plan
- Construct a list of deliverables
- Storyboarding
- Build site with tools and audience restriction

Design Skills

- Working with images and thumbnails
- Arranging text with images
- Creating a prototype
- Performing a technical test on a site
- Creating directory structure for images

Technical Skills

- Aligning images in a table
- Working with the site map
- Editing buttons
- Optimizing and sizing photographs

Research and Communication Skills

- Collaborate to define a project plan
- Develop appropriate captions for images
- Appropriate use of text

NWCET

- Gather data to identify customer requirements and capacity

ALIGNED WASHINGTON STATE STANDARDS

Art	<p>1.2 Develop arts skills and techniques</p> <p>3.1 Use the arts to express and present ideas and feelings</p> <p>3.2 Use the arts to communicate for a specific purpose</p>
Communications COMMON CORE Speaking and Listening Standards	SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	<p>1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.</p> <p>1.2.1 Communicate and collaborate to learn with others.</p> <p>1.3.2 Locate and organize information from a variety of sources and media.</p> <p>2.1.1 Practice personal safety.</p> <p>2.1.2 Practice ethical and respectful behavior.</p> <p>2.2.1 Develop skills to use technology effectively.</p> <p>2.3.1 Select and use common applications.</p> <p>2.3.2 Select and use online applications.</p> <p>2.4.1 Formulate and synthesize new knowledge.</p>
Reading COMMON CORE	<p>RST4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p>RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.</p>
Math	N-Q1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Science	<p>APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.</p> <p>APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.</p> <p>APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p>
Writing COMMON CORE	<p>W2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <ul style="list-style-type: none"> a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. <p>W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose,</p>

	<p>and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)</p> <p>W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.)</p> <p>W8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
Language Standards COMMON CORE	<p>L2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <ul style="list-style-type: none"> i. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. j. Use a colon to introduce a list or quotation.

UNIT 8 COMPONENTS AND COMPETENCIES

Performance Assessments:

Students' will demonstrate how to properly provide feedback to classmates, review websites, and revise websites with regards to feedback.

Embedded Leadership Activities

- With guidance from a teacher, students will learn and discuss good vs. bad web site design and use. They will provide feedback and suggestions on how to improve sites currently active on the web.
- During implementation of individual project web sites, students will be encouraged to evaluate several web sites and provide feedback in a professional manner. Students will review the overall project and consider all areas of concern based on industry standards.

STANDARDS AND COMPETENCIES

Standard/Unit:

UNIT 8 – REVIEW/REVISE/FEEDBACK

Competencies

Total Learning Hours for Unit: **10**

Project and Process Management Skills

- Create a mechanism to review a website for required elements
- Providing constructive criticism

Design Skills

- Usability
- Accessibility
- Navigation techniques and consistency
- Layout for readability and emphasis
- Links functionality and accessibility

Research and Communication Skills

- Presenting a website to a group
- Providing meaningful, but not overly critical feedback
- Taking notes on critique

NWCET

- Communicate and learn how to give/take constructive criticism
- Produce business and personal presentations using technology
- Complete projects that involve critical thinking and teacher facilitation
- Evaluate and recommend optimization and improvements

ALIGNED WASHINGTON STATE STANDARDS

Art	3.1 Use the arts to express and present ideas and feelings 3.2 Use the arts to communicate for a specific purpose
Communications COMMON CORE Speaking and Listening Standards	SL4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. SL5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 2.1.2 Practice ethical and respectful behavior. 2.2.1 Develop skills to use technology effectively.
Reading COMMON CORE	RI5 Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging. RST5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
Science	APPD: The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Writing COMMON CORE	W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.)

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Critical Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgments and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and /evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology

(ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others



Engineering Design and Architecture



INTRODUCTION

Course Name	<u>Engineering Design and Architecture</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>3 years</u>	Course Code(s)	<u>CTE 401, CTE 402, CTE 405 CTE 406, CTE 409, CTE 410</u>

Course Description

Engineering Design and Architecture 1 is a class for students entering any of the fields of engineering and architecture including areas within the various Science Technology Engineering Math categories. Computer Aided Design Drafting (CAD) will be used to connect the design idea with the finished product, using the latest technology. CAD and drafting concepts will provide marketable skills for students planning to enter the work force upon graduation, or the necessary training for those headed on to a college degree in any of the design fields. All students will benefit from the skills learned in this program. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

Engineering Design and Architecture 2 students will have an opportunity to further investigate engineering, architecture and STEM concepts to develop skills and understanding of engineering principles. Students further employ engineering and scientific concepts in the solution of engineering and architecture design problems. They will continue to develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

Engineering Design and Architecture 3 & 4 Students will learn about different types of engineering, including: mechanical, civil, architectural, structural, design, and electrical. In addition, students will study material selection and application. Most of the time will be used to develop skills relating to CAD drawings using a variety of presentation methods including 3-D modeling and product design on CAD. Each student will have the opportunity to select an area of interest to study in depth. In addition to individual work, students will develop team skills as members of group projects. Students will be encouraged to certify in AutoCAD. Individual and group projects will be assigned with the emphasis on design. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

Engineering Design and Architecture 5 & 6 - Contract Study This is an individualized course where students design and construct projects related to the study of engineering and architecture, including: engineering design, mechanical, civil, architectural, electrical, structural, model development, and other related areas of study. The emphasis will be upon application of design and CAD to course work. The course content is designed by the student, with the instructor's assistance and guidance. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.



Pathway Connections	STEM, Architecture and Construction and Manufacturing
Primary Connection	Engineering Technology, Construction, Design and Pre Construction, Manufacturing production process development
Secondary Connection	Apprenticeship, Internships, Community and Technical College, Four- Year College and University
Sample Sequence of Courses	Engineering Design and Architecture 1 Engineering Design and Architecture 2 Engineering Design and Architecture 3 Engineering Design and Architecture 4 Engineering Design and Architecture 5 Contract Study Engineering Design and Architecture 6 Contract Study
Cross Credit and/or College Credit	Math Credit College Credit is available through Tech Prep Articulation
Basic Textbook	<ol style="list-style-type: none"> 1. AutoCAD 2D and 3D CAD 2. Tools for Design Using AutoCAD 2016 and Autodesk Inventor 2016 3. SDC Publication By Randy H. Shih 4. Autodesk Revit Architecture CAD 5. Residential Design Using Autodesk Revit 2016 6. SDC Publication By Daniel John Stine CSI, CDT 7. Autodesk Inventor 3D CAD 8. Autodesk Inventor 2016 9. A Tutorial Introduction 10. SDC Publication By L. Scott Hansen Ph.D. 11. <u>Creo 3.0</u> 3D CAD 12. Parametric Modeling with Creo Parametric 3.0 13. An Introduction to Creo Parametric 3.0 14. SDC Publication By Randy H. Shih
Equipment	<ul style="list-style-type: none"> • Computer stations • Dual Monitors • Laser • 3D printer • CNC Router
Software	<ul style="list-style-type: none"> • Autodesk Suite 2016 or latest – AutoCad 2D and 3D, Inventor, Revit and 3D Studio Max • Mastercam 9.0 • PTC Creo 3.0, MATH CAD • Rhinoceros • Solidworks
Supplemental Materials	<ul style="list-style-type: none"> • Autodesk 3D Studio Max • Autodesk 3ds Max 2016 Fundamentals • SDC Publication By ASCENT • Mastercam Manual • MasterCAM X9 Bundle 1 • Publisher eMastercam.com



Skills Gap Data (CTE Courses only)

Auburn School District #408
Engineering Design
OSPI Curriculum Re-approval
2015-16

Overall							
Engineering Design	All Engineering technicians, except drafters.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$16.79	\$22.58	\$29.60	\$36.81	\$44.84
		Yearly	\$34,900	\$47,000	\$61,600	\$76,600	\$93,300
	Washington	Hourly	\$22.38	\$30.32	\$36.43	\$42.26	\$46.34
		Yearly	\$46,600	\$63,100	\$75,800	\$87,900	\$96,400
	State and National Trends						
	United States		Employment		Percent Change	Projected Annual Job Openings ¹	
			2012	2022			
	Engineering Technicians, Except Drafters, All Other		67,700	68,300	+1%	1,460	
	Washington		Employment		Percent Change	Projected Annual Job Openings ¹	
			2012	2022			
	Engineering Technicians, Except Drafters, All Other		1,990	2,050	+3%	50	
Engineering Design	Drafters, all other: Washington						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$15.05	\$18.46	\$24.04	\$31.18	\$39.07
		Yearly	\$31,300	\$38,400	\$50,000	\$64,900	\$81,300
	Washington	Hourly	\$16.89	\$21.03	\$26.94	\$32.63	\$37.05
		Yearly	\$35,100	\$43,700	\$56,000	\$67,900	\$77,100
	State and National Trends						
	United States		Employment		Percent Change	Projected Annual Job Openings ¹	
			2012	2022			



	Drafters, All Other	15,600	17,600	+13%	410		
	Washington	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Drafters, All Other	700	910	+30%	30		
Engineering Design	ARCHITECTURAL AND CIVIL DRAFTERS: WASHINGTON Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Use knowledge of building materials, engineering practices, and mathematics to complete drawings.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$15.78	\$19.37	\$24.03	\$29.46	\$36.37
		Yearly	\$32,800	\$40,300	\$50,000	\$61,300	\$75,600
	Washington	Hourly	\$16.84	\$20.53	\$26.29	\$31.94	\$36.93
		Yearly	\$35,000	\$42,700	\$54,700	\$66,400	\$76,800
	State and National Trends						
	United States	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters		87,900	88,500	+1%	1,240	
	Washington	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters		1,780	2,030	+14%	50	



COURSE OUTLINE

Course Name Engineering Design and Architecture **Grade Level(s)** 9-12

Engineering Design and Architecture 1 is a class for students entering any of the fields of engineering and architecture including areas within the various Science Technology Engineering Math categories. Computer Aided Design Drafting (CAD) will be used to connect the design idea with the finished product, using the latest technology. CAD and drafting concepts will provide marketable skills for students planning to enter the work force upon graduation, or the necessary training for those headed on to a college degree in any of the design fields. All students will benefit from the skills learned in this program. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

Engineering Design and Architecture 2 students will have an opportunity to further investigate engineering, architecture and STEM concepts to develop skills and understanding of engineering principles. Students further employ engineering and scientific concepts in the solution of engineering and architecture design problems. They will continue to develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

1. Sketching and Applications

- A. Apply and demonstrate freehand sketching skills
 - I. Sketch straight lines.
 - II. Sketch circles and arcs.
 - III. Sketch curved lines.
 - IV. Sketch multi-view drawings.
 - V. Sketch pictorial drawings.
 - VI. Apply measurement and proportions
 - VII. Apply Alphabet of Lines
- B. Create pictorial drawings and models.
 - I. Identify and create isometric and oblique drawings
 - II. Identify and create perspective drawings (1-point and 2-point)
 - III. Identify and create 3D models using appropriate materials.

2. Mechanical Engineering, Drawing, and CADD Application

- A. Apply mathematical concepts to problems in engineering and design.
 - I. Apply basic mathematical skills to drafting operations
 - II. Apply mathematical calculations involving practical geometry
 - III. Calculate and evaluate geometric figures
 - IV. Create geometric constructions utilizing technical sketching techniques
 - V. Determine/select appropriate dimensioning systems



- B. Apply measurement and scale concepts in engineering and design.
 - I. Identify types of measurement used in engineering and design.
 - II. Select proper measurement tools
 - III. Perform measurements with hand held instruments
 - IV. Determine and apply appropriate scale
- C. Interpret engineering documents and control documents.
 - I. Identify and describe basic types of drawings
 - II. Locate and interpret information on specific documents
 - III. Check prints for scale accuracy, completeness, and note detail
 - IV. Verify drawing elements
- D. Create technical drawings using basic drafting procedures.
 - I. Identify, select and use fundamental drafting techniques for drawings
 - II. Identify and create “Alphabet of Lines” by name, line type variation, order of usage and application on technical drawings
 - III. Create title blocks
 - IV. Format borders
 - V. Apply appropriate annotation methods (i.e., notes and dimensions)
 - VI. Plot drawings on media using the correct layout and scale, line width, and legible text

3. Architectural Drawing and CADD Application

- A. Explore architectural drafting design concepts and problems.
 - I. Use architectural terminology in context
 - II. Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.
 - III. Identify types of measurement used in Architect and Engineering Scales.
 - IV. Select proper measurement tools
 - V. Perform measurements with hand held instruments
 - VI. Determine and apply appropriate scale
 - VII. Interpret legal land descriptions and draft site plan
 - VIII. Read and interpret architectural prints
 - IX. Apply architectural symbols to a drawing
 - X. Use industry-standard application software for architectural drawing to solve a problem
 - XI. Identify architectural design details

4. Design and Problem Solving Process and Application

- A. Apply and demonstrate the basic steps to design and problem solving
 - I. Identify key terms that relate to the Design Process.
 - II. Identify the design process for problem solving.
 - III. Understand and implement the steps of the design process.
 - IV. Apply the design process to real world problems.
 - V. Evaluation process review, Capstone and/or presentation review. (Engineering Review)



5. Computer Aided Design and Drafting CADD

- A. Manage basic computer concepts, operations and applications
 - I. Use computer hardware and input/output devices for design problems
 - II. Apply basic commands of operating system software
 - III. Apply storage and cloud management techniques
 - IV. Use industry-accepted software applications for word processing, graphics, image editing, and scanning, drawing structure, and report generation as required
 - V. Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
 - VI. Prepare files for electronic transfer.
 - VII. Access and use a computer network for file management and transfer
- B. Apply and use CADD systems and procedures.
 - I. Explore project capability of CADD systems
 - II. Analyze drawings using software functions/commands
 - III. Use software commands to set up drawing scale, format, dimensioning, etc.
 - IV. Manage layers/visible items, colors, and line type
 - V. Use geometric and non-geometric editing commands
 - VI. Control entity properties
 - VII. Incorporate standard parts, symbol libraries and/or templates to improve efficiency
 - VIII. Use grouping techniques
 - IX. Control viewing commands
 - X. Create and manipulate views by modifying coordinate system settings
 - XI. Use file commands
 - XII. Minimize a drawing file for storage and transmission
- C. Apply and understand detail projection views/components
 - I. Determine the appropriate views for projection (i.e., plan, top, front, etc.)
 - II. Identify, create and place appropriate views for orthographic projections
 - III. Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
 - IV. Identify, create and place appropriate section views
 - V. Construct full, half and offset section of an object
 - VI. Construct, sketch and/or draw views of given objects showing visible and hidden features
 - VII. Utilize various material hatch patterns in section views
- D. Explore engineering and architectural design concepts and problems
 - I. Use manufacturing and machining terminology in context
 - II. Use precision measuring equipment
 - III. Solve engineering and architectural design problems in geometry
 - IV. Use industry-standard application software for engineering and architectural problems
 - V. Apply engineering and architectural symbols to a drawing
 - VI. Prepare detail working drawings



- E. Demonstrate engineering design concepts as related to basic manufacturing processes.
 - I. Design and detail a manufactured product
 - II. Prepare models for computer numerical control (CNC) processes
 - III. Prepare models for 3D printing processes
 - IV. Prepare models for Laser engraving and cutting
 - V. Denote shop processes to be used
 - VI. Prepare bill of materials for drawings

6. Careers and Leadership – 21st Century Skills

- A. Develop a plan for a career in the fields of Engineering and Architecture.
 - I. Investigate the variety of Engineering and Architecture career options.
 - II. Develop career goals based on interests, aptitudes, and research
 - III. Describe factors that contribute to job satisfaction and success
- B. Prepare for employment in the fields of Engineering and Architecture.
 - I. Develop a resume
 - II. Develop an electronic resume
 - III. Create a drafting/design portfolio with industry-specific work samples
 - IV. Complete job application process, including electronic applications
 - V. Demonstrate interviewing skills
- C. Participate in leadership activities such as those supported by career and technical student organizations.
 - I. Determine the roles and responsibilities that leaders and members bring to an organization
 - II. Evaluate characteristics and importance of an effective team player
 - III. Evaluate characteristics of effective teams
 - IV. Practice techniques to involve each member of the team
 - V. Participate in career development events
 - VI. Develop and implement a personal and professional improvement plan
 - VII. Demonstrate business etiquette
 - VIII. Participate in character development scenarios
 - IX. Practice decision-making process



POWER STANDARDS

Course Name Engineering Design and Architecture **Grade Level(s)** 9-12

Students will...

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Read with comprehension to gain information and/or perform a task in a career setting.
5. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
6. Understand and apply appropriate safety policies and procedures.
7. Research, analyze, and evaluate Career and Post-Secondary options.
8. Use arts knowledge and skills to express and present ideas to make connections across career disciplines.
9. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
10. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
11. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.
12. Demonstrate professional development skills in a simulated customer service or employment situation.

SKILLS GAP/LABOR MARKET DATA
Engineering Design Education Program

Overall							
Engineering Design	All Engineering technicians, except drafters.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$16.79	\$22.58	\$29.60	\$36.81	\$44.84
		Yearly	\$34,900	\$47,000	\$61,600	\$76,600	\$93,300
	Washington	Hourly	\$22.38	\$30.32	\$36.43	\$42.26	\$46.34
		Yearly	\$46,600	\$63,100	\$75,800	\$87,900	\$96,400
	State and National Trends						
	United States			Employment		Percent Change	Projected Annual Job Openings ¹
				2012	2022		
	Engineering Technicians, Except Drafters, All Other			67,700	68,300	+1%	1,460
	Washington			Employment		Percent Change	Projected Annual Job Openings ¹
2012				2022			
Engineering Technicians, Except Drafters, All Other			1,990	2,050	+3%	50	
Engineering Design	Drafters, all other: Washington						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$15.05	\$18.46	\$24.04	\$31.18	\$39.07
		Yearly	\$31,300	\$38,400	\$50,000	\$64,900	\$81,300
	Washington	Hourly	\$16.89	\$21.03	\$26.94	\$32.63	\$37.05

		Yearly	\$35,100	\$43,700	\$56,000	\$67,900	\$77,100
	State and National Trends						
	United States	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Drafters, All Other		15,600	17,600	+13%	410	
	Washington	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Drafters, All Other		700	910	+30%	30	
Engineering Design	ARCHITECTURAL AND CIVIL DRAFTERS: WASHINGTON Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Use knowledge of building materials, engineering practices, and mathematics to complete drawings.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$15.78	\$19.37	\$24.03	\$29.46	\$36.37
		Yearly	\$32,800	\$40,300	\$50,000	\$61,300	\$75,600
	Washington	Hourly	\$16.84	\$20.53	\$26.29	\$31.94	\$36.93
		Yearly	\$35,000	\$42,700	\$54,700	\$66,400	\$76,800
	State and National Trends						
	United States	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters		87,900	88,500	+1%	1,240	
	Washington	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters		1,780	2,030	+14%	50	



Engineering Design and Architecture

CIP Code:151302

Total Framework Hours up to:180 HOURS

**Course: CAD/CADD Drafting Technology and/or
Design Technology**

**Name of Course: ENGINEERING DESIGN AND
ARCHITECTURE 1 AND 2**

GRADE: 9TH -12TH

Exploratory

Career Cluster: STEM Cluster Pathway: ENGINEERING & TECHNOLOGY

Date Last Modified: November 5, 2015

COMPONENTS AND COMPETENCIES **SKETCHING AND APPLICATIONS**

Performance Assessments:

Apply and demonstrate freehand sketching skills.
Create pictorial drawings and models.

SKETCHING AND APPLICATIONS

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
5. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

Apply and demonstrate freehand sketching skills

C A. Sketch straight lines.

C	B. Sketch circles and arcs.
C	C. Sketch curved lines.
C	D. Sketch multi-view drawings.
C	E. Sketch pictorial drawings.
C	F. Apply measurement and proportions
C	G. Apply Alphabet of Lines
	Create pictorial drawings and models
C	A. Identify and create isometric and oblique drawings
C	B. Identify and create perspective drawings (1-point and 2-point)
C	C. Identify and create 3D models using appropriate materials
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
3.3	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
1.2	Collaborate: Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develop arts skills and techniques.
2.1	Apply a creative process in the arts.
3.2	Use the arts to communicate for a specific purpose.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better

	understand the problem and brainstorming to arrive at potential <i>solutions</i> .	
Mathematics Standards		
M1.1.A	Select and justify functions and equations to model and solve problems. (Grade 9 GLE) (Hands-on performance activity)	
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities. (Grade 9 GLE) (Hands-on performance activity)	
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables. (Grade 9 GLE) (Hands-on performance activity)	
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.A	Analyze a problem situation and represent it mathematically. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.B	Select and apply strategies to solve problems. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose. (Grade 9 GLE) (Hands-on performance activity)	
21 st CENTURY SKILLS		
Check those that students will demonstrate in this standard/unit:		
<div>LEARNING AND INNOVATION</div> <div><div>Creativity and Innovation</div><div><input checked="" type="checkbox"/>Think Creatively</div><div><input checked="" type="checkbox"/>Work Creatively with Others</div><div><input checked="" type="checkbox"/>Implement Innovations</div></div> <div><div>Critical Thinking and Problem Solving</div><div><input checked="" type="checkbox"/>Reason Effectively</div><div><input checked="" type="checkbox"/>Use Systems Thinking</div><div><input checked="" type="checkbox"/>Make Judgments and Decisions</div><div><input checked="" type="checkbox"/>Solve Problems</div></div> <div><div>Communication and Collaboration</div><div><input checked="" type="checkbox"/>Communicate Clearly</div><div><input checked="" type="checkbox"/>Collaborate with Others</div></div>	<div>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</div> <div><div>Information Literacy</div><div><input checked="" type="checkbox"/>Access and /evaluate Information</div><div><input checked="" type="checkbox"/>Use and Manage Information</div></div> <div><div>Media Literacy</div><div><input type="checkbox"/>Analyze Media</div><div><input type="checkbox"/>Create Media Products</div></div> <div><div>Information, Communications and Technology (ICT Literacy)</div><div><input checked="" type="checkbox"/>Apply Technology Effectively</div></div>	<div>LIFE AND CAREER SKILLS</div> <div><div>Flexibility and Adaptability</div><div><input checked="" type="checkbox"/>Adapt to Change</div><div><input checked="" type="checkbox"/>Be Flexible</div></div> <div><div>Initiative and Self-Direction</div><div><input checked="" type="checkbox"/>Manage Goals and Time</div><div><input checked="" type="checkbox"/>Work Independently</div><div><input type="checkbox"/>Be Self-Directed Learners</div></div> <div><div>Social and Cross-Cultural</div><div><input checked="" type="checkbox"/>Interact Effectively with Others</div><div><input type="checkbox"/>Work Effectively in Diverse Teams</div></div> <div><div>Productivity and Accountability</div><div><input checked="" type="checkbox"/>Manage Projects</div><div><input checked="" type="checkbox"/>Produce Results</div></div> <div><div>Leadership and Responsibility</div><div><input checked="" type="checkbox"/>Guide and Lead Others</div><div><input checked="" type="checkbox"/>Be Responsible to Others</div></div>

COMPONENTS AND COMPETENCIES

MECHANICAL ENGINEERING DRAWING AND CADD APPLICATION

Performance Assessments:

Apply mathematical concepts to problems in engineering and design.
 Apply measurement and scale concepts in engineering and design.
 Interpret engineering documents and control documents.
 Create technical drawings using basic drafting procedures.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 36

	Apply mathematical concepts to problems in engineering and design
C	Apply basic mathematical skills to drafting operations
C	Apply mathematical calculations involving practical geometry
C	Calculate and evaluate geometric figures
C	Create geometric constructions utilizing technical sketching techniques
C	Determine/select appropriate dimensioning systems
	Apply measurement and scale concepts in engineering and design
C	Identify types of measurement used in engineering and design
C	Select proper measurement tools
C	Perform measurements with hand held instruments
C	Determine and apply appropriate scale
	Interpret engineering documents and control documents
C	Identify and describe basic types of drawings
C	Locate and interpret information on specific documents
C	Check prints for scale accuracy, completeness, and note detail
C	Verify drawing elements
	Create technical drawings using basic drafting procedures.
C	Identify, select and use fundamental drafting techniques for drawings
C	Identify and create "Alphabet of Lines" by name, line type variation, order of usage and application on technical drawings
C	Create title blocks
C	Format borders

C	Apply appropriate annotation methods (i.e., notes and dimensions)
C	Plot drawings on media using the correct layout and scale, line width, and legible text
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develops arts skills and techniques (Sketching).
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better understand the problem and brainstorming to arrive at potential <i>solutions</i> .
Mathematics	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.

M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy <input checked="" type="checkbox"/> Access and /evaluate Information <input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

ARCHITECTURAL DRAWING AND CADD APPLICATION

Performance Assessments:

Explore architectural drafting design concepts and problems.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 36

	Explore architectural drafting design concepts and problems.
C	Use architectural terminology in context
C	Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.
C	Interpret legal land descriptions and draft site plan
C	Read and interpret architectural prints
C	Apply architectural symbols to a drawing
C	Use industry-standard application software for architectural drawing to solve a problem
C	Identify architectural design details

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

Reading

1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.

Communications

1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.

3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.

M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p style="text-align: center;">LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p style="text-align: center;">INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p style="text-align: center;">LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

COMPUTER AIDED DESIGN AND DRAFTING CADD

Performance Assessments:

Manage basic computer concepts, operations and applications
 Apply and use CADD systems and procedures
 Apply and understand detail projection views/components
 Explore engineering and architectural design concepts and problems
 Demonstrate engineering design concepts as related to basic manufacturing processes

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
5. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
6. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
7. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

	Manage basic computer concepts, operations and applications
C	Apply basic commands of operating system software
C	Apply storage and cloud management techniques
C	Use industry-accepted software applications for word processing, drawing structure, graphics, image editing, and scanning and report generation as required
C	Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
C	Prepare files for electronic transfer.
C	Use computer hardware and input/output devices for design problems
C	Access and use a computer network for file management and transfer
	Apply and use CADD systems and procedures
C	Explore project capability of CADD systems
C	Analyze drawings using software functions/commands
C	Use software commands to set up drawing scale, format, dimensioning, etc.
C	Manage layers/visible items, colors, and line type
C	Use geometric and non-geometric editing commands
C	Control entity properties

C	Incorporate standard parts, symbol libraries and/or templates to improve efficiency
C	Use grouping techniques
C	Control viewing commands
C	Create and manipulate views by modifying coordinate system settings
C	Use file commands
C	Minimize a drawing file for storage and transmission
	Apply and understand detail projection views/components
C	Identify, create and place appropriate views for orthographic projections
C	Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
C	Identify, create and place appropriate section views
C	Construct full, half and offset section of an object
C	Construct, sketch and/or draw views of given objects showing visible and hidden features
C	Determine the appropriate views for projection (i.e., plan, top, front, etc.)
C	Utilize various material hatch patterns in section views
	Explore engineering and architectural design concepts and problems
C	Use manufacturing and machining terminology in context
C	Use precision measuring equipment
C	Solve engineering and architectural design problems in geometry
C	Use industry-standard application software for engineering and architectural problems
C	Apply engineering and architectural symbols to a drawing
C	Prepare detail working drawings
	Demonstrate engineering design concepts as related to basic manufacturing processes
C	Design and detail a manufactured product
C	Prepare models for computer numerical control (CNC) processes
C	Prepare models for 3D printing processes
C	Prepare models for Laser engraving and cutting
C	Denote shop processes to be used
C	Prepare bill of materials for drawings
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.

3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .

6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
21st CENTURY SKILLS	
Check those that students will demonstrate in this standard/unit:	

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

DESIGN AND PROBLEM SOLVING PROCESS AND APPLICATION

Performance Assessments:

Apply and demonstrate the basic steps to design and problem solving.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
4. Understand and apply appropriate safety policies and procedures.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

	Apply and demonstrate the basic steps to design and problem solving
	Identify key terms that relate to the Design Process.
	Identify the design process for problem solving.
	Understand and implement the steps of the design process.

	Apply the design process to real world problems.
	Evaluation process review, Capstone and/or presentation review. (Engineering Review)
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.

6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.
M1.5.C	Make valid inferences and draw conclusions based on data.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
M1.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
21st CENTURY SKILLS	
Check those that students will demonstrate in this standard/unit:	

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy <input checked="" type="checkbox"/> Access and /evaluate Information <input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES
CAREERS AND LEADERSHIP 21st CENTURY SKILLS

Performance Assessments:

Develop a plan for a career in the fields of Engineering and Architecture.
Prepare for employment in the fields of Engineering and Architecture.
Participate in leadership activities such as those supported by career and technical student organizations.

STANDARDS AND COMPETENCIES

1. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
2. Read with comprehension to gain information and/or perform a task in a career setting.
3. Demonstrate professional development skills in a simulated customer service or employment situation.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

	Develop a plan for a career in the fields of Engineering and Architecture.
C	Investigate the variety of Engineering and Architecture career options.
C	Develop career goals based on interests, aptitudes, and research
C	Describe factors that contribute to job satisfaction and success
	Prepare for employment in the fields of Engineering and Architecture.

C	Develop an electronic resume
C	Create a drafting/design portfolio with industry-specific work samples
C	Complete job application process, including electronic applications
C	Demonstrate interviewing skills
	Participate in leadership activities such as those supported by career and technical student organizations.
C	Determine the roles and responsibilities that leaders and members bring to an organization
C	Evaluate characteristics and importance of an effective team player
C	Evaluate characteristics of effective teams
C	Practice techniques to involve each member of the team
C	Participate in career development events
C	Develop and implement a personal and professional improvement plan
C	Demonstrate business etiquette
C	Participate in character development scenarios
C	Practice decision-making process
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.

1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
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6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 ES2B	The Sun is the major source of <i>energy</i> for <i>phenomena</i> on Earth's surface, such as <i>winds</i> , ocean currents, and the water cycle.
6-8 LS2C	The major source of <i>energy</i> for <i>ecosystems</i> on Earth's surface is sunlight. <i>Producers</i> transform the <i>energy</i> of sunlight into the chemical <i>energy</i> of food through <i>photosynthesis</i> . This food <i>energy</i> is used by plants, and all other <i>organisms</i> to carry on life processes. Nearly all <i>organisms</i> on the surface of Earth depend on this <i>energy</i> source.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
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M1.8.A	Analyze a problem situation and represent it mathematically.
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M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
M1.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COURSE OUTLINE

Course Name Engineering Design and Architecture 3 & 4 **Grade Level(s)** 10-12

Engineering Design and Architecture 3 & 4 Students will learn about different types of engineering, including: mechanical, civil, architectural, structural, design, and electrical. In addition, students will study material selection and application. Most of the time will be used to develop skills relating to CAD drawings using a variety of presentation methods including 3-D modeling and product design on CAD. Each student will have the opportunity to select an area of interest to study in depth. In addition to individual work, students will develop team skills as members of group projects. Students will be encouraged to certify in AutoCAD. Individual and group projects will be assigned with the emphasis on design. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

1. Sketching and Applications

- A. Apply and demonstrate freehand sketching skills
 - I. Sketch straight lines.
 - II. Sketch circles and arcs.
 - III. Sketch curved lines.
 - IV. Sketch multi-view drawings.
 - V. Sketch pictorial drawings.
 - VI. Apply measurement and proportions
 - VII. Apply Alphabet of Lines
- B. Create pictorial drawings and models.
 - I. Identify and create isometric and oblique drawings
 - II. Identify and create perspective drawings (1-point and 2-point)
 - III. Identify and create 3D models using appropriate materials.

2. Mechanical Engineering, Drawing, and CADD Application

- A. Apply mathematical concepts to problems in engineering and design.
 - I. Apply basic mathematical skills to drafting operations
 - II. Apply mathematical calculations involving practical geometry
 - III. Calculate and evaluate geometric figures
 - IV. Create geometric constructions utilizing technical sketching techniques
 - V. Determine/select appropriate dimensioning systems
- B. Apply measurement and scale concepts in engineering and design.
 - I. Identify types of measurement used in engineering and design.
 - II. Select proper measurement tools
 - III. Perform measurements with hand held instruments
 - IV. Determine and apply appropriate scale
- C. Interpret engineering documents and control documents
 - I. Identify and describe basic types of drawings
 - II. Locate and interpret information on specific documents
 - III. Check prints for scale accuracy, completeness, and note detail
 - IV. Verify drawing elements



- D. Create technical drawings using basic drafting procedures.
 - I. Identify, select and use fundamental drafting techniques for drawings
 - II. Identify and create “Alphabet of Lines” by name, line type variation, order of usage and application on technical drawings
 - III. Create title blocks
 - IV. Format borders
 - V. Apply appropriate annotation methods (i.e., notes and dimensions)
 - VI. Plot drawings on media using the correct layout and scale, line width, and legible text

3. Architectural Drawing and CADD Application

- A. Explore architectural drafting design concepts and problems.
 - I. Use architectural terminology in context
 - II. Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.
 - III. Identify types of measurement used in Architect and Engineering Scales.
 - IV. Select proper measurement tools
 - V. Perform measurements with hand held instruments
 - VI. Determine and apply appropriate scale
 - VII. Interpret legal land descriptions and draft site plan
 - VIII. Read and interpret architectural prints
 - IX. Apply architectural symbols to a drawing
 - X. Use industry-standard application software for architectural drawing to solve a problem
 - XI. Identify architectural design details

4. Design and Problem Solving Process and Application

- A. Apply and demonstrate the basic steps to design and problem solving
 - I. Identify key terms that relate to the Design Process.
 - II. Identify the design process for problem solving.
 - III. Understand and implement the steps of the design process.
 - IV. Apply the design process to real world problems.
 - V. Evaluation process review, Capstone and/or presentation review. (Engineering Review)

5. Computer Aided Design and Drafting CADD

- A. Manage basic computer concepts, operations and applications
 - I. Use computer hardware and input/output devices for design problems
 - II. Apply basic commands of operating system software
 - III. Apply storage and cloud management techniques
 - IV. Use industry-accepted software applications for word processing, graphics, image editing, and scanning, drawing structure, and report generation as required
 - V. Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
 - VI. Prepare files for electronic transfer.
 - VII. Access and use a computer network for file management and transfer



- B. Apply and use CADD systems and procedures.
 - I. Explore project capability of CADD systems
 - II. Analyze drawings using software functions/commands
 - III. Use software commands to set up drawing scale, format, dimensioning, etc.
 - IV. Manage layers/visible items, colors, and line type
 - V. Use geometric and non-geometric editing commands
 - VI. Control entity properties
 - VII. Incorporate standard parts, symbol libraries and/or templates to improve efficiency
 - VIII. Use grouping techniques
 - IX. Control viewing commands
 - X. Create and manipulate views by modifying coordinate system settings
 - XI. Use file commands
 - XII. Minimize a drawing file for storage and transmission
- C. Apply and understand detail projection views/components
 - I. Determine the appropriate views for projection (i.e., plan, top, front, etc.)
 - II. Identify, create and place appropriate views for orthographic projections
 - III. Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
 - IV. Identify, create and place appropriate section views
 - V. Construct full, half and offset section of an object
 - VI. Construct, sketch and/or draw views of given objects showing visible and hidden features
 - VII. Utilize various material hatch patterns in section views
- D. Explore engineering and architectural design concepts and problems
 - I. Use manufacturing and machining terminology in context
 - II. Use precision measuring equipment
 - III. Solve engineering and architectural design problems in geometry
 - IV. Use industry-standard application software for engineering and architectural problems
 - V. Apply engineering and architectural symbols to a drawing
 - VI. Prepare detail working drawings
- E. Demonstrate engineering design concepts as related to basic manufacturing processes.
 - I. Design and detail a manufactured product
 - II. Prepare models for computer numerical control (CNC) processes
 - III. Prepare models for 3D printing processes.
 - IV. Prepare models for Laser engraving and cutting.
 - V. Denote shop processes to be used
 - VI. Prepare bill of materials for drawings
- F. Explore the area of technical computer models and animation.
 - I. Understand basic animation, storytelling and design principles as they relate to specific animation projects.
 - II. Demonstrate knowledge of computer animation concepts and applications.
 - III. Be able to solve design problems, which contain 3D models, camera positions, lighting, and textures.
 - IV. Make efficient use of the hardware and software, taking into consideration their strengths and their shortcomings, when planning and producing animations.



6. Careers and Leadership – 21st Century Skills

- A. Develop a plan for a career in the fields of Engineering and Architecture
 - I. Investigate the variety of Engineering and Architecture career options.
 - II. Develop career goals based on interests, aptitudes, and research
 - III. Describe factors that contribute to job satisfaction and success
- B. Prepare for employment in the fields of Engineering and Architecture.
 - I. Develop a resume
 - II. Develop an electronic resume
 - III. Create a drafting/design portfolio with industry-specific work samples
 - IV. Complete job application process, including electronic applications
 - V. Demonstrate interviewing skills
- C. Participate in leadership activities such as those supported by career and technical student organizations.
 - I. Determine the roles and responsibilities that leaders and members bring to an organization
 - II. Evaluate characteristics and importance of an effective team player
 - III. Evaluate characteristics of effective teams
 - IV. Practice techniques to involve each member of the team
 - V. Participate in career development events
 - VI. Develop and implement a personal and professional improvement plan
 - VII. Demonstrate business etiquette
 - VIII. Participate in character development scenarios
 - IX. Practice decision-making process



Engineering Design and Architecture

CIP Code:151302

Total Framework Hours up to:180 HOURS

Course: CAD/CADD Drafting Technology and/or Design Technology

Name of Course: ENGINEERING DESIGN AND ARCHITECTURE 3 AND 4
GRADE: 10TH -12TH

Exploratory

Career Cluster: STEM Cluster Pathway: ENGINEERING & TECHNOLOGY

Date Last Modified: November 5, 2015

COMPONENTS AND COMPETENCIES **SKETCHING AND APPLICATIONS**

Performance Assessments:

Apply and demonstrate freehand sketching skills.
Create pictorial drawings and models.

SKETCHING AND APPLICATIONS

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
5. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

Apply and demonstrate freehand sketching skills

C A. Sketch straight lines.

C B. Sketch circles and arcs.

C C. Sketch curved lines.

C	D. Sketch multi-view drawings.
C	E. Sketch pictorial drawings.
C	F. Apply measurement and proportions
C	G. Apply Alphabet of Lines
Create pictorial drawings and models	
C	A. Identify and create isometric and oblique drawings
C	B. Identify and create perspective drawings (1-point and 2-point)
C	C. Identify and create 3D models using appropriate materials
EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)	
Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
1.2	Collaborate: Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develop arts skills and techniques.
2.1	Apply a creative process in the arts.
3.2	Use the arts to communicate for a specific purpose.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better understand the problem and brainstorming to arrive at potential <i>solutions</i> .
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems. (Grade 9 GLE) (Hands-on performance activity)

M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities. (Grade 9 GLE) (Hands-on performance activity)
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables. (Grade 9 GLE) (Hands-on performance activity)
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection. (Grade 9 GLE) (Hands-on performance activity)
M1.8.A	Analyze a problem situation and represent it mathematically. (Grade 9 GLE) (Hands-on performance activity)
M1.8.B	Select and apply strategies to solve problems. (Grade 9 GLE) (Hands-on performance activity)
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics. (Grade 9 GLE) (Hands-on performance activity)
M1.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose. (Grade 9 GLE) (Hands-on performance activity)

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy <input checked="" type="checkbox"/> Access and /evaluate Information <input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

MECHANICAL ENGINEERING DRAWING AND CADD APPLICATION

Performance Assessments:

Apply mathematical concepts to problems in engineering and design.
 Apply measurement and scale concepts in engineering and design.
 Interpret engineering documents and control documents.
 Create technical drawings using basic drafting procedures.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 36

	Apply mathematical concepts to problems in engineering and design
C	Apply basic mathematical skills to drafting operations
C	Apply mathematical calculations involving practical geometry
C	Calculate and evaluate geometric figures
C	Create geometric constructions utilizing technical sketching techniques
C	Determine/select appropriate dimensioning systems
	Apply measurement and scale concepts in engineering and design
C	Identify types of measurement used in engineering and design
C	Select proper measurement tools
C	Perform measurements with hand held instruments
C	Determine and apply appropriate scale
	Interpret engineering documents and control documents
C	Identify and describe basic types of drawings
C	Locate and interpret information on specific documents
C	Check prints for scale accuracy, completeness, and note detail
C	Verify drawing elements
	Create technical drawings using basic drafting procedures.
C	Identify, select and use fundamental drafting techniques for drawings
C	Identify and create "Alphabet of Lines" by name, line type variation, order of usage and application on technical drawings
C	Create title blocks
C	Format borders
C	Apply appropriate annotation methods (i.e., notes and dimensions)
C	Plot drawings on media using the correct layout and scale, line width, and legible text

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develops arts skills and techniques (Sketching).
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better understand the problem and brainstorming to arrive at potential <i>solutions</i> .
Mathematics	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

ARCHITECTURAL DRAWING AND CADD APPLICATION

Performance Assessments:

Explore architectural drafting design concepts and problems.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced		Total Learning Hours for Unit: 36
	Explore architectural drafting design concepts and problems.	
C	Use architectural terminology in context	
C	Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.	
C	Interpret legal land descriptions and draft site plan	
C	Read and interpret architectural prints	
C	Apply architectural symbols to a drawing	
C	Use industry-standard application software for architectural drawing to solve a problem	
C	Identify architectural design details	
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>		
Reading		
1.2	Uses vocabulary (word meaning) strategies to comprehend text.	
1.3	Build vocabulary through wide reading.	
3.1	Read to learn new information.	
3.2	Read to perform a task.	
3.3	Read for career application.	
Communications		
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.	
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.	
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.	
3.3	Uses effective delivery.	

Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Critical Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and /evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

COMPONENTS AND COMPETENCIES

COMPUTER AIDED DESIGN AND DRAFTING CADD

Performance Assessments:

Manage basic computer concepts, operations and applications
 Apply and use CADD systems and procedures
 Apply and understand detail projection views/components
 Explore engineering and architectural design concepts and problems
 Demonstrate engineering design concepts as related to basic manufacturing processes

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
5. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
6. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
7. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

	Manage basic computer concepts, operations and applications
C	Apply basic commands of operating system software
C	Apply storage and cloud management techniques
C	Use industry-accepted software applications for word processing, drawing structure, graphics, image editing, and scanning and report generation as required
C	Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
C	Prepare files for electronic transfer.
C	Use computer hardware and input/output devices for design problems
C	Access and use a computer network for file management and transfer
	Apply and use CADD systems and procedures
C	Explore project capability of CADD systems
C	Analyze drawings using software functions/commands
C	Use software commands to set up drawing scale, format, dimensioning, etc.
C	Manage layers/visible items, colors, and line type
C	Use geometric and non-geometric editing commands
C	Control entity properties
C	Incorporate standard parts, symbol libraries and/or templates to improve efficiency
C	Use grouping techniques

C	Control viewing commands
C	Create and manipulate views by modifying coordinate system settings
C	Use file commands
C	Minimize a drawing file for storage and transmission
	Apply and understand detail projection views/components
C	Identify, create and place appropriate views for orthographic projections
C	Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
C	Identify, create and place appropriate section views
C	Construct full, half and offset section of an object
C	Construct, sketch and/or draw views of given objects showing visible and hidden features
C	Determine the appropriate views for projection (i.e., plan, top, front, etc.)
C	Utilize various material hatch patterns in section views
	Explore engineering and architectural design concepts and problems
C	Use manufacturing and machining terminology in context
C	Use precision measuring equipment
C	Solve engineering and architectural design problems in geometry
C	Use industry-standard application software for engineering and architectural problems
C	Apply engineering and architectural symbols to a drawing
C	Prepare detail working drawings
	Demonstrate engineering design concepts as related to basic manufacturing processes
C	Design and detail a manufactured product
C	Prepare models for computer numerical control (CNC) processes
C	Prepare models for 3D printing processes
C	Prepare models for Laser engraving and cutting
C	Denote shop processes to be used
C	Prepare bill of materials for drawings
	Explore the area of technical computer models and animation.
C	Understand basic animation, storytelling and design principles as they relate to specific animation projects.
C	Demonstrate knowledge of computer animation concepts and applications.
C	Be able to solve design problems, which contain 3D models, camera positions, lighting, and textures.
C	Make efficient use of the hardware and software, taking into consideration their strengths and their shortcomings, when planning and producing animations.
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	

1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be

	communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
21st CENTURY SKILLS	
Check those that students will demonstrate in this standard/unit:	

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

DESIGN AND PROBLEM SOLVING PROCESS AND APPLICATION

Performance Assessments:

Apply and demonstrate the basic steps to design and problem solving.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
4. Understand and apply appropriate safety policies and procedures.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

	Apply and demonstrate the basic steps to design and problem solving
	Identify key terms that relate to the Design Process.
	Identify the design process for problem solving.
	Understand and implement the steps of the design process.

	Apply the design process to real world problems.
	Evaluation process review, Capstone and/or presentation review. (Engineering Review)
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.

6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.
M1.5.C	Make valid inferences and draw conclusions based on data.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
M1.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
21st CENTURY SKILLS	
Check those that students will demonstrate in this standard/unit:	

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

CAREERS AND LEADERSHIP 21st CENTURY SKILLS

Performance Assessments:

Develop a plan for a career in the fields of Engineering and Architecture.

Prepare for employment in the fields of Engineering and Architecture.

Participate in leadership activities such as those supported by career and technical student organizations.

STANDARDS AND COMPETENCIES

1. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
2. Read with comprehension to gain information and/or perform a task in a career setting.
3. Demonstrate professional development skills in a simulated customer service or employment situation.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

Develop a plan for a career in the fields of Engineering and Architecture.

C Investigate the variety of Engineering and Architecture career options.

C Develop career goals based on interests, aptitudes, and research

C Describe factors that contribute to job satisfaction and success

Prepare for employment in the fields of Engineering and Architecture.

C Develop an electronic resume

C Create a drafting/design portfolio with industry-specific work samples

C Complete job application process, including electronic applications

C Demonstrate interviewing skills

Participate in leadership activities such as those supported by career and technical student organizations.

C Determine the roles and responsibilities that leaders and members bring to an organization

C Evaluate characteristics and importance of an effective team player

C Evaluate characteristics of effective teams

C Practice techniques to involve each member of the team

C Participate in career development events

C Develop and implement a personal and professional improvement plan

C Demonstrate business etiquette

C Participate in character development scenarios

C Practice decision-making process

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

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1.2	Uses vocabulary (word meaning) strategies to comprehend text.
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2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
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	communicated persuasively.
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6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 ES2B	The Sun is the major source of <i>energy</i> for <i>phenomena</i> on Earth's surface, such as <i>winds</i> , ocean currents, and the water cycle.
6-8 LS2C	The major source of <i>energy</i> for <i>ecosystems</i> on Earth's surface is sunlight. <i>Producers</i> transform the <i>energy</i> of sunlight into the chemical <i>energy</i> of food through <i>photosynthesis</i> . This food <i>energy</i> is used by plants, and all other <i>organisms</i> to carry on life processes. Nearly all <i>organisms</i> on the surface of Earth depend on this <i>energy</i> source.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
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<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COURSE OUTLINE

Course Name Engineering Design and Architecture 5 & 6 **Grade Level(s)** 11-12

Engineering Design and Architecture 5 & 6 Contract Study This is an individualized course where students design and construct projects related to the study of engineering and architecture, including: engineering design, mechanical, civil, architectural, electrical, structural, model development, and other related areas of study. The emphasis will be upon application of design and CAD to course work. The course content is designed by the student, with the instructor's assistance and guidance. Students will have the opportunity to join school technology clubs that are involved in robotics, architecture, and engineering activities.

1. Sketching and Applications

- A. Apply and demonstrate freehand sketching skills
 - I. Sketch straight lines.
 - II. Sketch circles and arcs.
 - III. Sketch curved lines.
 - IV. Sketch multi-view drawings.
 - V. Sketch pictorial drawings.
 - VI. Apply measurement and proportions
 - VII. Apply Alphabet of Lines
- B. Create pictorial drawings and models.
 - I. Identify and create isometric and oblique drawings
 - II. Identify and create perspective drawings (1-point and 2-point)
 - III. Identify and create 3D models using appropriate materials.

2. Mechanical Engineering Drawing and CADD Application

- A. Apply mathematical concepts to problems in engineering and design.
 - I. Apply basic mathematical skills to drafting operations
 - II. Apply mathematical calculations involving practical geometry
 - III. Calculate and evaluate geometric figures
 - IV. Create geometric constructions utilizing technical sketching techniques
 - V. Determine/select appropriate dimensioning systems
- B. Apply measurement and scale concepts in engineering and design.
 - I. Identify types of measurement used in engineering and design.
 - II. Select proper measurement tools
 - III. Perform measurements with hand held instruments
 - IV. Determine and apply appropriate scale
- C. Interpret engineering documents and control documents.
 - I. Identify and describe basic types of drawings
 - II. Locate and interpret information on specific documents
 - III. Check prints for scale accuracy, completeness, and note detail
 - IV. Verify drawing elements



- D. Create technical drawings using basic drafting procedures.
 - I. Identify, select and use fundamental drafting techniques for drawings
 - II. Identify and create “Alphabet of Lines” by name, line type variation, order of usage and application on technical drawings
 - III. Create title blocks
 - IV. Format borders
 - V. Apply appropriate annotation methods (i.e., notes and dimensions)
 - VI. Plot drawings on media using the correct layout and scale, line width, and legible text

3. Architectural Drawing and CADD Application

- A. Explore architectural drafting design concepts and problems.
 - I. Use architectural terminology in context
 - II. Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.
 - III. Identify types of measurement used in Architect and Engineering Scales.
 - IV. Select proper measurement tools
 - V. Perform measurements with hand held instruments
 - VI. Determine and apply appropriate scale
 - VII. Interpret legal land descriptions and draft site plan
 - VIII. Read and interpret architectural prints
 - IX. Apply architectural symbols to a drawing
 - X. Use industry-standard application software for architectural drawing to solve a problem
 - XI. Identify architectural design details

4. Design and Problem Solving Process and Application

- A. Apply and demonstrate the basic steps to design and problem solving
 - I. Identify key terms that relate to the Design Process.
 - II. Identify the design process for problem solving.
 - III. Understand and implement the steps of the design process.
 - IV. Apply the design process to real world problems.
 - V. Evaluation process review, Capstone and/or presentation review. (Engineering Review)

5. Computer Aided Design and Drafting CADD

- A. Manage basic computer concepts, operations and applications
 - I. Use computer hardware and input/output devices for design problems
 - II. Apply basic commands of operating system software
 - III. Apply storage and cloud management techniques
 - IV. Use industry-accepted software applications for word processing, graphics, image editing, and scanning, drawing structure, and report generation as required
 - V. Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
 - VI. Prepare files for electronic transfer.
 - VII. Access and use a computer network for file management and transfer



- B. Apply and use CADD systems and procedures.
 - I. Explore project capability of CADD systems
 - II. Analyze drawings using software functions/commands
 - III. Use software commands to set up drawing scale, format, dimensioning, etc.
 - IV. Manage layers/visible items, colors, and line type
 - V. Use geometric and non-geometric editing commands
 - VI. Control entity properties
 - VII. Incorporate standard parts, symbol libraries and/or templates to improve efficiency
 - VIII. Use grouping techniques
 - IX. Control viewing commands
 - X. Create and manipulate views by modifying coordinate system settings
 - XI. Use file commands
 - XII. Minimize a drawing file for storage and transmission
- C. Apply and understand detail projection views/components
 - I. Determine the appropriate views for projection (i.e., plan, top, front, etc.)
 - II. Identify, create and place appropriate views for orthographic projections
 - III. Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
 - IV. Identify, create and place appropriate section views
 - V. Construct full, half and offset section of an object
 - VI. Construct, sketch and/or draw views of given objects showing visible and hidden features
 - VII. Utilize various material hatch patterns in section views
- D. Explore engineering and architectural design concepts and problems
 - I. Use manufacturing and machining terminology in context
 - II. Use precision measuring equipment
 - III. Solve engineering and architectural design problems in geometry
 - IV. Use industry-standard application software for engineering and architectural problems
 - V. Apply engineering and architectural symbols to a drawing
 - VI. Prepare detail working drawings
- E. Demonstrate engineering design concepts as related to basic manufacturing processes.
 - I. Design and detail a manufactured product
 - II. Prepare models for computer numerical control (CNC) processes
 - III. Prepare models for 3D printing processes.
 - IV. Prepare models for Laser engraving and cutting.
 - V. Denote shop processes to be used
 - VI. Prepare bill of materials for drawings
- F. Explore the area of technical computer models and animation.
 - I. Understand basic animation, storytelling and design principles as they relate to specific animation projects.
 - II. Demonstrate knowledge of computer animation concepts and applications.
 - III. Be able to solve design problems, which contain 3D models, camera positions, lighting, and textures.
 - IV. Make efficient use of the hardware and software, taking into consideration their strengths and their shortcomings, when planning and producing animations.



6. Careers and Leadership – 21st Century Skills

- A. Develop a plan for a career in the fields of Engineering and Architecture.
 - I. Investigate the variety of Engineering and Architecture career options.
 - II. Develop career goals based on interests, aptitudes, and research
 - III. Describe factors that contribute to job satisfaction and success
- B. Prepare for employment in the fields of Engineering and Architecture.
 - I. Develop a resume
 - II. Develop an electronic resume
 - III. Create a drafting/design portfolio with industry-specific work samples
 - IV. Complete job application process, including electronic applications
 - V. Demonstrate interviewing skills
- C. Participate in leadership activities such as those supported by career and technical student organizations.
 - I. Determine the roles and responsibilities that leaders and members bring to an organization
 - II. Evaluate characteristics and importance of an effective team player
 - III. Evaluate characteristics of effective teams
 - IV. Practice techniques to involve each member of the team
 - V. Participate in career development events
 - VI. Develop and implement a personal and professional improvement plan
 - VII. Demonstrate business etiquette
 - VIII. Participate in character development scenarios
 - IX. Practice decision-making process



Engineering Design and Architecture

CIP Code:151302

Total Framework Hours up to:180 HOURS

**Course: CAD/CADD Drafting Technology and/or
Design Technology**

**Name of Course: ENGINEERING DESIGN AND
ARCHITECTURE 5 AND 6**

GRADE: 11TH-12TH

Exploratory

Career Cluster: STEM Cluster Pathway: ENGINEERING & TECHNOLOGY

Date Last Modified: November 5, 2015

COMPONENTS AND COMPETENCIES **SKETCHING AND APPLICATIONS**

Performance Assessments:

Apply and demonstrate freehand sketching skills.
Create pictorial drawings and models.

SKETCHING AND APPLICATIONS

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
5. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

Apply and demonstrate freehand sketching skills

C A. Sketch straight lines.

C	B. Sketch circles and arcs.
C	C. Sketch curved lines.
C	D. Sketch multi-view drawings.
C	E. Sketch pictorial drawings.
C	F. Apply measurement and proportions
C	G. Apply Alphabet of Lines
	Create pictorial drawings and models
C	A. Identify and create isometric and oblique drawings
C	B. Identify and create perspective drawings (1-point and 2-point)
C	C. Identify and create 3D models using appropriate materials
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
3.3	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
1.2	Collaborate: Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develop arts skills and techniques.
2.1	Apply a creative process in the arts.
3.2	Use the arts to communicate for a specific purpose.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better

	understand the problem and brainstorming to arrive at potential <i>solutions</i> .	
Mathematics Standards		
M1.1.A	Select and justify functions and equations to model and solve problems. (Grade 9 GLE) (Hands-on performance activity)	
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities. (Grade 9 GLE) (Hands-on performance activity)	
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables. (Grade 9 GLE) (Hands-on performance activity)	
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.A	Analyze a problem situation and represent it mathematically. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.B	Select and apply strategies to solve problems. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics. (Grade 9 GLE) (Hands-on performance activity)	
M1.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose. (Grade 9 GLE) (Hands-on performance activity)	
21 st CENTURY SKILLS		
Check those that students will demonstrate in this standard/unit:		
<div>LEARNING AND INNOVATION</div> <div><div>Creativity and Innovation</div><div><input checked="" type="checkbox"/>Think Creatively</div><div><input checked="" type="checkbox"/>Work Creatively with Others</div><div><input checked="" type="checkbox"/>Implement Innovations</div></div> <div><div>Critical Thinking and Problem Solving</div><div><input checked="" type="checkbox"/>Reason Effectively</div><div><input checked="" type="checkbox"/>Use Systems Thinking</div><div><input checked="" type="checkbox"/>Make Judgments and Decisions</div><div><input checked="" type="checkbox"/>Solve Problems</div></div> <div><div>Communication and Collaboration</div><div><input checked="" type="checkbox"/>Communicate Clearly</div><div><input checked="" type="checkbox"/>Collaborate with Others</div></div>	<div>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</div> <div><div>Information Literacy</div><div><input checked="" type="checkbox"/>Access and /evaluate Information</div><div><input checked="" type="checkbox"/>Use and Manage Information</div></div> <div><div>Media Literacy</div><div><input type="checkbox"/>Analyze Media</div><div><input type="checkbox"/>Create Media Products</div></div> <div><div>Information, Communications and Technology (ICT Literacy)</div><div><input checked="" type="checkbox"/>Apply Technology Effectively</div></div>	<div>LIFE AND CAREER SKILLS</div> <div><div>Flexibility and Adaptability</div><div><input checked="" type="checkbox"/>Adapt to Change</div><div><input checked="" type="checkbox"/>Be Flexible</div></div> <div><div>Initiative and Self-Direction</div><div><input checked="" type="checkbox"/>Manage Goals and Time</div><div><input checked="" type="checkbox"/>Work Independently</div><div><input type="checkbox"/>Be Self-Directed Learners</div></div> <div><div>Social and Cross-Cultural</div><div><input checked="" type="checkbox"/>Interact Effectively with Others</div><div><input type="checkbox"/>Work Effectively in Diverse Teams</div></div> <div><div>Productivity and Accountability</div><div><input checked="" type="checkbox"/>Manage Projects</div><div><input checked="" type="checkbox"/>Produce Results</div></div> <div><div>Leadership and Responsibility</div><div><input checked="" type="checkbox"/>Guide and Lead Others</div><div><input checked="" type="checkbox"/>Be Responsible to Others</div></div>

COMPONENTS AND COMPETENCIES

MECHANICAL ENGINEERING DRAWING AND CADD APPLICATION

Performance Assessments:

Apply mathematical concepts to problems in engineering and design.
 Apply measurement and scale concepts in engineering and design.
 Interpret engineering documents and control documents.
 Create technical drawings using basic drafting procedures.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 36

	Apply mathematical concepts to problems in engineering and design
C	Apply basic mathematical skills to drafting operations
C	Apply mathematical calculations involving practical geometry
C	Calculate and evaluate geometric figures
C	Create geometric constructions utilizing technical sketching techniques
C	Determine/select appropriate dimensioning systems
	Apply measurement and scale concepts in engineering and design
C	Identify types of measurement used in engineering and design
C	Select proper measurement tools
C	Perform measurements with hand held instruments
C	Determine and apply appropriate scale
	Interpret engineering documents and control documents
C	Identify and describe basic types of drawings
C	Locate and interpret information on specific documents
C	Check prints for scale accuracy, completeness, and note detail
C	Verify drawing elements
	Create technical drawings using basic drafting procedures.
C	Identify, select and use fundamental drafting techniques for drawings
C	Identify and create "Alphabet of Lines" by name, line type variation, order of usage and application on technical drawings
C	Create title blocks
C	Format borders

C	Apply appropriate annotation methods (i.e., notes and dimensions)
C	Plot drawings on media using the correct layout and scale, line width, and legible text
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	
Reading	
1.2	Use vocabulary (word meaning) strategies to comprehend text.
2.1	Demonstrate evidence of reading comprehension.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
2.1	Uses language to interact effectively and responsibly in a multicultural context.
Educational Technology	
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
2.2	Writes for different purposes.
2.3	Writes in a variety of forms/genres.
3.2	Uses appropriate style.
Art	
1.2	Develops arts skills and techniques (Sketching).
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPD	The process of <i>technological design</i> begins by defining a problem and identifying <i>criteria</i> for a successful <i>solution</i> , followed by research to better understand the problem and brainstorming to arrive at potential <i>solutions</i> .
Mathematics	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.

M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p style="text-align: center;">LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p style="text-align: center;">INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p style="text-align: center;">LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

ARCHITECTURAL DRAWING AND CADD APPLICATION

Performance Assessments:

Explore architectural drafting design concepts and problems.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 36

	Explore architectural drafting design concepts and problems.
C	Use architectural terminology in context
C	Project drawings must include a minimum of: a 3D view, floor plan, exterior elevation, site plan and appropriate section drawings.
C	Interpret legal land descriptions and draft site plan
C	Read and interpret architectural prints
C	Apply architectural symbols to a drawing
C	Use industry-standard application software for architectural drawing to solve a problem
C	Identify architectural design details

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

Reading

1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.

Communications

1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.

Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Critical Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and /evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

COMPONENTS AND COMPETENCIES

COMPUTER AIDED DESIGN AND DRAFTING CADD

Performance Assessments:

Manage basic computer concepts, operations and applications
 Apply and use CADD systems and procedures
 Apply and understand detail projection views/components
 Explore engineering and architectural design concepts and problems
 Demonstrate engineering design concepts as related to basic manufacturing processes

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
5. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
6. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
7. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

	Manage basic computer concepts, operations and applications
C	Apply basic commands of operating system software
C	Apply storage and cloud management techniques
C	Use industry-accepted software applications for word processing, drawing structure, graphics, image editing, and scanning and report generation as required
C	Import and export data files using different formats (dxf, dwg, dxb, Tiff, gif, pcx, eps, step or other formats as required)
C	Prepare files for electronic transfer.
C	Use computer hardware and input/output devices for design problems
C	Access and use a computer network for file management and transfer
	Apply and use CADD systems and procedures
C	Explore project capability of CADD systems
C	Analyze drawings using software functions/commands
C	Use software commands to set up drawing scale, format, dimensioning, etc.
C	Manage layers/visible items, colors, and line type
C	Use geometric and non-geometric editing commands
C	Control entity properties
C	Incorporate standard parts, symbol libraries and/or templates to improve efficiency

C	Use grouping techniques
C	Control viewing commands
C	Create and manipulate views by modifying coordinate system settings
C	Use file commands
C	Minimize a drawing file for storage and transmission
	Apply and understand detail projection views/components
C	Identify, create and place appropriate views for orthographic projections
C	Identify, create and place appropriate auxiliary views to determine true size, shape, and location of non-orthogonal features
C	Identify, create and place appropriate section views
C	Construct full, half and offset section of an object
C	Construct, sketch and/or draw views of given objects showing visible and hidden features
C	Determine the appropriate views for projection (i.e., plan, top, front, etc.)
C	Utilize various material hatch patterns in section views
	Explore engineering and architectural design concepts and problems
C	Use manufacturing and machining terminology in context
C	Use precision measuring equipment
C	Solve engineering and architectural design problems in geometry
C	Use industry-standard application software for engineering and architectural problems
C	Apply engineering and architectural symbols to a drawing
C	Prepare detail working drawings
	Demonstrate engineering design concepts as related to basic manufacturing processes
C	Design and detail a manufactured product
C	Prepare models for computer numerical control (CNC) processes
C	Prepare models for 3D printing processes
C	Prepare models for Laser engraving and cutting
C	Denote shop processes to be used
C	Prepare bill of materials for drawings
	Explore the area of technical computer models and animation.
C	Understand basic animation, storytelling and design principles as they relate to specific animation projects.
C	Demonstrate knowledge of computer animation concepts and applications.
C	Be able to solve design problems, which contain 3D models, camera positions, lighting, and textures.
C	Make efficient use of the hardware and software, taking into consideration their strengths and their shortcomings, when planning and producing animations.
<i>EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)</i>	

Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
3.3	Uses effective delivery.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
3.1	Use the arts to express and present ideas and feelings.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.

6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	
M1.1.A	Select and justify functions and equations to model and solve problems.
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.
M1.4.D	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Critical Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and /evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

COMPONENTS AND COMPETENCIES

DESIGN AND PROBLEM SOLVING PROCESS AND APPLICATION

Performance Assessments:

Apply and demonstrate the basic steps to design and problem solving.

STANDARDS AND COMPETENCIES

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
4. Understand and apply appropriate safety policies and procedures.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 38

- | | |
|--|--|
| | Apply and demonstrate the basic steps to design and problem solving |
| | Identify key terms that relate to the Design Process. |
| | Identify the design process for problem solving. |
| | Understand and implement the steps of the design process. |
| | Apply the design process to real world problems. |
| | Evaluation process review, Capstone and/or presentation review. (Engineering Review) |

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

Reading

- | | |
|-----|---|
| 1.2 | Uses vocabulary (word meaning) strategies to comprehend text. |
| 1.3 | Build vocabulary through wide reading. |
| 3.1 | Read to learn new information. |
| 3.2 | Read to perform a task. |
| 3.3 | Read for career application. |

Communications

- | | |
|-----|---|
| 1.1 | Uses listening and observation skills and strategies to focus attention and interpret information. |
| 1.2 | Understands, analyzes, synthesizes, or evaluates information from a variety of sources. |
| 2.2 | Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks. |
| 3.3 | Uses effective delivery. |

Educational Technology

- | | |
|-----|--|
| 1.1 | Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology. |
|-----|--|

1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
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1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
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6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
6-8 PS1D	The same unbalanced <i>force</i> will change the <i>motion</i> of an object with more <i>mass</i> more slowly than an object with less <i>mass</i> .
6-8 PS3A	<i>Energy</i> exists in many forms which include: <i>heat</i> , light, chemical, electrical, <i>motion</i> of objects, and sound. <i>Energy</i> can be <i>transformed</i> from one <i>form</i> to another and <i>transferred</i> from one place to another.
Mathematics Standards	

M1.1.A	Select and justify functions and equations to model and solve problems.
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.
M1.5.C	Make valid inferences and draw conclusions based on data.
M1.6.A	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
M1.8.A	Analyze a problem situation and represent it mathematically.
M1.8.B	Select and apply strategies to solve problems.
M1.8.E	Read and interpret diagrams, graphs, and text containing symbols, language and conventions of mathematics.
M1.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy <input checked="" type="checkbox"/> Access and /evaluate Information <input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others</p>
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COMPONENTS AND COMPETENCIES

CAREERS AND LEADERSHIP 21st CENTURY SKILLS

Performance Assessments:

Develop a plan for a career in the fields of Engineering and Architecture.

Prepare for employment in the fields of Engineering and Architecture.

Participate in leadership activities such as those supported by career and technical student organizations.

STANDARDS AND COMPETENCIES

1. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
2. Read with comprehension to gain information and/or perform a task in a career setting.
3. Demonstrate professional development skills in a simulated customer service or employment situation.

Competencies C=Core A=Advanced

Total Learning Hours for Unit: 16

	Develop a plan for a career in the fields of Engineering and Architecture.
C	Investigate the variety of Engineering and Architecture career options.
C	Develop career goals based on interests, aptitudes, and research
C	Describe factors that contribute to job satisfaction and success
	Prepare for employment in the fields of Engineering and Architecture.
C	Develop an electronic resume
C	Create a drafting/design portfolio with industry-specific work samples
C	Complete job application process, including electronic applications
C	Demonstrate interviewing skills
	Participate in leadership activities such as those supported by career and technical student organizations.
C	Determine the roles and responsibilities that leaders and members bring to an organization
C	Evaluate characteristics and importance of an effective team player
C	Evaluate characteristics of effective teams
C	Practice techniques to involve each member of the team
C	Participate in career development events
C	Develop and implement a personal and professional improvement plan
C	Demonstrate business etiquette
C	Participate in character development scenarios
C	Practice decision-making process

EALRs, GLEs, Math and Science Standards (Taught & Assessed in Standards)

Reading	
1.2	Uses vocabulary (word meaning) strategies to comprehend text.
1.3	Build vocabulary through wide reading.
3.1	Read to learn new information.
3.2	Read to perform a task.
3.3	Read for career application.
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
2.2	Uses interpersonal skills and strategies in a multicultural context to work collaboratively, solve problems, and perform tasks.
Educational Technology	
1.1	Innovate: Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.
1.3	Investigate and Think Critically: Research, manage and evaluate information and solve problems using digital tools and resources.
2.2	Operate Systems: Understand technology systems and use hardware and networks to support learning.
2.3	Select and Use Applications: Use productively tools and common applications effectively and constructively.
Writing	
1.1	Pre-writes to generate ideas and plan writing.
1.2	Produces draft.
1.3	Revises to improve text.
1.4	Edits text.
1.5	Publishes text to share with audience.
2.3	Writes in a variety of forms/genres.
3.1	Develops ideas and organizes writing.
Art	
1.2	Develops arts skills and techniques (Sketching).
2.1	Apply a creative process in the arts: Develop ideas and techniques.
4.2	Demonstrate and analyze the connections among the arts and other content areas.
Science	
6-8 INQA	Scientific <i>inquiry</i> involves asking and answering <i>questions</i> and comparing the answer with what scientists already know about the world.
6-8 INQB	Different kinds of <i>questions</i> suggest different kinds of scientific <i>investigations</i> .
6-8 INQC	Collecting, analyzing, and displaying data are essential aspects of all <i>investigations</i> .
6-8 INQE	<i>Models</i> are used to represent objects, events, <i>systems</i> , and processes. <i>Models</i> can be used to test <i>hypotheses</i> and better understand <i>phenomena</i> , but they have limitations.
6-8 APPF	<i>Solutions</i> must be tested to determine whether or not they will solve the problem. Results are used to modify the <i>design</i> , and the best <i>solution</i> must be

	communicated persuasively.
6-8 INQG	Scientific reports should enable another investigator to repeat the study to check the results.
6-8 APPA	People have always used <i>technology</i> to solve problems. Advances in human civilization are linked to advances in <i>technology</i> .
6-8 APPE	Scientists and engineers often work together to <i>generate</i> creative <i>solutions</i> to problems and decide which ones are most promising.
6-8 ES2B	The Sun is the major source of <i>energy</i> for <i>phenomena</i> on Earth's surface, such as <i>winds</i> , ocean currents, and the water cycle.
6-8 LS2C	The major source of <i>energy</i> for <i>ecosystems</i> on Earth's surface is sunlight. <i>Producers</i> transform the <i>energy</i> of sunlight into the chemical <i>energy</i> of food through <i>photosynthesis</i> . This food <i>energy</i> is used by plants, and all other <i>organisms</i> to carry on life processes. Nearly all <i>organisms</i> on the surface of Earth depend on this <i>energy</i> source.
6-8 PS1A	<i>Average speed</i> is defined as the distance traveled in a given period of time.
6-8 PS1B	<i>Friction</i> is a <i>force</i> that can help objects start moving, stop moving, slow down or can change the direction of the object's <i>motion</i> .
6-8 PS1C	Unbalanced <i>forces</i> will cause changes in the <i>speed</i> or direction of an object's <i>motion</i> . The <i>motion</i> of an object will stay the same when forces are balanced.
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M1.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

21st CENTURY SKILLS

Check those that students will demonstrate in this standard/unit:

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Critical Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgments and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and /evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others



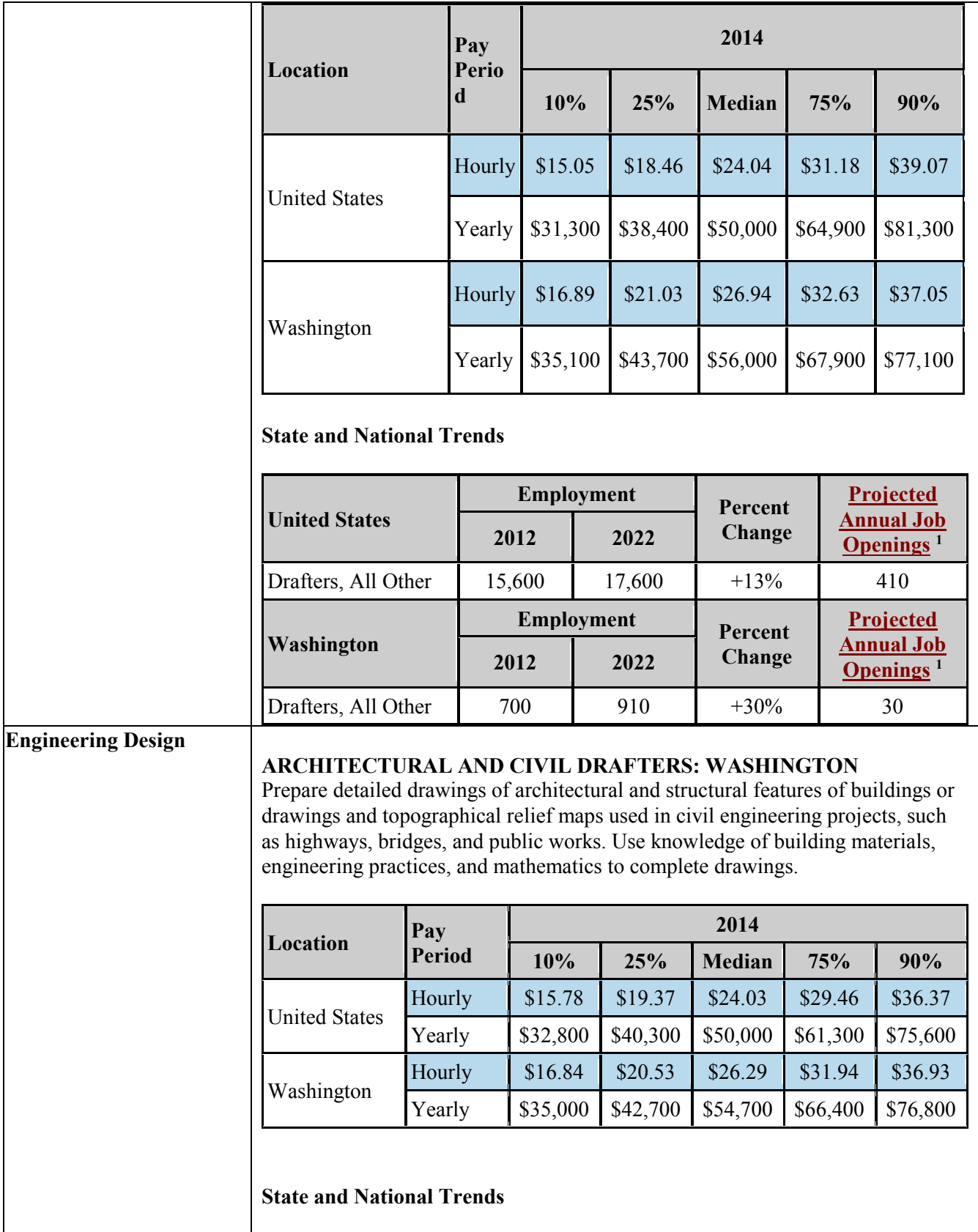
Power Energy and Transportation



INTRODUCTION

Course Name	Power Energy and Transportation	Grade Level(s)	9-12
Course Length	1 Year 2 Semester	Course Code (s)	CTE 450 451
Course Description	<p>Power Energy and Transportation 1 Power, Energy and Transportation is an introductory design and construction course. The course will deal with the study of power and energy: their source, generation, transmission, utilization, application, and control. Students will design, construct and problem solve in a wide variety of hands on activities and assignments using various technical and shop equipment.</p> <p>Power Energy and Transportation 2 This course is a continuation of PET 1. It is offered for the student interested in studying more advanced concepts in power, energy and transportation design. Students will continue to work on group and individual hands-on projects studying concepts in chemical, mechanical, electrical, thermal, nuclear and electromagnetic energy. Activities will include simple devices and complex team constructed projects using various types of materials.</p>		
Pathway Connections	STEM, Architecture and Construction and Manufacturing		
Primary Connection	Engineering Technology, Construction, Design and Pre Construction, Manufacturing production process development		
Secondary Connection	Apprenticeship, Internships, Community and Technical College, Four- year College and University		
Sample Sequence of Courses	Power Energy and Transportation 1 Power Energy and Transportation 2		
Cross Credit and/or College Credit	Math Credit Non Lab Science Credit College Credit is available through Tech Prep Articulation		
Basic Textbook	Energy, Power, and Transportation Technology, 2 nd By: Len S. Litowitz and Ryan A. Brown, Copyright: 2012		
Equipment	Computer stations Dual Monitors Laser 3D printer CNC Router		
Software	Autodesk Suite 2016 or latest – AutoCad 2D and 3D, Inventor, Revit and 3D Studio Max Mastercam 9.0 Rhinoceros Solidworks		

Overall							
Engineering Design	All Engineering technicians, except drafters.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$16.79	\$22.58	\$29.60	\$36.81	\$44.84
		Yearly	\$34,900	\$47,000	\$61,600	\$76,600	\$93,300
	Washington	Hourly	\$22.38	\$30.32	\$36.43	\$42.26	\$46.34
		Yearly	\$46,600	\$63,100	\$75,800	\$87,900	\$96,400
	State and National Trends						
	United States	Employment		Percent Change	Projected Annual Job Openings ¹		
		2012	2022				
Engineering Technicians, Except Drafters, All Other	67,700	68,300	+1%	1,460			
Washington	Employment		Percent Change	Projected Annual Job Openings ¹			
	2012	2022					
Engineering Technicians, Except Drafters, All Other	1,990	2,050	+3%	50			
Engineering Design	Drafters, all other: Washington						





Commercial and Industrial Designers	United States	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters	87,900	88,500	+1%	1,240		
	Washington	Employment		Percent Change	<u>Projected Annual Job Openings</u> ¹		
		2012	2022				
	Architectural and Civil Drafters	1,780	2,030	+14%	50		
	Commercial and Industrial Designers Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$15.78	\$19.37	\$24.03	\$29.46	\$36.37
Yearly		\$32,800	\$40,300	\$50,000	\$61,300	\$75,600	
Washington	Hourly	\$16.84	\$20.53	\$26.29	\$31.94	\$36.93	
	Yearly	\$35,000	\$42,700	\$54,700	\$66,400	\$76,800	



COURSE OUTLINE

Course Name Power Energy and Transportation **Grade Level(s)** 9-12

Power Energy and Transportation 1

Power, Energy and Transportation is an introductory design and construction course. The course will deal with the study of power and energy: their source, generation, transmission, utilization, application, and control.

Students will design, construct and problem solve in a wide variety of hands on activities and assignments using various technical and shop equipment.

Power Energy and Transportation 2

This course is a continuation of PET 1. It is offered for the student interested in studying more advanced concepts in power, energy and transportation design. Students will continue to work on group and individual hands-on projects studying concepts in chemical, mechanical, electrical, thermal, nuclear and electromagnetic energy. Activities will include simple devices and complex team constructed projects using various types of materials.

1. Design and Problem Solving Process and Application

- A. Apply and demonstrate the basic steps to design and problem solving
 - I. Identify key terms that relate to the Design Process.
 - II. Identify the design process for problem solving.
 - III. Understand and implement the steps of the design process.
 - IV. Apply the design process to real world problems.
 - V. Evaluation process review, Capstone and/or presentation review. (Engineering Review)

2. Energy Technology

- A. Introduction to Principles of Energy Technology
 - I. Identify the sources of renewable, nonrenewable and inexhaustible sources of energy.
 - II. Learn the terms used to describe the technology surrounding energy systems
 - III. Identify and explain the six forms of energy;
 - a. Mechanical
 - b. Thermal
 - c. Chemical
 - d. Electrical
 - e. Nuclear
 - f. Electromagnetic
 - IV. Understand and apply the concepts of surrounding energy-to-energy conversion.
 - V. Gain an understanding of potential and kinetic energy and how potential energy can be converted to kinetic energy.
 - VI. Develop an awareness of the impacts and consequences of energy use for you and the future.

3. Power Technology

- A. Introduction to Principles of Power Technology
 - I. Develop and understanding of how power differs from energy.
 - II. Learn the terms used to describe the technology surrounding power systems.
 - III. Gain and awareness of how energy is converted to power.
 - IV. Develop and understanding of the three methods of transmitting power:
 - a. Mechanical – Six Simple Machines
 - b. Fluid
 - c. Electrical
 - V. Develop an awareness of the impacts and consequences of power usage, to future power system directions, and power related careers.



4. Transportation Technology

- A. Introduction to Principles of Transportation Technology
 - I. Develop and understanding of nature of transportation systems.
 - II. Learn the terms used to describe the technology transportation systems.
 - III. Be introduced to the five modes of transportation:
 - a. Land
 - b. Water
 - c. Air
 - d. Space
 - e. Intermodal systems
 - IV. Develop and understanding of the six vehicular systems:
 - a. Propulsion
 - b. Guidance
 - c. Control
 - d. Suspension
 - e. Structural
 - f. Support systems
 - V. Develop an awareness of the impacts and consequences of the various transportation systems, to future transportation system directions, and to transportation related careers.

5. Sketching and Applications

- A. Apply and demonstrate freehand sketching skills
 - I. Sketch straight lines.
 - II. Sketch circles and arcs.
 - III. Sketch curved lines.
 - IV. Sketch multi-view drawings.
 - V. Sketch pictorial drawings.
 - VI. Apply measurement and proportions
 - VII. Apply Alphabet of Lines
- B. Create pictorial drawings and models.
 - I. Identify and create isometric and oblique drawings
 - II. Identify and create perspective drawings (1-point and 2-point)
 - III. Identify and create 3D models using appropriate materials.
- C. Create technical sketching/freehand drawings using basic drafting procedures.
 - I. Identify, select and use fundamental drafting techniques for drawings
 - II. Identify and create “Alphabet of Lines” by name, line type variation, order of usage and application on technical drawings
 - III. Create title blocks
 - IV. Format borders
 - V. Apply appropriate annotation methods (i.e., notes and dimensions)
 - VI. Plot drawings on media using the correct layout and scale, line width, and legible text

6. Lab Safety Procedures

- A. Apply, test and demonstrate the basic lab safety procedures and operations.
 - I. Safety procedures and operations.
 - II. Safe and proper hand and power tool and machine usage.
 - III. Safe and proper material handling.



7. Careers and Leadership – 21st Century Skills

- A. Develop a plan for a career in the fields of Engineering and Architecture.
 - I. Investigate the variety of Science, Engineering and Architecture career options.
 - II. Develop career goals based on interests, aptitudes, and research
 - III. Describe factors that contribute to job satisfaction and success
- B. Prepare for employment in the fields of Science, Engineering and Architecture.
 - I. Develop a resume
 - II. Develop an electronic resume
 - III. Create a drafting/design portfolio with industry-specific work samples
 - IV. Complete job application process, including electronic applications
 - V. Demonstrate interviewing skills
- C. Participate in leadership activities such as those supported by career and technical student organizations.
 - I. Determine the roles and responsibilities that leaders and members bring to an organization
 - II. Evaluate characteristics and importance of an effective team player
 - III. Evaluate characteristics of effective teams
 - IV. Practice techniques to involve each member of the team
 - V. Participate in career development events
 - VI. Develop and implement a personal and professional improvement plan
 - VII. Demonstrate business etiquette
 - VIII. Participate in character development scenarios
 - IX. Practice decision-making process



Course Name Power, Energy and Transportation **Grade Level(s)** 9-12

POWER STANDARDS

Power Energy and Transportation 1

Power, Energy and Transportation is an introductory design and construction course. The course will deal with the study of power and energy: their source, generation, transmission, utilization, application, and control. Students will design, construct and problem solve in a wide variety of hands on activities and assignments using various technical and shop equipment.

Power Energy and Transportation 2

This course is a continuation of PET 1. It is offered for the student interested in studying more advanced concepts in power, energy and transportation design. Students will continue to work on group and individual hands-on projects studying concepts in chemical, mechanical, electrical, thermal, nuclear and electromagnetic energy. Activities will include simple devices and complex team constructed projects using various types of materials.

The student will...

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Read with comprehension to gain information and/or perform a task in a career setting.
5. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
6. Understand and apply appropriate safety policies and procedures.
7. Research, analyze, and evaluate Career and Post-Secondary options.
8. Use arts knowledge and skills to express and present ideas to make connections across career disciplines.
9. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
10. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
11. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.
12. Demonstrate professional development skills in a simulated customer service or employment situation.

MANUFACTURING PRODUCTION PATHWAY
OSPI Curriculum Re-approval
2015-2016



SKILLS GAP/LABOR MARKET DATA
Power, Energy & Transportation (STEM) Program

Power, Energy & Transportation Education Overall

Assemblers and fabricators assemble both finished products and the parts that go into them.

Quick Facts: Assemblers and Fabricators

<u>2014 Median Pay</u>	\$29,280 per year \$14.08 per hour
<u>Typical Entry-Level Education</u>	High school diploma or equivalent
<u>Work Experience in a Related Occupation</u>	None
<u>On-the-job Training</u>	Moderate-term on-the-job training
<u>Number of Jobs, 2014</u>	1,834,000
<u>Job Outlook, 2014-24</u>	-1% (Little or no change)
<u>Employment Change, 2014-24</u>	-9,700

Industrial machinery mechanics, machinery maintenance workers, and millwrights all repair manufacturing equipment.

Quick Facts: Industrial Machinery Mechanics, Machinery Maintenance Workers, and Millwrights

<u>2014 Median Pay</u>	\$47,450 per year \$22.82 per hour
<u>Typical Entry-Level Education</u>	High school diploma or equivalent
<u>Work Experience in a Related Occupation</u>	None
<u>On-the-job Training</u>	<u>See How to Become One</u>
<u>Number of Jobs, 2014</u>	464,400
<u>Job Outlook, 2014-24</u>	16% (Much faster than average)
<u>Employment Change, 2014-24</u>	

Workers use hand tools and power tools to fix appliances and equipment.

Quick Facts: General Maintenance and Repair Workers	
<u>2014 Median Pay</u>	\$36,170 per year \$17.39 per hour
<u>Typical Entry-Level Education</u>	High school diploma or equivalent
<u>Work Experience in a Related</u>	None
<u>On-the-job Training</u>	Long-term on-the-job training
<u>Number of Jobs, 2014</u>	1,374,700
<u>Job Outlook, 2014-24</u>	6% (As fast as average)
<u>Employment Change, 2014-24</u>	83,500

WASHINGTON TECHNOLOGY STUDENT ASSOCIATION

21ST CENTURY SKILLS CROSSWALK

HIGH SCHOOL PROGRAM

This crosswalk and the activities listed are for use by Affiliated TSA Chapters Only

	CREATIVITY & Innovation			CRITICAL THINKING & Problem Solving				Comm. & Collab		Info. Literacy		Media Literacy			Flex. & Adapt.		Initiative & Self Direction			Social & Cultural Skills		Product& Account		Leader. & Respon	
Activity	Think Creatively	Work Creativeley w/ others	Implement Innovations	Reason Effectively	Use Systems Thinking	Make Judgements & Decisions	Solve Problems	Communicate Clearly	Collaborate with Others	Access and /evaluate Information	Use and Manage Information	Analyze Media	Create Media Products	Apply Technology Effectively	Adapt to Change	Be Flexible	Manage Goals and Time	Work Independently	Be Self-Directed Learners	Interact Effectively with Others	Work Effectively in Diverse Teams	Manage Projects	Produce Results	Guide and Lead Others	Be Responsible to Others
	1A	1B	1C	2A	2B	2C	2D	3A	3B	4A	4B	5A	5B	6A	7A	7B	8A	8B	8C	9A	9B	10A	10B	11A	11B
Animatronics	X	X	X	X	X		X	X	X	X	X			X			X	X	X	X	X	X	X		
Architectural Renovation	X	X	X	X	X		X	X	X	X	X			X			X	X	X	X	X	X	X		
Biotechnology Design				X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X	X	X
Career Preparation								X	X	X	X			X	X	X	X	X	X	X		X	X		
Chapter Team (HS)				X		X		X	X						X	X				X	X			X	X
Computer-Aided Design 2D, Architecture	X	?	X				X	X					X	X		X	X	X	X						
Computer-Aided Design 3D, Engineering	X	?	X				X	X					X	X		X	X	X	X						
CNC Production	X	X	X	X	X		X	X	X					X	X	X	X	X	X	X	X	X	X	X	X
Debating Technology Issues				X	X	X		X	X	X	X	X			X	X		X		X	X				X
Desktop Publishing	X		X				X						X	X		X	X	X	X			X	X		
Digital Video Production	X	X	X					X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Dragster Design (HS)	X		X					X						X			X	X	X				X		
Engineering Design	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
Essays on Technology				X		X		X		X	X	X					X	X					X		
Extemporaneous Speech	X			X				X	X						X	X		X		X					
Fashion Design	X	X	X				X	X	X					X	X	X	X	X	X	X	X	X	X	X	X
Flight Endurance	X			X	X		X			X						X	X	X	X			X	X		
Future Technology Teacher	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X			X	X		
Manufacturing Prototype	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
Music Production	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
On Demand Video	X	X	X					X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
Open Source Software Development	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Photographic Technology	X	X	X					X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
Prepared Presentation	X			X				X	X	X	X	X	X	X	X	X	X	X		X		X	X		
Promotional Graphics	X		X				X						X	X		X	X	X	X			X	X		
SCIVIS	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Structural Engineering	X	X	X	X			X		X						X	X	X	X	X	X	X		X		X
Technical Sketching & Application	X						X	X							X	X		X					X		
Technology Bowl				X		X		X	X			X			X	X				X	X				X
Technology Problem Solving	X	X	X				X		X						X	X	X	X	X	X	X	X	X		X
Transportation Modeling	X		X	X			X	X		X				X			X	X	X			X	X		X
TSA/ VEX Robotics Competition	X	X	X	X	X		X		X	X				X	X	X	X	X	X	X	X	X	X		X
Video Game Design	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Webmaster	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Woodworking Design	X		X				X							X			X	X	X			X	X		
TSA Leadership Activities Guide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TSA Achievement Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TSA Officer Team Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Auburn School District Framework: Power, Energy and Transportation 1

Course: Technologies Foundations

Total Framework Hours: 180 Hours

CIP Code: 210198

Type: Exploratory

Career Cluster: Science, Technology, Engineering and Mathematics

Date Last Modified: Friday, January 29, 2016

Resources and Standard used in Framework Development:

Standards and competencies used in this framework are from the International Technology Education Association (ITEA) Standards for Technical Literacy outlined in the OSPI Model Framework for Technologies Foundations

Unit 1 SKETCHING AND APPLICATIONS

Hours: 20

Performance Assessment(s):

- A. Sketch straight lines.
- B. Sketch circles and arcs.
- C. Sketch curved lines.
- D. Sketch multi-view drawings.
- E. Sketch pictorial drawings.
- F. Apply measurement and proportions
- G. Apply Alphabet of Lines

Create pictorial drawings and models.

- A. Identify and create isometric and oblique drawings
- B. Identify and create perspective drawings (1-point and 2-point)
- C. Identify and create 3D models using appropriate materials.

Create technical sketching/freehand drawings using basic drafting procedures.

- A. Identify, select and use fundamental drafting techniques for drawings
- B. Identify and create "Alphabet of Lines" by name, line type variation, order of usage and application on technical drawings
- C. Create title blocks
- D. Format borders
- E. Apply appropriate annotation methods (i.e., notes and dimensions)
- F. Plot drawings on media using the correct layout and scale, line width, and legible text

Leadership Alignment:

TSA Design competition
TSA Co2 Dragster

Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 8: The attributes of design.

- DP8.3 Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.

Standard 11: Apply the design process.

- DP11.2 Identify criteria and constraints and determine how these will affect the design process.

- DP11.4 Evaluate the design solution using conceptual, physical and mathematical models at various intervals of the design process in order to check for proper design and to note where areas of improvements are needed.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Comprehension and Collaboration (9-10)

SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and

Presentation of Knowledge and Ideas (9-10)

SL.9-10.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9–10 Language standards 1 and 3

Health and Fitness

Language

Mathematics

Reading

Science

Engineering, Technology, and Applications of Science

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Performance Assessment(s):

Apply and demonstrate the basic steps to design and problem solving

- A. Identify key terms that relate to the Design Process.
- B. Identify the design process for problem solving.
- C. Understand and implement the steps of the design process.
- D. Apply the design process to real world problems.
- E. Evaluation process review, Capstone and/or presentation review. (Engineering Review)

Classroom-based assessment

Vocab test

Self and peer evaluation

Evaluation of products using rubric

Collection of examples using rubric

Leadership Alignment:

Lego competition

Paper Car design contest

TSA Competition

Standards and Competencies

Standard 1: The characteristics and scope of technology.

- C1.2 The rate of technological development and diffusion is increasing rapidly; advancements in technology drive more advances in technology.
- C1.3 Inventions and innovations in a specific area are generally driven by research to achieve a specific objective.

Standard 8: The attributes of design.

- DP8.1 Design problems are seldom presented in a clearly defined form; the best results are often based on the clarity of the design problem.
- DP8.2 The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved; the best results are often achieved when the process is non-linear.

Standard 11: Apply the design process.

- DP11.1 Identify the design problem to solve and decide whether or not to address it; differentiate between problems and solutions.
- DP11.3 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
- DP11.5 Develop and produce a product or system using a design process.

Aligned to Washington State Standards**Arts**

1.2 Develops arts skills and techniques.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Identifies audience and purpose.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
<p><u>CC: Mathematical Practices (MP)</u></p> <p>1 - Make sense of problems and persevere in solving them.</p> <p>6 - Attend to precision.</p>		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Performance Assessment(s):

- A. Identify the sources of renewable, nonrenewable and inexhaustible sources of energy.
B. Learn the terms used to describe the technology surrounding energy systems
C. Identify and explain the six forms of energy; (Rubric)
a. Mechanical
b. Thermal
c. Chemical
d. Electrical
e. Nuclear
f. Electromagnetic
D. Understand and apply the concepts of surrounding energy-to-energy conversion. (Contest assessment)

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of products using rubric
Collection of examples using rubric

Leadership Alignment:

TSA Competition
TSA Co2 Dragster

Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 1: The characteristics and scope of technology.

- C1.1 The history and development of technological knowledge and processes are functions of the setting and have been driven by needs.
- C1.3 Inventions and innovations in a specific area are generally driven by research to achieve a specific objective.

Standard 3: The relationships among technologies and the connections between technology and other fields of study.

- C3.2 Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
- C3.4 Technological progress promotes the understanding and relevance of science, mathematics, reading, writing and oral communications.

Standard 4: The cultural, social, economics, and political effects of technology.

- C4.1 Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.
- C4.2 Making decisions about the use of technology involves understanding the impacts.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Algebra (A)

Arithmetic with Polynomials and Rational Expressions (A-APR)

1 - Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and

Reading

Science

Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
6. Constructing explanations and designing solutions

Physical Sciences

HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric

HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 4 POWER TECHNOLOGY

Hours: 30

Performance Assessment(s):

- A. Develop and understanding of how power differs from energy.
- B. Learn the terms used to describe the technology surrounding power systems.
- C. Gain and awareness of how energy is converted to power.
- D. Develop and understanding of the three methods of transmitting power:
 - a. Mechanical – Six Simple Machines
 - b. Fluid
 - c. Electrical
- E. Develop an awareness of the impacts and consequences of power usage, to future power system directions, and power related careers.

Classroom-based assessment

Vocab test

Self and peer evaluation

Evaluation of products using rubric

Collection of examples using rubric

Leadership Alignment:

TSA Competition

TSA Co2 Dragster

Determine the roles and responsibilities that leaders and members bring to an organization.

Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 2: The core concepts of technology.

- C2.1 Systems thinking involves input, process, output and feedback and applies logic and creativity with appropriate compromises in complex real-life problems.
- C2.2 Technological systems interact with other systems including social, environmental, and scientific. Outputs - expected desirable, expected undesirable, unexpected desirable, unexpected undesirable.
- C2.9 Management is the process of planning, organizing, and controlling work.

Standard 5: The effects of technology on the environment.

- C5.4 The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.
- C5.6 Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative impacts on the environment.

Standard 7: The influence of technology on history.

- C7.3 Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
- C7.6 The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communications systems, advanced construction practices, and improved education and leisure time.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

Integration of Knowledge and Ideas (9-10)

RI.9-10.8 Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false

Key Ideas and Details (11-12)

RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the

Science

Engineering, Technology, and Applications of Science

HS-ETS1 Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☒ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Performance Assessment(s):

- A. Develop and understanding of nature of transportation systems.
- B. Learn the terms used to describe the technology transportation systems.
- C. Be introduced to the five modes of transportation:
 - a. Land
 - b. Water
 - c. Air
 - d. Space
 - e. Intermodal systems
- D. Develop and understanding of the six vehicular systems:
 - a. Propulsion
 - b. Guidance
 - c. Control
 - d. Suspension
 - e. Structural
 - f. Support systems
- E. Develop an awareness of the impacts and consequences of the various transportation systems, to future transportation system directions, and to transportation related careers.

Classroom-based assessment

Vocab test

Self and peer evaluation

Evaluation of products using rubric

Collection of examples using rubric

Leadership Alignment:

TSA Competition

TSA Co2 Dragster

Mouse Trap Car

Determine the roles and responsibilities that leaders and members bring to an organization.

Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 6: The role of society in the development and use of technology.

- C6.1 Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values, and standard of living.
- C6.2 Perceived needs are sometimes based on the existence of a technology not on real needs.

Standard 7: The influence of technology on history.

- C7.1 Most technological development has been evolutionary, the result of a series of refinements to a basic invention; many technology changes have driven and have been impacted by history.
- C7.6 The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communications systems, advanced construction practices, and improved education and leisure time.

Standard 9: The design process

- DP9.2 The design process is influenced by personal characteristics, such as creativity, teamwork, resourcefulness, and the ability to visualize and think abstractly.
- DP9.4 The design process takes into account a number of factors, including safety, reliability, economic considerations, manufacturability, maintenance and repairs, and human factors engineering; the design process can't be complete without a prototype or virtual model.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 6 - Attend to precision.

Reading

Science

Engineering, Technology, and Applications of Science

- HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
- HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability,

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 6 LAB SAFETY PROCEDURES**Hours: 30****Performance Assessment(s):**

Apply, test and demonstrate the basic lab safety procedures and operations.

A. Safety procedures and operations.

B. Safe and proper hand and power tool and machine usage.

C. Safe and proper material handling.

Classroom-based assessment

Written Tests

Vocab test

Self and peer evaluation

Evaluation of products/safety using rubric

Collection of examples using rubric

Leadership Alignment:

TSA Competition

TSA Co2 Dragster

Determine the roles and responsibilities that leaders and members bring to an organization.

Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 10: The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- DP10.2 Technological problems must be researched before they can be solved.

- DP10.3 Not every problem can be solved using technology.

Standard 12: Use and maintain technological products and systems.

- DP12.1 Document process and procedures and communicate them to different audiences using appropriate oral and written techniques; technical communications is critical to maintaining and operating a system.

- DP12.2 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.

- DP12.3 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.

Aligned to Washington State Standards**Arts****Communication - Speaking and Listening****Health and Fitness****Language****Mathematics****Reading**

CC: Reading Informational Text

Craft and Structure (9-10)

RI.9-10.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of

Craft and Structure (11-12)

RI.11-12.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and

Integration of Knowledge and Ideas (11-12)

RI.11-12.7 Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a

Science

Social Studies

Writing

CC: Writing (9-10)

Text Types and Purposes (9-10)

W.9-10.3d Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

Production and Distribution of Writing (9-10)

W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Performance Assessment(s):

Careers and Leadership

Develop a plan for a career in the related fields of Power, Energy and Transportation.

- A. Investigate the variety of drafting/design career options in design, engineering and manufacturing
- B. Develop career goals based on interests, aptitudes, and research
- C. Write, review and revise plan/goals on annual basis
- D. Manage personal and career goals
- E. Describe factors that contribute to job satisfaction and success

Prepare for employment in the related fields of Power, Energy and Transportation.

- A. Develop a resume
- B. Develop an electronic resume
- C. Create a portfolio with industry-specific work samples
- D. Complete job application process, including electronic applications
- E. Demonstrate interviewing skills

Demonstrate oral communication skills.

- A. Conduct formal/informal research to collect appropriate topical information and data
- B. Use questioning techniques to obtain needed information from audience
- C. Interpret oral and nonverbal communications of audience
- D. Demonstrate active listening during communications
- E. Demonstrate appropriate technologies for a formal presentation
- F. Deliver presentation incorporating both appropriate verbal and nonverbal communication techniques
- G. Communicate using equitable and culturally sensitive language for a diverse audience

Classroom-based assessment

Written Tests

Vocab test

Self and peer evaluation

Evaluations using rubrics

Collection of examples using rubric

Leadership Alignment:

TSA Competitions

Group Leader activity/Team Building

Moc Job interviews

Standards and Competencies

Standard 5: The effects of technology on the environment.

- C5.1 Humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling; technology impacts on the environment can be either positive or negative depending on how they are used.
- C5.5 Humans devise technologies to reduce the negative consequences of other technologies.

Standard 10: The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- DP10.2 Technological problems must be researched before they can be solved.
- DP10.4 Many technological problems require a multidisciplinary approach.

Standard 13: Assess the impact of products and systems.

- DP13.1 Ongoing development depends on evaluating a product or system effectiveness based the design criteria.

- DP13.3 Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Comprehension and Collaboration (9-10)

SL.9-10.1b Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear

Presentation of Knowledge and Ideas (9-10)

SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development,

Presentation of Knowledge and Ideas (11-12)

SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or

Health and Fitness

Language

Mathematics

Reading

Science

Engineering, Technology, and Applications of Science

HS-ETS1 Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Auburn School District Framework: Power, Energy and Transportation 2

Course: Technologies Foundations

Total Framework Hours: 180 Hours

CIP Code: 210198

Type: Exploratory

Career Cluster: Science, Technology, Engineering and Mathematics

Date Last Modified: Friday, January 29, 2016

Resources and Standard used in Framework Development:

Standards and competencies used in this framework are from the International Technology Education Association (ITEA) Standards for Technical Literacy outlined in the OSPI Model Framework for Technologies Foundations

Unit 1 ADVANCED SKETCHING AND APPLICATIONS

Hours: 15

Performance Assessment(s):

- A. Sketch straight lines.
- B. Sketch circles and arcs.
- C. Sketch curved lines.
- D. Sketch multi-view drawings.
- E. Sketch pictorial drawings.
- F. Apply measurement and proportions
- G. Apply Alphabet of Lines

Create pictorial drawings and models.

- A. Identify and create isometric and oblique drawings
- B. Identify and create perspective drawings (1-point and 2-point)
- C. Identify and create 3D models using appropriate materials.

Create technical sketching/freehand drawings using basic drafting procedures.

- A. Identify, select and use fundamental drafting techniques for drawings
- B. Identify and create "Alphabet of Lines" by name, line type variation, order of usage and application on technical drawings
- C. Create title blocks
- D. Format borders
- E. Apply appropriate annotation methods (i.e., notes and dimensions)
- F. Plot drawings on media using the correct layout and scale, line width, and legible text

Leadership Alignment:

TSA Logo Contest
School Design Challenge
Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 3: The relationships among technologies and the connections between technology and other fields of study.

- C3.1 Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function; all technical systems are interrelated.
- C3.4 Technological progress promotes the understanding and relevance of science, mathematics, reading, writing and oral communications.

Standard 8: The attributes of design.

- DP8.2 The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved; the best results are often achieved when the process is non-linear.

Standard 9: The design process

- DP9.1 Established design principles are used to evaluate existing designs, to collect data, and to guide the design process; Design principles are often rules of thumb rather than absolutes.

- DP9.3 A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

Standard 11: Apply the design process.

- DP11.1 Identify the design problem to solve and decide whether or not to address it; differentiate between problems and solutions.
- DP11.3 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

- Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.

4.3. Understands how the arts impact and reflect personal choices throughout life

Communication - Speaking and Listening

SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development,

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

1 - Make sense of problems and persevere in solving them.

5 - Use appropriate tools strategically.

Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Unit 2 DESIGN AND PROBLEM SOLVING PROCESS AND APPLICATION**Hours: 15****Performance Assessment(s):**

Apply and demonstrate the basic steps to design and problem solving

- A. Identify key terms that relate to the Design Process.
- B. Identify the design process for problem solving.
- C. Understand and implement the steps of the design process.
- D. Apply the design process to real world problems.
- E. Evaluation process review, Capstone and/or presentation review. (Engineering Review)

Classroom-based assessment

Vocab test

Self and peer evaluation

Evaluation of products using rubric

Collection of examples using rubric

Leadership Alignment:

Lego competition

Paper Car design contest

TSA Competition

School Design Challenge

Determine the roles and responsibilities that leaders and members bring to an organization.

Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 1: The characteristics and scope of technology.

- C1.1 The history and development of technological knowledge and processes are functions of the setting and have been driven by needs.
- C1.4 Most development of technologies is driven by profit motive and the market; corporations need to continue to make a profit to continue to develop new products and continue research.
- C1.6 Non-traditional training and employment options/opportunities are both possible and encouraged in all technologies.

Standard 3: The relationships among technologies and the connections between technology and other fields of study.

- C3.1 Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function; all technical systems are interrelated.
- C3.2 Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.

Standard 6: The role of society in the development and use of technology.

- C6.1 Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values, and standard of living.

Standard 10: The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- DP10.1 Research and development is an integral part of the design process.
- DP10.4 Many technological problems require a multidisciplinary approach.

Aligned to Washington State Standards**Arts**

1.2 Develops arts skills and techniques.

- Presents work to others in a performance, exhibition, and/or production.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
<u>CC: Mathematical Practices (MP)</u> 1 - Make sense of problems and persevere in solving them. 6 - Attend to precision.
Reading
Science
<u>Science and Engineering Practices</u> 1. Asking questions and defining problems 2. Developing and using models
Social Studies
Writing
<u>CC: Writing (9-10)</u> W.9-10.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☒ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☐ Be Responsible to Others

Performance Assessment(s):

- A. Identify the sources of renewable, nonrenewable and inexhaustible sources of energy.
- B. Learn the terms used to describe the technology surrounding energy systems
- C. Identify and explain the six forms of energy; (Rubric)
 - a. Mechanical
 - b. Thermal
 - c. Chemical
 - d. Electrical
 - e. Nuclear
 - f. Electromagnetic
- D. Understand and apply the concepts of surrounding energy-to-energy conversion. (Contest assessment)

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of products using rubric
Collection of examples using rubric

Leadership Alignment:

TSA Competitions
TSA Co2 Dragster
Mouse Trap Vehicle

Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

- Standard 3: The relationships among technologies and the connections between technology and other fields of study.
- C3.2 Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
- Standard 7: The influence of technology on history.
- C7.7 The Information Age places emphasis on the processing and exchange of information; the current growth of technology is having a greater impact on society today than at any other time in history.
- Standard 9: The design process
- DP9.3 A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.
- Standard 12: Use and maintain technological products and systems.
- DP12.3 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

5 - Use appropriate tools strategically.

6 - Attend to precision.

Reading

CC: Reading Informational Text

RI.9-10.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of

RI.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the

Science

Science and Engineering Practices

1. Asking questions and defining problems

3. Planning and carrying out investigations

Physical Sciences

HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at

HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 4 ADVANCED POWER TECHNOLOGY**Hours: 30****Performance Assessment(s):**

- A. Develop and understanding of how power differs from energy.
- B. Learn the terms used to describe the technology surrounding power systems.
- C. Gain and awareness of how energy is converted to power.
- D. Develop and understanding of the three methods of transmitting power:
 - a. Mechanical – Six Simple Machines
 - b. Fluid
 - c. Electrical
- E. Develop an awareness of the impacts and consequences of power usage, to future power system directions, and power related careers.

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of products using rubric
Collection of examples using rubric

Leadership Alignment:

Prop Racer Competition
Hydraulic Arm contest
TSA Competition
School DC Motor Challenge
Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

- Standard 5: The effects of technology on the environment.
- C5.2 When new technologies are developed to reduce the use of resources, considerations of the impacts are important.
 - C5.5 Humans devise technologies to reduce the negative consequences of other technologies.
- Standard 6: The role of society in the development and use of technology.
- C6.1 Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values, and standard of living.
- Standard 10: The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- DP10.2 Technological problems must be researched before they can be solved.
- Standard 12: Use and maintain technological products and systems.
- DP12.3 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.

Aligned to Washington State Standards**Arts**

- Selects artistic resources, materials and/or repertoire to create, perform and present.
- Presents, exhibits, and produces work and/or performance for others.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
<u>CC: Mathematical Practices (MP)</u> 1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 6 - Attend to precision.
Reading
Science
<u>Science and Engineering Practices</u> 3. Planning and carrying out investigations 6. Constructing explanations and designing solutions

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☐ Be Responsible to Others

Performance Assessment(s):

- A. Develop and understanding of nature of transportation systems.
- B. Learn the terms used to describe the technology transportation systems.
- C. Be introduced to the five modes of transportation:
 - a. Land
 - b. Water
 - c. Air
 - d. Space
 - e. Intermodal systems
- D. Develop and understanding of the six vehicular systems:
 - a. Propulsion
 - b. Guidance
 - c. Control
 - d. Suspension
 - e. Structural
 - f. Support systems
- E. Develop an awareness of the impacts and consequences of the various transportation systems, to future transportation system directions, and to transportation related careers.

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of products using rubric
Collection of examples using rubric

Leadership Alignment:

Prop Racer Competition
Hydrolic Arm contest
TSA Competition
Mouse Trap Challenge
Determine the roles and responsibilities that leaders and members bring to an organization.
Evaluate characteristics and importance of an effective team player.

Standards and Competencies

- Standard 4: The cultural, social, economics, and political effects of technology.
- C4.1 Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.
 - C4.2 Making decisions about the use of technology involves understanding the impacts.
- Standard 5: The effects of technology on the environment.
- C5.3 With the aid of technology, various aspects of the environment can be monitored to provide information for decision-making.
 - C5.6 Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative impacts on the environment.
- Standard 10: The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- DP10.2 Technological problems must be researched before they can be solved.
 - DP10.4 Many technological problems require a multidisciplinary approach.
- Standard 11: Apply the design process.
- DP11.2 Identify criteria and constraints and determine how these will affect the design process.
 - DP11.6 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 3 - Construct viable arguments and critique the reasoning of others.
- 5 - Use appropriate tools strategically.

Reading

CC: Reading Literature

- RL.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- RL.11-12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the

Science

Science and Engineering Practices

- 2. Developing and using models
- 5. Using mathematics and computational thinking

Social Studies

Writing

CC: Writing (11-12)

- W.11-12.1a Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an
- W.11-12.2d Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 6 LAB PERFORMANCE AND SAFETY PROCEDURES**Hours: 40****Performance Assessment(s):**

Apply, test and demonstrate the basic lab safety procedures and operations.

A. Safety procedures and operations.

B. Safe and proper hand and power tool and machine usage.

C. Safe and proper material handling.

Classroom-based assessment

Written Tests

Vocab test

Self and peer evaluation

Project development rubric

Evaluation of products/safety using rubric

Collection of examples using rubric

Leadership Alignment:

Understand industrial procedures

TSA Competitions

TSA Co2 Dragster

Mouse Trap Vehicle

Determine the roles and responsibilities that leaders and members bring to an organization.

Evaluate characteristics and importance of an effective team player.

Standards and Competencies

Standard 3: The relationships among technologies and the connections between technology and other fields of study.

- C3.1 Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function; all technical systems are interrelated.
- C3.2 Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.

Standard 6: The role of society in the development and use of technology.

- C6.2 Perceived needs are sometimes based on the existence of a technology not on real needs.
- C6.4 The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.

Standard 7: The influence of technology on history.

- C7.6 The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communications systems, advanced construction practices, and improved education and leisure time.
- C7.7 The Information Age places emphasis on the processing and exchange of information; the current growth of technology is having a greater impact on society today than at any other time in history.

Standard 12: Use and maintain technological products and systems.

- DP12.2 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.

Standard 13: Assess the impact of products and systems.

- DP13.1 Ongoing development depends on evaluating a product or system effectiveness based the design criteria.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

5 - Use appropriate tools strategically.

6 - Attend to precision.

Reading

CC: Reading Informational Text

RI.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Science

Science and Engineering Practices

2. Developing and using models

6. Constructing explanations and designing solutions

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Performance Assessment(s):

Careers and Leadership

Develop a plan for a career in the related fields of Power, Energy and Transportation.

- A. Investigate the variety of drafting/design career options in design, engineering and manufacturing
- B. Develop career goals based on interests, aptitudes, and research
- C. Write, review and revise plan/goals on annual basis
- D. Manage personal and career goals
- E. Describe factors that contribute to job satisfaction and success

Prepare for employment in the related fields of Power, Energy and Transportation.

- A. Develop a resume
- B. Develop an electronic resume
- C. Create a portfolio with industry-specific work samples
- D. Complete job application process, including electronic applications
- E. Demonstrate interviewing skills

Demonstrate oral communication skills.

- A. Conduct formal/informal research to collect appropriate topical information and data
- B. Use questioning techniques to obtain needed information from audience
- C. Interpret oral and nonverbal communications of audience
- D. Demonstrate active listening during communications
- E. Demonstrate appropriate technologies for a formal presentation
- F. Deliver presentation incorporating both appropriate verbal and nonverbal communication techniques
- G. Communicate using equitable and culturally sensitive language for a diverse audience

Classroom-based assessment

Written Tests

Vocab test

Self and peer evaluation

Evaluations using rubrics

Collection of examples using rubric

Leadership Alignment:

TSA Competitions

Group Leader activity/Team Building

Moc Job interviews

Standards and Competencies

Standard 1: The characteristics and scope of technology.

- C1.1 The history and development of technological knowledge and processes are functions of the setting and have been driven by needs.
- C1.6 Non-traditional training and employment options/opportunities are both possible and encouraged in all technologies.

Standard 4: The cultural, social, economics, and political effects of technology.

- C4.3 Ethical considerations are important in the development, selection, and use of technologies (should we do it just because we can?).
- C4.4 The transfer of a technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees; desirable impacts in one society may be undesirable in another.

Standard 7: The influence of technology on history.

- C7.1 Most technological development has been evolutionary, the result of a series of refinements to a basic invention; many technology changes have driven and have been impacted by history.
 - C7.7 The Information Age places emphasis on the processing and exchange of information; the current growth of technology is having a greater impact on society today than at any other time in history.
- Standard 13: Assess the impact of products and systems.
- DP13.4 Design forecasting techniques to evaluate the results of altering natural systems.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

SL.9-10.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other

SL.9-10.1d Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and

SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development,

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

3 - Construct viable arguments and critique the reasoning of others.

Reading

Science

Science and Engineering Practices

1. Asking questions and defining problems
3. Planning and carrying out investigations
6. Constructing explanations and designing solutions

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others



Robotics Technology



INTRODUCTION

Course Name	<u>Robotics Technology</u>	Grade Level(s)	<u>9-12</u>
Course Length	<u>2 Years</u>	Course Code(s)	<u>CTE 389, CTE 390</u>

Course Description

ROBOTICS TECHNOLOGY (CTE 389, 390) OPEN TO: 9, 10, 11, 12 Full Year Course CROSS CREDIT: Math May not satisfy four-year college entrance requirements. This is an introductory course into the world of robotics. The students will both program and operate EV3 Robots and additional platforms (such as Tetrix and VEX) as they explore and learn to operate and build robot bases to perform tasks in class. As a student in the class, the robotics technology students will have the opportunity to build and compete with a variety of robots in and out of the classroom including participating in FIRST ROBOTICS (National Organization), TSA, etc. This class will focus on robotic Technologies. Students will conduct lab experiments while learning the theory of force, work, rate, resistance, energy, power, and force transformers and how each applies to Robotics.

ROBOTICS TECHNOLOGY (CTE xxx, xxx) OPEN TO: 11, 12 Full Year Course CROSS CREDIT: Math May not satisfy four-year college entrance requirements. This is an advance course into the world of robotics. The students will both program and operate platforms (such as Tetrix and VEX) as they further explore and develop concepts and skills related to designing, prototyping, programming, building advance robots to solve problems presented by Robot Challenges presented by TSA, FIRST, VEX Robotics Foundation, Rob-Sub Foundation, etc. accepting a challenge with instructor guidance and approval, and learn to operate and build robots to solve and engineering challenge. Student expectation is that they will be part of a team that develops a product for a technology challenge presented. Students will need to help fundraise to develop robot solutions as part of the class. As a student in the class, the robotics technology students will have the opportunity to build and compete with a variety of robots in and out of the classroom including participating in FIRST ROBOTICS (National Organization), TSA, etc. This class will focus on robotic Technologies. Students will conduct lab experiments while learning the theory of force, work, rate, resistance, energy, power, and force transformers and how each applies to Robotics.

Primary Connection Engineering Technology, Manufacturing, STEM, Manufacturing production process development

Secondary Connection Apprenticeship, Internships, Community and Technical College, Four- year, College and University

Sample Sequence of Courses of Study

1. Robotic Technology 1
2. Robotic Technology 2
3. Robotic Technology 3
4. Robotic Technology 4
5. Electronics 1
6. Electronics 2



7. Engineering Design and Architecture
8. Computer Science
9. Computer System Engineer
10. Woodworking Design
11. Machining Technology
12. Aerospace Assembly

**Cross Credit and/or
College Credit**

Math Credit (3rd Year)

**Hardware: Kits and
supplemental**

Tetrix or Vex Ed Robots
Lego EV3

Software

Autodesk Suite 2016 or latest – AutoCad 2D and 3D, Inventor, Revit and 3D Studio
Max
Mastercam 9.0
PTC Creo 3.0, MATH CAD
Rhinoceous
Solidworks

Supplemental Materials

Autodesk 3D Studio Max
Autodesk 3ds Max 2016 Fundamentals
SDC Publication By ASCENT
Mastercam Manual
MasterCAM X9 Bundle 1
Publisher eMastercam.com

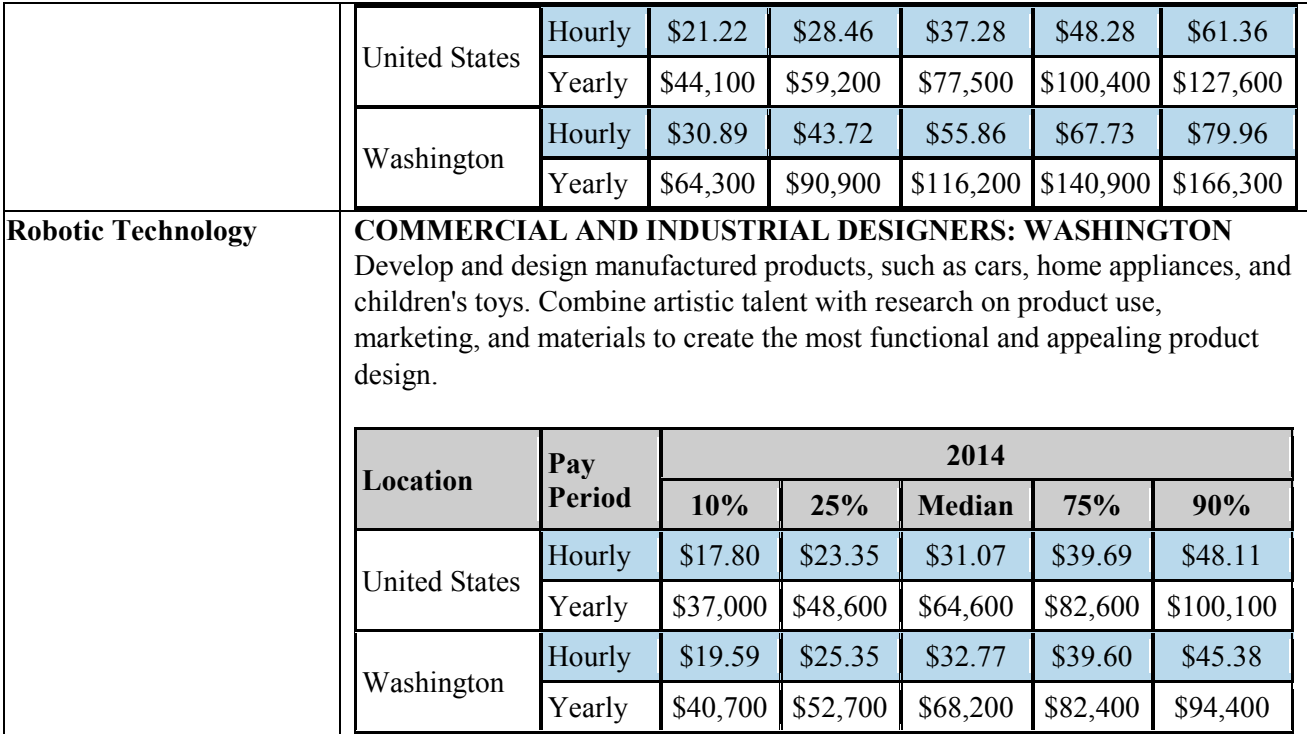


Auburn School District #408

Robotics Technology PATHWAY
OSPI Curriculum Re-approval
2015-16

**Robotics Technology
Robotics Technology Program**

Robotics Technology	<p>Engineering: All engineers not listed separately. State and National Wages</p> <table><tr><th rowspan="2">Location</th><th rowspan="2">Pay Period</th><th colspan="5">2014</th></tr><tr><th>10%</th><th>25%</th><th>Median</th><th>75%</th><th>90%</th></tr><tr><td rowspan="2">United States</td><td>Hourly</td><td>\$24.72</td><td>\$33.71</td><td>\$45.31</td><td>\$57.90</td><td>\$70.76</td></tr><tr><td>Yearly</td><td>\$51,400</td><td>\$70,100</td><td>\$94,200</td><td>\$120,400</td><td>\$147,200</td></tr><tr><td rowspan="2">Washington</td><td>Hourly</td><td>\$21.86</td><td>\$28.79</td><td>\$43.67</td><td>\$55.58</td><td>\$67.25</td></tr><tr><td>Yearly</td><td>\$45,500</td><td>\$59,900</td><td>\$90,800</td><td>\$115,600</td><td>\$139,900</td></tr></table>	Location	Pay Period	2014					10%	25%	Median	75%	90%	United States	Hourly	\$24.72	\$33.71	\$45.31	\$57.90	\$70.76	Yearly	\$51,400	\$70,100	\$94,200	\$120,400	\$147,200	Washington	Hourly	\$21.86	\$28.79	\$43.67	\$55.58	\$67.25	Yearly	\$45,500	\$59,900	\$90,800	\$115,600	\$139,900
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Robotics Technology	<p>Mechanical Engineering Technicians</p> <p>Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists. State and National Wages</p> <table><tr><th rowspan="2">Location</th><th rowspan="2">Pay Period</th><th colspan="5">2014</th></tr><tr><th>10%</th><th>25%</th><th>Median</th><th>75%</th><th>90%</th></tr><tr><td rowspan="2">United States</td><td>Hourly</td><td>\$16.31</td><td>\$20.30</td><td>\$25.74</td><td>\$32.24</td><td>\$38.30</td></tr><tr><td>Yearly</td><td>\$33,900</td><td>\$42,200</td><td>\$53,500</td><td>\$67,100</td><td>\$79,700</td></tr><tr><td rowspan="2">Washington</td><td>Hourly</td><td>\$18.35</td><td>\$22.84</td><td>\$28.61</td><td>\$35.46</td><td>\$42.62</td></tr><tr><td>Yearly</td><td>\$38,200</td><td>\$47,500</td><td>\$59,500</td><td>\$73,800</td><td>\$88,600</td></tr></table>	Location	Pay Period	2014					10%	25%	Median	75%	90%	United States	Hourly	\$16.31	\$20.30	\$25.74	\$32.24	\$38.30	Yearly	\$33,900	\$42,200	\$53,500	\$67,100	\$79,700	Washington	Hourly	\$18.35	\$22.84	\$28.61	\$35.46	\$42.62	Yearly	\$38,200	\$47,500	\$59,500	\$73,800	\$88,600
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COURSE OUTLINE

Course Name Robotics Technology **Grade Level(s)** 9-12

1. Introduction to Robotics

- A. Show knowledge of robotic history and development
- B. Create a research paper on robots
- C. Create and present lesson on robotic history

2. Occupational Safety and Health

- A. Show knowledge of Safety Regulations
- B. Demonstrate Health and Safety
- C. Demonstrate Shop/Lab Safety

3. Electrical Systems used in Robotics

- A. Demonstrate knowledge of Basic Principles of Electronics and Electricity
- B. Identify electronic components.
- C. Demonstrate ability to use measuring devices and processes.
- D. Demonstrate knowledge of electronic circuits.

- E. Demonstrate knowledge of DC motors commonly used in the robotics industry.
- F. Demonstrate the ability to wire a component part to perform a function.

4. Mechanical Systems

- A. Given a robotic manipulator, identify its type by using all classification parameters.
- B. Given a gear train determine its mechanical advantage.

5. Servo Systems

- A. Identify the various control modes used in servo systems and explain their advantages and disadvantages. Identify the various feedback devices used in servo systems and describe their operational parameters and characteristics.
- B. Design and build a Closed-Loop Servo system.

6. Pneumatic Systems

- A. Identify the various types of compressors and demonstrate their proper use/operation.
- B. Identify and demonstrate the proper operation of desiccant dryers, receiver tanks, pressure switches and pressure regulators as used in a pneumatic system.
- C. Design and construct a pneumatic control system.



7. Robotic Control Systems

- A. Identify the various robot control devices and demonstrate their function including:
- B. Wireless Controlled System
- C. Wire Controlled System
- D. Infrared sensing system
- E. Optical sensing system
- F. Fiber-optic system
- G. Sound sensors
- H. Demonstrate a knowledge of sensing devices used in robotics

8. Programming Languages and Software

- A. Demonstrate a knowledge of available software used to program robotic functions
- B. Use software to integrate software with control systems
- C. Program a robot to perform a task using software to control the functions

9. Technical Knowledge and Skills

- A. Demonstrate a knowledge of Operations
- B. Demonstrate a knowledge Problem Solving
- C. Demonstrate competency in using equipment and machinery
- D. Demonstrate competency in using measuring devices
- E. Identify and classify types of robotic manipulators and all classification parameters.
- F. Demonstrate understanding of an open loop and closed loop system in accordance with a set of specifications.
- G. Demonstrate a knowledge of the LERT (linear, extensional, rotational, and twisting) system in a given project
- H. Demonstrate ability to determine gear train and gear ratios

10. Manufacturing & Design

- A. Develop a product using the Design process
- B. Produce a freehand drawing of a mechanical component by applying proportions and direct variation principles.
- C. Produce sketches by integrating proper sketching techniques and styles
- D. Produce a 2-D drawing demonstrating geometric constraints
- E. Produce a 3-D drawing of an object.

11. Careers & Occupations / 21st Century Skills

- A. Demonstrate an understanding of the career opportunities related to manufacturing engineering.
- B. Demonstrate an understanding of the skills and knowledge necessary for success in the world of work generally and in engineering



Course Name Robotics Technology

Grade Level(s) 9-12

POWER STANDARDS

The student will...

- Follow technical documents to build a working robotic system.
- Program a robot to perform specified tasks.
- Utilize the engineering design process to produce and evaluate a product.
- Apply mathematical thinking and problem-solving skills to perform tasks.
- Research, analyze, and evaluate Career and Post-Secondary options in STEM fields.
- Know, understand, and demonstrate appropriate workplace behaviors.

AUBURN SCHOOL DISTRICT #408

EQUIVALENT LEADERSHIP

For

Robotics Technology

Leadership and Employability (21 st CENTURY SKILLS DOCUMENTATION)	Activity and Explanation
Creativity and Innovation	
<p><u>Think Creatively</u></p> <ul style="list-style-type: none"> • Use a wide range of idea creation techniques (such as brainstorming). • Create new and worthwhile ideas (both incremental and radical concepts). • Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts. 	<p>Activity: Students will complete assignments/projects; ones that require students to think creatively using their foundational knowledge to design and create functioning robots that are used to perform a task.</p>
<p><u>Work Creatively with Others</u></p> <ul style="list-style-type: none"> • Develop, implement and communicate new ideas to others effectively. • Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work. • Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas. 	<p>Activity: Students will participate in and complete group projects; ones that require collaborating, brainstorming, communication, negotiating, etc. to assure project success.</p>
Critical Thinking and Problem Solving	
<p><u>Solve Problems</u></p> <ul style="list-style-type: none"> • Solve different kinds of non-familiar problems in both conventional and innovative ways. • Identify and ask significant questions that clarify various points of view and lead to better solutions. 	<p>Activity: Students will complete assignments/projects; ones that require demonstrating their competency of their problem solving skills through constant evaluation and testing of their project.</p>
Communication and Collaboration	
<p><u>Communicate Clearly</u></p> <ul style="list-style-type: none"> • Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts. • Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions. • Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade). • Utilize multiple media and technologies, and know how to judge their effectiveness a priority as well as assess their impact. • Communicate effectively in diverse environments (including multi-lingual). 	<p>Activity: Students will participate in and complete group projects; ones that require collaborating, brainstorming, communication, negotiating, etc. to assure project success.</p>
<p><u>Collaborate with Others</u></p> <ul style="list-style-type: none"> • Demonstrate ability to work effectively and respectfully with diverse teams. • Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal. • Assume shared responsibility for collaborative work, and value the individual contributions made by each team member. 	<p>Activity: Students will participate in and complete group projects; ones that require collaborating, brainstorming, communication, negotiating, etc. to assure project success.</p>

Information Literacy

Access and Evaluate Information

- Access information efficiently (time) and effectively (sources).
- Evaluate information critically and competently.

Activity:

Students will complete assignments/projects; ones that require researching information by using search engines and websites via the Internet

Use and Manage Information

- Use information accurately and creatively for the issue or problem at hand.
- Manage the flow of information from a wide variety of sources.
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information.

Activity:

Students will complete assignments/projects; ones that require using search engines and websites via the Internet

Media Literacy

Analyze Media

- Understand both how and why media messages are constructed, and for what purposes.
- Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors.
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media.

Activity:

Students will complete assignments/projects; ones that require using search engines and websites via the Internet, comparing information from multiple websites to validate the information

Create Media Products

- Understand and utilize the most appropriate media creation tools, characteristics and conventions.
- Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments.

Activity:

Students will complete projects; ones that require the use of industry recognized and developed software to design fully functioning robots.

Information, Communications and Technology (ICT) Literacy

Apply Technology Effectively

- Use technology as a tool to research, organize, evaluate and communicate information.
- Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy.
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies.

Activity:

Students will complete assignments/projects; ones that require the understanding of how to appropriately use various technologies and how they may function with the work done in the classroom.

Initiative and Self-Direction

Manage Goals and Time

- Set goals with tangible and intangible success criteria.
- Balance tactical (short-term) and strategic (long-term) goals.
- Utilize time and manage workload efficiently.

Activity:

Students will complete assignments/projects; ones that require the setting of short-term goals with a deadline for completing the goals

Work Independently

- Monitor defines, prioritize and complete tasks without direct oversight

Activity:

Students will complete assignments/projects; ones that require work to be done without or minimal direct instruction or oversight

Social and Cross-Cultural Skills

Interact Effectively with Others

- Know when it is appropriate to listen and when to speak.
- Conduct themselves in a respectable, professional manner.

Activity:

Students will participate in and complete group projects; ones that require students to work together which provides them the ability to demonstrate and practice their interpersonal skills and problem solving skills

<p><u>Work Effectively with Diverse Teams</u></p> <ul style="list-style-type: none"> • Respect cultural differences and work effectively with people from a range of social and cultural backgrounds. • Respond open-mindedly to different ideas and values. • Leverage social and cultural differences to create new ideas and increase both innovation and quality of work. 	<p><u>Activity:</u></p> <p>Students will participate in and complete group projects; ones that require students to work together which provides them the ability to demonstrate and practice their interpersonal skills and problem solving skills</p>
<p align="center">Productivity and Accountability</p>	
<p><u>Manage Projects</u></p> <ul style="list-style-type: none"> • Set and meet goals, even in the face of obstacles and competing pressures. • Prioritize, plan and manage work to achieve the intended result. 	<p><u>Activity:</u></p> <p>Students will complete assignments/projects; ones that require deadlines to be set for working through the entire assignment/project from start-to-finish to meet a due date</p>
<p><u>Produce Results</u></p> <ul style="list-style-type: none"> • Demonstrate additional attributes associated with producing high quality products including the abilities to: <ul style="list-style-type: none"> ○ Work positively and ethically. ○ Manage time and projects effectively. ○ Multi-task. ○ Participate actively, as well as be reliable and punctual. ○ Present oneself professionally and with proper etiquette. ○ Collaborate and cooperate effectively with teams. ○ Respect and appreciate team diversity. ○ Be accountable for results. 	<p><u>Activity:</u></p> <p>Students will complete projects; ones that require knowledge and skills to plan, design, and build their robot and be able to compete.</p>
<p align="center">Leadership and Responsibility</p>	
<p><u>Guide and Lead Others</u></p> <ul style="list-style-type: none"> • Use interpersonal and problem-solving skills to influence and guide others toward a goal. • Leverage strengths of others to accomplish a common goal. • Inspire others to reach their very best via example and selflessness. • Demonstrate integrity and ethical behavior in using influence and power. 	<p><u>Activity:</u></p> <p>Students will participate in and complete group projects; ones that require demonstration of interpersonal skills, problem solving skills and relationship building to act responsibly to one another in the classroom and to those outside of the classroom specifically for the purpose of projects related to competitions.</p>

Robotics Technology
Robotics Technology Program

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	Washington	Hourly	\$30.89	\$43.72	\$55.86	\$67.73	\$79.96
		Yearly	\$64,300	\$90,900	\$116,200	\$140,900	\$166,300
Robotic Technology	COMMERCIAL AND INDUSTRIAL DESIGNERS: WASHINGTON						
	Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$17.80	\$23.35	\$31.07	\$39.69	\$48.11
		Yearly	\$37,000	\$48,600	\$64,600	\$82,600	\$100,100
	Washington	Hourly	\$19.59	\$25.35	\$32.77	\$39.60	\$45.38
		Yearly	\$40,700	\$52,700	\$68,200	\$82,400	\$94,400



Auburn School District

Auburn Public Schools Frameworks: Robotics Technology

CIP Code: 150405

Total Framework Hours: 360

OSPI Course: Industrial Robotics Technology/Technician

Preparatory Course

Career Cluster: Manufacturing

Cluster Pathway: Manufacturing Production Process Development

Date Last Modified: January 14, 2016

This course is designed to help meet current workforce shortages in the area of science, math, and technology. This course has been approved by our local advisory committee and will be reviewed annually to update technology requirements. This course works in conjunction with the **FIRST** (For Inspiration and Recognition of Science and Technology) Robotics organization for competitive events and student leadership activities. Through **FIRST**, students are able to work with mentors from our local business community to prepare for competitions and participate in other local, state, and national events.

Resources and Standards used in Framework Development:

- FIRST Robotics Program
- ETCAI (Electricity and Electronics Teaching Tools)
- ISCET (International Society of Certified Electronics Technicians)
- Electronic Kourseware Interactive (EKI) Curriculum
- Robotics Engineering Curriculum Volumes I & II
- NXT Video Trainer
- Robolab Video Trainer
- LEGO Mindstorms EV3 Curriculum and programming Software
- Tetrix Curriculum Materials
- Vex Robotics Curriculum
- National Instruments LabVIEW programming
- Occupational Safety and Health Administration Resources
- OSPI Safety Guide
- OSPI Industrial Robotics Framework
- Local Advisory Board

Unit 1 – Introduction to Robotics

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

- A. Show knowledge of robotic history and development
- B. Create a research paper on robots
- C. Create and present lesson on robotic history

Competencies

Total Learning Hours for Unit: 5

A	Identify characteristics of a robot
B	Create a research paper on important/iconic robotics, both real and fictional.
C	Create a 10 minute lesson on one real robot including its history, uses, and future to present to the class

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)

(Samples included below of GLEs, EALRS and Math Standards must be modified for district frameworks)

Reading

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
2.1.7	Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: determine importance and <u>summarize</u> the text.
2.2.2	Apply understanding of complex <u>organizational features</u> of printed text and <u>electronic sources</u> .
2.2.4	Apply understanding of <u>text organizational structures</u> .
2.4.6	Analyze and evaluate the presentation and development of ideas and concepts within, among, and beyond multiple texts

Communications

1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
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1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
3.1	Uses knowledge of topic/theme, audience, and purpose to plan presentations.
3.2	Uses media and other resources to support presentations.
3.3	Uses effective delivery.
Social Studies – Civics	
2.1	Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
4.1.2	Understands how the following themes and developments help to define eras in world history:
4.2.3	Analyzes and evaluates how technology and ideas have shaped world history (1450—present).
2.4.1	Analyzes and evaluates how people across the world have addressed issues involved with the distribution of resources and sustainability in the past or present.
5.3.1	Evaluates one’s own viewpoint and the viewpoints of others in the context of a discussion.
3.2.1	Analyzes and evaluates human interaction with the environment across the world in the past or present.
4.4.1	Analyzes how an understanding of world history can help us prevent problems today.
Writing	
1.1.1	Analyzes and selects effective strategies for generating ideas and planning writing.
1.3.1	Revises text, including changing words, sentences, paragraphs, and ideas.
2.2.1	Demonstrates understanding of different purposes for writing.
2.4.1	Produces documents used in a career setting.
3.1.1	Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.
3.2.1	3.2.1 Analyzes audience and purposes and uses appropriate voice.
3.3	Knows and applies writing conventions appropriate for the grade level.
Art	
1.2	Develops arts skills and techniques.
1.3	Understands and applies arts genres and styles from various artists, cultures and times.
2.1	Applies a creative process in the arts (dance, music, theatre and visual arts.) (<i>Identifies, explores, gathers, interprets, uses ideas, implements, reflects, refines, presents</i>)
2.2	Applies a performance process. (<i>Identifies, selects, analyzes, interprets, rehearses, adjusts, refines, presents, exhibits, produces, reflects, and self-evaluates</i>)
3.2	Uses the arts to communicate for a specific purpose.
3.3	Develops personal aesthetic criteria to communicate artistic choices.
4.1	Demonstrates and analyzes the connections among the arts disciplines.
Science Standards	

9-12 SYSA	Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.
9-12 SYSB	Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.
9-12 INQC	Explain Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-12 INQF	Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.
9-12 INQG	Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.
9-12 APPA	Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study and by deciding what research will be funded.
9-12 APPD	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
9-12 APPC	Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.
9-12 APPE	Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended, others not.
9-12 APPF	It is important for all citizens to apply science and technology to critical issues that influence society.
9-11 PS1C	An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by an unbalanced force. (Newton's First Law of Motion, the Law of Inertia)
9-11 PS1E	Whenever one object exerts a force on another object, a force of equal magnitude is exerted on the first object in the opposite direction. (Newton's Third Law of Motion)
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Mathematics Standards	

G.5.D, M3.2.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.
G.6.A, M3.7.D	Derive and apply formulas for arc length and area of a sector of a circle.
G.6.B, M3.5.F	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
G.6.E, M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F, M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.
G.7.A, M2.6.A	Analyze a problem situation and represent it mathematically.
G.7.B, M2.6.B	Select and apply strategies to solve problems.
G.7.C, M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
G.7.D, M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
G.7.E, M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

SKILLS

Leadership: Individual Skills

- 1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences.
- 1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.
- 1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.
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Leadership: Group Skills

- 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals.
- 2.2 The student will demonstrate knowledge of conflict resolution and challenge management.
- 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.

Leadership: Community and Career Skills

- 3.2 The student will demonstrate social responsibility in family, community, and business and industry.
- 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.

Student leadership organizations and opportunities**FIRST Robotics****Employability:**

- 1.1 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.
- 1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including computers and other technologies. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):

X Observe	X	X Finding	X Reasoning	X Originality
X Patterns	Cause/Effect	Evidence	X Problem	X Risking
X Sequence	X Fact/Opinion	X Evaluation	Solving	X Inquisitiveness
X Classify	X Main Idea	X Detect Bias	X Goal Setting	Attending
X Compare/Contrast	Summary	Inference	Fluency	Persistence
Predict	X Point of	X Conclusion	Elaboration	X Precision
	View	Meta-cognition	Flexibility	
	Analysis			

Unit 2 - Occupational Safety and Health

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

- A. Show knowledge of Safety Regulations
- B. Demonstrate Health and Safety
- C. Demonstrate Shop/Lab Safety

Competencies

Total Learning Hours for Unit: 5

- | | |
|----|---|
| A. | Review OSHA and WISA regulations. |
| A. | Review EPA and other environmental protection regulations that apply. |
| A. | Review Hazard Communication Policies |
| A. | Identify contact information for appropriate health and safety agencies and resources |
| B. | Review and demonstrate effective use of MSDS. |
| B. | Read chemical, product and equipment labels to determine appropriate health and safety considerations. |
| B. | Review basic first aid procedures and how to contact first responders |
| C. | Learn and demonstrate safe dress for the workplace and lab. |
| C. | Learn and use relevant safety gear and personal protective equipment (PPE), |
| C. | Locate emergency equipment in lab, shop, and classroom, and school. |
| C. | Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom. |

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards) ***(Samples included below of GLEs, EALRS and Math Standards must be modified for district frameworks)***

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- | | |
|-------|--|
| 1.2.2 | Apply strategies to comprehend words and ideas. |
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- | | |
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| 1.1 | Uses listening and observation skills and strategies to focus attention and interpret information. |
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FIRST Robotics

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X Observe	X	X Finding	X Reasoning	X Originality
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X Sequence	X Fact/Opinion	X Evaluation	Solving	X Inquisitiveness
X Classify	X Main Idea	X Detect Bias	X Goal Setting	Attending
X Compare/Contrast	Summary	Inference	Fluency	Persistence
Predict	X Point of	X Conclusion	Elaboration	X Precision
	View	Meta-cognition	Flexibility	
	Analysis			

Unit 3 – Electronics and Electrical Systems**Performance Assessments:**

Successfully complete a unit of study on electronic components and the physics related to basic DC circuits

- Identify and use meters and Power Sources

- Identify Resistors and Potentiometers
- Identify Capacitors
- Identify Inductors and Transformers
- Identify Diodes
- Identify Transistors
- Identify Lamps and LEDs
- Understand Ohm's Law
- Understand Series, Parallel, and Combo Circuits
- Understand Kirchhoff's Voltage law
- Solve problems in simple Series, Parallel, and Combo circuits
- Understand Polarity and Subscript Notation
- Demonstrate the ability to use methods of Circuit Analysis
- Construct simple working circuits and perform appropriate analysis using industry accepted processes.
- Select proper wire gauges for different applications

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

- Demonstrate knowledge of Basic Principles of Electronics and Electricity
 - Identify electronic components.
 - Demonstrate ability to use measuring devices and processes.
 - Demonstrate knowledge of electronic circuits.
- Demonstrate knowledge of DC motors commonly used in the robotics industry.
- Demonstrate the ability to wire a component part to perform a function.

Competencies

Total Learning Hours for Unit: 60

- Accurately identify miscellaneous electronic components related to robotics
- Calculate electrical current through various points of an electric circuit (series, parallel, s/p combination).
- Calculate and Measure voltage drop (series, parallel, s/p combination).
- Determine the resistance of a resistor by using: a) Direct measurement by using an ohmmeter, b) Color Code Method, c) Ohm's Law, d) Calculation
- Determine the power consumption of an electrical device
- Construct a simple electrical circuit and investigate Ohm's Law
- Construct a series circuit and perform circuit measurements at various parts of the circuit.
- Construct a parallel circuit and perform circuit measurements at various parts of the circuit.
- Construct a series-parallel combination circuit and perform circuit measurements at various parts of the circuit.
- Design, Build, Test, and Analyze Electronic Circuits Using Inductors, Capacitors and Transformers.

- B. Design, Build, and Test Electronic Circuits Using Diodes, Transistors, Rectifiers, and ICs.
- B. Identify the various types of electric motors and demonstrate their proper use/operation.
- B. Identify the parts of a basic AC and a DC motor and explain their function.
- C. Wire a component part using the proper gauge of wiring and following a color schematic.

<i>EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)</i> <i>(Samples included below of GLEs, EALRS and Math Standards must be modified for district frameworks)</i>	
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G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

SKILLS

Leadership: Individual Skills

- 1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences.
- 1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.
- 1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.
- 1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.
- 1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Leadership: Group Skills

- 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals.
- 2.2 The student will demonstrate knowledge of conflict resolution and challenge management.
- 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.

Leadership: Community and Career Skills

- 3.2 The student will demonstrate social responsibility in family, community, and business and industry.
- 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.

Student leadership organizations and opportunities

FIRST Robotics

Employability:

- 1.3 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.
- 1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including computers and other technologies. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):

<input checked="" type="checkbox"/> Observe	<input checked="" type="checkbox"/> Cause/Effect	<input checked="" type="checkbox"/> Finding Evidence	<input checked="" type="checkbox"/> Reasoning	<input checked="" type="checkbox"/> Originality
<input checked="" type="checkbox"/> Patterns	<input checked="" type="checkbox"/> Fact/Opinion	<input checked="" type="checkbox"/> Evaluation	<input checked="" type="checkbox"/> Problem Solving	<input checked="" type="checkbox"/> Risking
<input checked="" type="checkbox"/> Sequence	<input checked="" type="checkbox"/> Main Idea	<input checked="" type="checkbox"/> Detect Bias	<input checked="" type="checkbox"/> Goal Setting	<input checked="" type="checkbox"/> Inquisitiveness
<input checked="" type="checkbox"/> Classify	Summary	Inference	Fluency	Attending
<input checked="" type="checkbox"/> Compare/Contrast	<input checked="" type="checkbox"/> Point of View	<input checked="" type="checkbox"/> Conclusion	Elaboration	Persistence
Predict	Analysis	Meta-cognition	Flexibility	<input checked="" type="checkbox"/> Precision

Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.

Unit 4 - Mechanical Systems

Performance Assessments:

Mechanical Systems

- Determine the degrees of freedom for each type of a manipulator.
- Determine the work envelope of a robot and a description of a robot's axes.
- Determine gear ratios, gear trains and mechanical advantage
- Determine a robot's class
- Identify and explain the robot's power supply and controller.

Servo Systems

- Identify the various feedback devices used in servo systems and describe their operational parameters and characteristics.

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:**A. Mechanical Systems**

Given a robotic manipulator, identify its type by using all classification parameters.

Given a gear train determine its mechanical advantage.

B. Servo Systems

Identify the various control modes used in servo systems and explain their advantages and disadvantages. Identify the various feedback devices used in servo systems and describe their operational parameters and characteristics.

Competencies:**Total Learning Hours for Unit: 50**

- A. Identify and classify types of robotic manipulators and all classification parameters.
- A. Demonstrate understanding of an open loop and closed loop system in accordance with a set of specifications.
- A. Demonstrate a knowledge of the LERT (linear, extensional, rotational, and twisting) system in a given project
- A. Demonstrate ability to determine gear train and gear ratios
- B. Design and build an Open- Loop Servo system.
- B. Design and build a Closed-Loop Servo system.
- B. Develop an appropriate flow chart for the process

Reading	
1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
2.1.7	Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: determine importance and <u>summarize</u> the text.
2.2.2	Apply understanding of complex <u>organizational features</u> of printed text and <u>electronic sources</u> .
2.2.4	Apply understanding of <u>text organizational structures</u> .
2.4.6	Analyze and evaluate the presentation and development of ideas and concepts within, among, and beyond multiple texts
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
3.1	Uses knowledge of topic/theme, audience, and purpose to plan presentations.
3.2	Uses media and other resources to support presentations.
3.3	Uses effective delivery.
Social Studies – Civics	

2.1	Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
4.1.2	Understands how the following themes and developments help to define eras in world history:
4.2.3	Analyzes and evaluates how technology and ideas have shaped world history (1450—present).
2.4.1	Analyzes and evaluates how people across the world have addressed issues involved with the distribution of resources and sustainability in the past or present.
5.3.1	Evaluates one's own viewpoint and the viewpoints of others in the context of a discussion.
3.2.1	Analyzes and evaluates human interaction with the environment across the world in the past or present.
4.4.1	Analyzes how an understanding of world history can help us prevent problems today.
Writing	
1.1.1	Analyzes and selects effective strategies for generating ideas and planning writing.
1.3.1	Revises text, including changing words, sentences, paragraphs, and ideas.
2.2.1	Demonstrates understanding of different purposes for writing.
2.4.1	Produces documents used in a career setting.
3.1.1	Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.
3.2.1	3.2.1 Analyzes audience and purposes and uses appropriate voice.
3.3	Knows and applies writing conventions appropriate for the grade level.
Art	
1.2	Develops arts skills and techniques.
1.3	Understands and applies arts genres and styles from various artists, cultures and times.
2.1	Applies a creative process in the arts (dance, music, theatre and visual arts.) <i>(Identifies, explores, gathers, interprets, uses ideas, implements, reflects, refines, presents)</i>
2.2	Applies a performance process. <i>(Identifies, selects, analyzes, interprets, rehearses, adjusts, refines, presents, exhibits, produces, reflects, and self-evaluates)</i>
3.2	Uses the arts to communicate for a specific purpose.
3.3	Develops personal aesthetic criteria to communicate artistic choices.
4.1	Demonstrates and analyzes the connections among the arts disciplines.
Science Standards	
9-12 SYSA	Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.
9-12 SYSB	Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.
9-12 INQC	Explain Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-12 INQF	Science is a human endeavor that involves logical reasoning and creativity

	and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.
9-12 INQG	Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.
9-12 APPA	Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study and by deciding what research will be funded.
9-12 APPD	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
9-12 APPC	Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.
9-12 APPE	Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended, others not.
9-12 APPF	It is important for all citizens to apply science and technology to critical issues that influence society.
9-11 PS1C	An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by an unbalanced force. (Newton's First Law of Motion, the Law of Inertia)
9-11 PS1E	Whenever one object exerts a force on another object, a force of equal magnitude is exerted on the first object in the opposite direction. (Newton's Third Law of Motion)
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Mathematics Standards	
G.5.D, M3.2.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.
G.6.A, M3.7.D	Derive and apply formulas for arc length and area of a sector of a circle.
G.6.B, M3.5.F	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
G.6.E, M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F, M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.
G.7.A, M2.6.A	Analyze a problem situation and represent it mathematically.
G.7.B, M2.6.B	Select and apply strategies to solve problems.
G.7.C, M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

G.7.D, M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.			
G.7.E, M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.			
G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.			
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.			
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.			
SKILLS				
Leadership: Individual Skills				
1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences.				
1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.				
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Leadership: Group Skills				
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2.2 The student will demonstrate knowledge of conflict resolution and challenge management.				
2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.				
Leadership: Community and Career Skills				
3.2 The student will demonstrate social responsibility in family, community, and business and industry.				
3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.				
Student leadership organizations and opportunities				
FIRST Robotics				
Employability:				
1.4 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.				
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Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):				
X Observe	X Cause/Effect	X Finding Evidence	X Reasoning	X Originality
X Patterns	X Fact/Opinion	X Evaluation	X Problem Solving	X Risking
X Sequence	X Main Idea	X Detect Bias	X Goal Setting	X Inquisitiveness
X Classify	Summary	Inference	Fluency	Attending
X Compare/Contrast	X Point of View	X Conclusion	Elaboration	Persistence
Predict	Analysis	Meta-cognition	Flexibility	X Precision
Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.				

Unit 5 - Pneumatic Systems

Performance Assessments:

Pneumatic Systems

Demonstrate knowledge of pneumatic systems used in robotics construction.

Demonstrate the ability to plan, design, and connect pneumatic systems for specific purposes.

Hydraulic Systems

Demonstrate knowledge of Hydraulic systems used to control a robot.

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

A. Pneumatic Systems

Demonstrate a knowledge of pneumatic control systems.

Design, build and operate a hydraulic system; relief valves, pressure compensated flow control valves. Check valves, direction control valves and servo control valves as used in a hydraulic system.

B. Hydraulic Systems

Demonstrate a knowledge of pneumatic connections and components

Competencies:

Total Learning Hours for Unit: 50

- A. Identify the various types of compressors and demonstrate their proper use/operation.
- A. Identify and demonstrate the proper operation of desiccant dryers, receiver tanks, pressure switches and pressure regulators as used in a pneumatic system.
- A. Design and construct a pneumatic control system.

- B. Identify the schematic symbol for each part of a hydraulic system.
- B. Identify the parts of a typical hydraulic cylinder and demonstrate their proper use.
- B. Identify the various types of hydraulic pumps and demonstrate their proper use.
- B. Identify the various types of hydraulic accumulators and demonstrate their proper use.
- B. Identify the various types of actuators and demonstrate their proper use.
- B. Identify the various types of hydraulic motors and demonstrate their proper use.

Reading

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.

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Social Studies – Civics	
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G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
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G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
SKILLS	
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Leadership: Group Skills 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals. 2.2 The student will demonstrate knowledge of conflict resolution and challenge management. 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.	
Leadership: Community and Career Skills 3.2 The student will demonstrate social responsibility in family, community, and business and industry. 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.	
Student leadership organizations and opportunities FIRST Robotics	

Employability:

1.5 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.

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Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):

X Observe	X Cause/Effect	X Finding Evidence	X Reasoning	X Originality
X Patterns	X Fact/Opinion	X Evaluation	X Problem Solving	X Risking
X Sequence	X Main Idea	X Detect Bias	X Goal Setting	X Inquisitiveness
X Classify	Summary	Inference	Fluency	Attending
X Compare/Contrast	X Point of View	X Conclusion	Elaboration	Persistence
Predict	Analysis	Meta-cognition	Flexibility	X Precision

Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.

Unit 6 - Robotic Control Systems

Performance Assessments:

- Identify the various robot control devices and demonstrate their function including:
 - Wireless Controlled System
 - Wire Controlled System
 - Infrared sensing system
 - Optical sensing system
 - Fiber-optic system
 - Sound sensors
- Demonstrate a knowledge of sensing devices used in robotics

PERFORMANCE STANDARDS AND COMPETENCIES

Standards

Given an integrated project design, build and test the systems necessary to control a robot.

Competencies :

- Design and build a wireless controlled system.

Total Learning Hours for Unit: 30

1. Design and build a wired system.
1. Design and build an infrared sensing system.
1. Assemble, calibrate and operate an infrared sensing system
2. Design and build a sound sensing device.

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)
Reading

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
2.1.7	Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: determine importance and <u>summarize</u> the text.
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Social Studies – Civics	
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9-11 PS1C	An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by an unbalanced force. (Newton's First Law of Motion, the Law of Inertia)
9-11 PS1E	Whenever one object exerts a force on another object, a force of equal magnitude is exerted on the first object in the opposite direction. (Newton's Third Law of Motion)
9-11 INQC	Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-11 APPC	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Mathematics Standards	
G.5.D, M3.2.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.
G.6.A, M3.7.D	Derive and apply formulas for arc length and area of a sector of a circle.
G.6.B, M3.5.F	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
G.6.E, M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F, M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.
G.7.A, M2.6.A	Analyze a problem situation and represent it mathematically.
G.7.B, M2.6.B	Select and apply strategies to solve problems.
G.7.C, M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
G.7.D, M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
G.7.E, M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
SKILLS	
Leadership: Individual Skills	
1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences.	
1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.	

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions. 1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals. 1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies. Leadership: Group Skills 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals. 2.2 The student will demonstrate knowledge of conflict resolution and challenge management. 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry. Leadership: Community and Career Skills 3.2 The student will demonstrate social responsibility in family, community, and business and industry. 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life. Student leadership organizations and opportunities FIRST Robotics				
Employability: 1.6 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information. 1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including computers and other technologies. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.				
Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):				
X Observe X Patterns X Sequence X Classify X Compare/Contrast Predict	X Cause/Effect X Fact/Opinion X Main Idea Summary X Point of View Analysis	X Finding Evidence X Evaluation X Detect Bias Inference X Conclusion Meta-cognition	X Reasoning X Problem Solving X Goal Setting Fluency Elaboration Flexibility	X Originality X Risking X Inquisitiveness Attending Persistence X Precision
Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.				

Unit 7 - Programming Languages and Software

Performance Assessments:

Demonstrate an understanding of the computer software necessary to run and control robotic systems

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

Given specific software; program and control a robotic device to achieve specific goals.

Competencies

Total Learning Hours for Unit: 60

- A Demonstrate a knowledge of available software used to program robotic functions (EV3, Robot C , LabVIEW, JAVA)
- B Use software to integrate software with control systems (EV3, Robot C, LabVIEW, JAVA)
- C Program a robot to perform a task using software to control the functions (EV3, Robot C, LabVIEW, JAVA)

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards) **Reading**

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
2.1.7	Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: determine importance and <u>summarize</u> the text.
2.2.2	Apply understanding of complex <u>organizational features</u> of printed text and <u>electronic sources</u> .
2.2.4	Apply understanding of <u>text organizational structures</u> .
2.4.6	Analyze and evaluate the presentation and development of ideas and concepts within, among, and beyond multiple texts

Communications

1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
3.1	Uses knowledge of topic/theme, audience, and purpose to plan presentations.
3.2	Uses media and other resources to support presentations.
3.3	Uses effective delivery.

Social Studies – Civics

2.1	Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
4.1.2	Understands how the following themes and developments help to define eras in world history:
4.2.3	Analyzes and evaluates how technology and ideas have shaped world history (1450—present).
2.4.1	Analyzes and evaluates how people across the world have addressed issues involved with the distribution of resources and sustainability in the past or present.
5.3.1	Evaluates one’s own viewpoint and the viewpoints of others in the context of a discussion.
3.2.1	Analyzes and evaluates human interaction with the environment across the world in the past or present.
4.4.1	Analyzes how an understanding of world history can help us prevent problems today.

Writing

1.1.1	Analyzes and selects effective strategies for generating ideas and planning writing.
1.3.1	Revises text, including changing words, sentences, paragraphs, and ideas.

2.2.1	Demonstrates understanding of different purposes for writing.
2.4.1	Produces documents used in a career setting.
3.1.1	Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.
3.2.1	3.2.1 Analyzes audience and purposes and uses appropriate voice.
3.3	Knows and applies writing conventions appropriate for the grade level.
Art	
1.2	Develops arts skills and techniques.
1.3	Understands and applies arts genres and styles from various artists, cultures and times.
2.1	Applies a creative process in the arts (dance, music, theatre and visual arts.) (<i>Identifies, explores, gathers, interprets, uses ideas, implements, reflects, refines, presents</i>)
2.2	Applies a performance process. (<i>Identifies, selects, analyzes, interprets, rehearses, adjusts, refines, presents, exhibits, produces, reflects, and self-evaluates</i>)
3.2	Uses the arts to communicate for a specific purpose.
3.3	Develops personal aesthetic criteria to communicate artistic choices.
4.1	Demonstrates and analyzes the connections among the arts disciplines.
1.2	Develops arts skills and techniques.
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Science Standards	
9-12 SYSA	Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.
9-12 SYSB	Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.
9-12 INQC	Explain Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-12 INQF	Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.
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G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
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Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):				
X Observe X Patterns X Sequence X Classify X Compare/Contrast Predict	X Cause/Effect X Fact/Opinion X Main Idea Summary X Point of View Analysis	X Finding Evidence X Evaluation X Detect Bias Inference X Conclusion Meta-cognition	X Reasoning X Problem Solving X Goal Setting Fluency Elaboration Flexibility	X Originality X Risking X Inquisitiveness Attending Persistence X Precision
Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.				

Unit 8 - Technical Knowledge and Skills

Performance Assessments:

- Apply principles of “world class” operations (industry quality standards operation)
- Demonstrate skills in problem solving, diagnostics, and troubleshooting.
- Maintain tools, equipment and machinery to industry standards.
- Demonstrate competence in the use of measuring devices.

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

- A. Demonstrate a knowledge of Operations
- B. Demonstrate a knowledge Problem Solving
- C. Demonstrate competency in using equipment and machinery
- D. Demonstrate competency in using measuring devices

Competencies:

Total Learning Hours for Unit: 40

- A. Develop, implement and assess a plan for continuous improvement related to total quality management.
- B. Develop solutions using a structured problem solving process
- B. Implement the correct strategies to remedy the problem.
- C. Use appropriate testing equipment and tools for diagnosing the problem.
- C. Identify and use proper tools, equipment, and machinery for tasks.
- C. Monitor equipment indicators to insure that it is operating correctly.
- D. Learn and apply a variety of techniques, tools and formulas for determining measurements in projects.
- D. Use the proper electronic devices and/or gauges for specific tasks.

- D Calibrate and use electronic and other measurement devices accurately

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)

Reading

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G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
G.6.E, M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F, M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.
G.7.A, M2.6.A	Analyze a problem situation and represent it mathematically.
G.7.B, M2.6.B	Select and apply strategies to solve problems.

G.7.C, M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
G.7.D, M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
G.7.E, M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
SKILLS	
Leadership: Individual Skills 1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences. 1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills. 1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions. 1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals. 1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.	
Leadership: Group Skills 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals. 2.2 The student will demonstrate knowledge of conflict resolution and challenge management. 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.	
Leadership: Community and Career Skills 3.2 The student will demonstrate social responsibility in family, community, and business and industry. 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.	
Student leadership organizations and opportunities FIRST Robotics	
Employability: 1.8 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information. 1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including computers and other technologies. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.	
Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):	
X Observe X Patterns X Sequence X Classify X Compare/Contrast Predict	X Cause/Effect X Fact/Opinion X Main Idea Summary X Point of View Analysis
X Finding Evidence X Evaluation X Detect Bias Inference X Conclusion Meta-cognition	X Reasoning X Problem Solving X Goal Setting Fluency Elaboration Flexibility
X Originality X Risking X Inquisitiveness Attending Persistence X Precision	
Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.	

Unit 9 - Manufacturing & Design

Performance Assessments:

Use the design process to identify, problem solve and evaluate a solution.

Design a robotic component of a machine to accomplish a specific task. Determine the following; the need that the invention met, the design and development process the invention went through, what products or processes were developed as a result of this invention, any relevant documentation such as pictures, diagrams, drawings etc.

PERFORMANCE STANDARDS AND COMPETENCIES

Standards

A Follow a Design Process

B Demonstrate knowledge of Design as it relates to manufacturing.

Competencies:

Total Learning Hours for Unit: 40

- A. Develop a product using the Design process
- B. Produce a freehand drawing of a mechanical component by applying proportions and direct variation principles.
- B. Produce sketches by integrating proper sketching techniques and styles.
- B. Produce a 2-D drawing demonstrating geometric constraints.
- B. Produce a 3-D drawing of an object.

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)

(Samples included below of GLEs, EALRS and Math Standards must be modified for district frameworks)

Reading

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
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Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.

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3.1	Uses knowledge of topic/theme, audience, and purpose to plan presentations.
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Social Studies – Civics	
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9-12 INQC	Explain Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-12 INQF	Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.
9-12 INQG	Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.
9-12 APPA	Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study and by deciding what research will be funded.
9-12 APPD	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
9-12 APPC	Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.
9-12 APPE	Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended, others not.
9-12 APPF	It is important for all citizens to apply science and technology to critical issues that influence society.
9-11 PS1C	An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by an unbalanced force. (Newton's First Law of Motion, the Law of Inertia)
9-11 PS1E	Whenever one object exerts a force on another object, a force of equal magnitude is exerted on the first object in the opposite direction. (Newton's Third Law of Motion)
9-11 INQC	Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-11 APPC	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Mathematics Standards	
G.5.D, M3.2.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.
G.6.A, M3.7.D	Derive and apply formulas for arc length and area of a sector of a circle.
G.6.B, M3.5.F	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
G.6.C, M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.

G.6.D, M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two and three-dimensional figures.
G.6.E, M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F, M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.
G.7.A, M2.6.A	Analyze a problem situation and represent it mathematically.
G.7.B, M2.6.B	Select and apply strategies to solve problems.
G.7.C, M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
G.7.D, M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
G.7.E, M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
G.7.F, M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G, M2.6.G	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.
G.7.H, M1.8.H, M2.6.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

SKILLS

Leadership: Individual Skills

- 1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work-related) experiences.
- 1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.
- 1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.
- 1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.
- 1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Leadership: Group Skills

- 2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals.
- 2.2 The student will demonstrate knowledge of conflict resolution and challenge management.
- 2.4 The student will demonstrate skills that assist in understanding and accepting responsibility to family, community, and business and industry.

Leadership: Community and Career Skills

- 3.2 The student will demonstrate social responsibility in family, community, and business and industry.
- 3.4 The student will understand the organizational skills necessary to be a successful leader and citizen and practices those skills in real-life.

Student leadership organizations and opportunities

Skills USA
TSA

Employability:

- 1.9 The student will demonstrate the ability to acquire and use information in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.
- 1.4 The student will demonstrate an ability to work with a variety of technologies, identify or solve problems with equipment, including computers and other technologies. This means that the student can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

Analytical, Logical & Creative Thinking (check those that students will demonstrate in this lesson):

<input checked="" type="checkbox"/> Observe	<input checked="" type="checkbox"/> Cause/Effect	<input checked="" type="checkbox"/> Finding Evidence	<input checked="" type="checkbox"/> Reasoning	<input checked="" type="checkbox"/> Originality
<input checked="" type="checkbox"/> Patterns	<input checked="" type="checkbox"/> Fact/Opinion	<input checked="" type="checkbox"/> Evaluation	<input checked="" type="checkbox"/> Problem Solving	<input checked="" type="checkbox"/> Risking
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<input checked="" type="checkbox"/> Classify	Summary	Inference	Fluency	Attending

X Compare/Contrast Predict	X Point of View Analysis	X Conclusion Meta-cognition	Elaboration Flexibility	Persistence X Precision
Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.				

Unit 10 - Careers & Occupations / 21st Century Skills

Performance Assessments:

Conduct a research of the various fields of engineering (scope, elements, and educational requirements).

Identify possible career paths for engineers and robotics technicians.

Conduct a job shadow or practicum in an engineering-manufacturing facility.

Contact post-secondary institutions and Identify education and post secondary training needed for various careers related to engineering.

PERFORMANCE STANDARDS AND COMPETENCIES

Standards:

A. Demonstrate an understanding of the career opportunities related to manufacturing engineering.

B. Demonstrate an understanding of the skills and knowledge necessary for success in the world of work generally and in an engineering related career specifically.

C. Develop a portfolio that can be used articulating to post secondary training and education

Competencies:

Total Learning Hours for Unit: 20

A. Present self in a professional manner

A. Demonstrate “21st Century” and “Leadership” skills related to successful career search and career preparation.

A. Develop a post secondary plan that will enable the student to pursue a career in manufacturing engineering related to robotics.

B. Demonstrate the academic and technical skills necessary to continue to prepare for a career in engineering

EALRs, GLEs, and Math Standards (Taught & Assessed in Standards)

(Samples included below of GLEs, EALRS and Math Standards must be modified for district frameworks)

Reading

1.2.2	Apply strategies to comprehend words and ideas.
1.3.2	Understand and apply <u>content/academic vocabulary</u> critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.
2.1.7	Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: determine importance and <u>summarize</u> the text.

2.2.2	Apply understanding of complex <u>organizational features</u> of printed text and <u>electronic sources</u> .
2.2.4	Apply understanding of <u>text organizational structures</u> .
2.4.6	Analyze and evaluate the presentation and development of ideas and concepts within, among, and beyond multiple texts
Communications	
1.1	Uses listening and observation skills and strategies to focus attention and interpret information.
1.2	Understands, analyzes, synthesizes, or evaluates information from a variety of sources.
3.1	Uses knowledge of topic/theme, audience, and purpose to plan presentations.
3.2	Uses media and other resources to support presentations.
3.3	Uses effective delivery.
Social Studies – Civics	
2.1	Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
4.1.2	Understands how the following themes and developments help to define eras in world history:
4.2.3	Analyzes and evaluates how technology and ideas have shaped world history (1450—present).
2.4.1	Analyzes and evaluates how people across the world have addressed issues involved with the distribution of resources and sustainability in the past or present.
5.3.1	Evaluates one’s own viewpoint and the viewpoints of others in the context of a discussion.
3.2.1	Analyzes and evaluates human interaction with the environment across the world in the past or present.
4.4.1	Analyzes how an understanding of world history can help us prevent problems today.
Writing	
1.1.1	Analyzes and selects effective strategies for generating ideas and planning writing.
1.3.1	Revises text, including changing words, sentences, paragraphs, and ideas.
2.2.1	Demonstrates understanding of different purposes for writing.
2.4.1	Produces documents used in a career setting.
3.1.1	Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.
3.2.1	3.2.1 Analyzes audience and purposes and uses appropriate voice.
3.3	Knows and applies writing conventions appropriate for the grade level.
Art	
1.2	Develops arts skills and techniques.
1.3	Understands and applies arts genres and styles from various artists, cultures and times.
2.1	Applies a creative process in the arts (dance, music, theatre and visual arts.) (<i>Identifies, explores, gathers, interprets, uses ideas, implements, reflects, refines, presents</i>)
2.2	Applies a performance process. (<i>Identifies, selects, analyzes, interprets, rehearses, adjusts, refines, presents, exhibits, produces, reflects, and self-evaluates</i>)
3.2	Uses the arts to communicate for a specific purpose.

3.3	Develops personal aesthetic criteria to communicate artistic choices.
4.1	Demonstrates and analyzes the connections among the arts disciplines.
1.2	Develops arts skills and techniques.
1.3	Understands and applies arts genres and styles from various artists, cultures and times.
Science Standards	
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Leadership: Community and Career Skills

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Student leadership organizations and opportunities

FIRST Robotics

Employability:

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<input checked="" type="checkbox"/> Classify	Summary	Inference	Fluency	Attending
<input checked="" type="checkbox"/> Compare/Contrast	<input checked="" type="checkbox"/> Point of View	<input checked="" type="checkbox"/> Conclusion	Elaboration	Persistence
Predict	Analysis	Meta-cognition	Flexibility	<input checked="" type="checkbox"/> Precision

Relevance to Work: Understanding that a strong work ethic will contribute to higher productivity in organizations.

Robotics Technology
Robotics Technology Program

Robotics Technology	<p>Engineering: All engineers not listed separately.</p> <p>State and National Wages</p> <table><tr><th rowspan="2">Location</th><th rowspan="2">Pay Period</th><th colspan="5">2014</th></tr><tr><th>10%</th><th>25%</th><th>Median</th><th>75%</th><th>90%</th></tr><tr><td rowspan="2">United States</td><td>Hourly</td><td>\$24.72</td><td>\$33.71</td><td>\$45.31</td><td>\$57.90</td><td>\$70.76</td></tr><tr><td>Yearly</td><td>\$51,400</td><td>\$70,100</td><td>\$94,200</td><td>\$120,400</td><td>\$147,200</td></tr><tr><td rowspan="2">Washington</td><td>Hourly</td><td>\$21.86</td><td>\$28.79</td><td>\$43.67</td><td>\$55.58</td><td>\$67.25</td></tr><tr><td>Yearly</td><td>\$45,500</td><td>\$59,900</td><td>\$90,800</td><td>\$115,600</td><td>\$139,900</td></tr></table>	Location	Pay Period	2014					10%	25%	Median	75%	90%	United States	Hourly	\$24.72	\$33.71	\$45.31	\$57.90	\$70.76	Yearly	\$51,400	\$70,100	\$94,200	\$120,400	\$147,200	Washington	Hourly	\$21.86	\$28.79	\$43.67	\$55.58	\$67.25	Yearly	\$45,500	\$59,900	\$90,800	\$115,600	\$139,900
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Robotics Technology	<p>Mechanical Engineering Technicians</p> <p>Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists.</p> <p>State and National Wages</p> <table><tr><th rowspan="2">Location</th><th rowspan="2">Pay Period</th><th colspan="5">2014</th></tr><tr><th>10%</th><th>25%</th><th>Median</th><th>75%</th><th>90%</th></tr><tr><td rowspan="2">United States</td><td>Hourly</td><td>\$16.31</td><td>\$20.30</td><td>\$25.74</td><td>\$32.24</td><td>\$38.30</td></tr><tr><td>Yearly</td><td>\$33,900</td><td>\$42,200</td><td>\$53,500</td><td>\$67,100</td><td>\$79,700</td></tr><tr><td rowspan="2">Washington</td><td>Hourly</td><td>\$18.35</td><td>\$22.84</td><td>\$28.61</td><td>\$35.46</td><td>\$42.62</td></tr><tr><td>Yearly</td><td>\$38,200</td><td>\$47,500</td><td>\$59,500</td><td>\$73,800</td><td>\$88,600</td></tr></table>	Location	Pay Period	2014					10%	25%	Median	75%	90%	United States	Hourly	\$16.31	\$20.30	\$25.74	\$32.24	\$38.30	Yearly	\$33,900	\$42,200	\$53,500	\$67,100	\$79,700	Washington	Hourly	\$18.35	\$22.84	\$28.61	\$35.46	\$42.62	Yearly	\$38,200	\$47,500	\$59,500	\$73,800	\$88,600
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Robotics Technology	<p>Computer Programmer</p> <p>Create, modify, and test the code, forms, and script that allow computer applications to run. Work from specifications drawn up by software developers or other individuals. May assist software developers by analyzing user needs and designing software solutions. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.</p> <p>State and National Wages</p>																																						

	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$21.22	\$28.46	\$37.28	\$48.28	\$61.36
		Yearly	\$44,100	\$59,200	\$77,500	\$100,400	\$127,600
	Washington	Hourly	\$30.89	\$43.72	\$55.86	\$67.73	\$79.96
		Yearly	\$64,300	\$90,900	\$116,200	\$140,900	\$166,300
Robotic Technology	COMMERCIAL AND INDUSTRIAL DESIGNERS: WASHINGTON						
	Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design.						
	Location	Pay Period	2014				
			10%	25%	Median	75%	90%
	United States	Hourly	\$17.80	\$23.35	\$31.07	\$39.69	\$48.11
		Yearly	\$37,000	\$48,600	\$64,600	\$82,600	\$100,100
	Washington	Hourly	\$19.59	\$25.35	\$32.77	\$39.60	\$45.38
		Yearly	\$40,700	\$52,700	\$68,200	\$82,400	\$94,400

Auburn School District Framework: Robotics Foundations 1

Course: Robotics Foundations	Total Framework Hours: 90 Hours
CIP Code: 150406	Type: Exploratory
Career Cluster: Science, Technology, Engineering and Mathematics	Date Last Modified: Thursday, November 06, 2014

Resources and Standard used in Framework Development:

Standards used for this framework are from OSPI Model Framework for 150406 Robotics Foundations

Unit 1 ROBOTS IN SOCIETY

Hours: 2

Performance Assessment(s):

Select a robot from the sample list provided and create a powerpoint to describe the attributes that make it a robot.

Leadership Alignment:

Select a robot from the sample list provided and create a powerpoint to describe the attributes that make it a robot.

Standards and Competencies

Introduction to Robotics/Mechatronics and the Course

- Describe what a robot is.
- List jobs related to robotics, automation, embedded systems, and manufacturing.
- Explain how project- and activity-based learning are used in this course.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Presentation of Knowledge and Ideas:

SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 2 ROBOT BUILDING	Hours: 2
Performance Assessment(s):	
Use blueprints to build a robot.	
Leadership Alignment:	
Use blueprints to build a robot.	
Standards and Competencies	
Build and Test the VEX Robot - Select and use appropriate hand tools, fasteners and electrical connectors to build the robot. - Verification of system functionality. District Power Standards Using the Lego Mindstorms NXT/EV3 programming and build kits, or similar technology	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
Reading	
Science	
<u>Engineering, Technology, and Applications of Science</u> MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	

Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 3 PROGRAMMING	Hours: 56
Performance Assessment(s):	
Program the robot to complete the following challenges: Close-Shave, Labyrinth, Vacuum, Intersection, Walled Maze, Line Following, Sentry, Sentry 2, Obstacle Course, and Fruit Picker.	
Leadership Alignment:	
Problem solve with a partner to develop solutions for programming challenges	
Standards and Competencies	
<p>Introduction to Programming</p> <ul style="list-style-type: none"> - Think like a programmer in terms of robot behaviors - Describe how Boolean logic is used to control program flow - Write, test, and troubleshoot (debug) a simple program using ROBOTC <p>Movement</p> <ul style="list-style-type: none"> - Write and compile (download) programs from the PC to the microcontroller - Program motor controls--speed/power and timing--to accelerate, move and turn in given directions - Use Boolean logic to control behavior: While loops <p>Robotic Sensors</p> <ul style="list-style-type: none"> - Identify and describe the functions of the various sensors on the robot (e.g., accelerometer, ultrasonic range finder, potentiometer, line sensors, limit switches) - Use sensor feedback to the microcontroller to control robot behaviors - Distinguish between Loops and Conditional statements and when best to use each <p>District Power Standards</p> <p>Using the Lego Mindstorms NXT/EV3 programming and build kits, or similar technology</p>	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<p><u>CC: Mathematical Practices (MP)</u></p> <p>MP.1 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and go</p> <p>MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet</p> <p>MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using</p> <p>MP.7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a</p> <p>MP.8 Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that th</p>	

Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 4 ENGINEERING	Hours: 30
Performance Assessment(s):	
Design and build a bridge to span a 4 foot gap. Design and build a freestanding tower. Incorporate a gear train into a robotic car to maximize speed. Incorporate a gear train into a robotic vehicle to maximize torque.	
Leadership Alignment:	
Collaborate with a partner to design and assess solutions for engineering challenges	
Standards and Competencies	
Project Management and the Engineering Design Process - Explain why engineers use a structured process to solve problems. - Describe the design process and how it applies to this course. - Maintain an engineer's notebook per industry standards. Build and Test the VEX Robot - Select and use appropriate hand tools, fasteners and electrical connectors to build the robot. - Identify and describe the purpose and function the Remote Control, Motor Controllers, Microcontroller, PC, the various Sensors, Structural Components, and output devices. - Verification of system functionality. District Power Standards Using the Lego Mindstorms NXT/EV3 programming and build kits, or similar technology	
Aligned to Washington State Standards	
Arts	
Communication - Speaking and Listening	
Health and Fitness	
Language	
Mathematics	
<u>CC: Ratios and Proportions (RP)</u> 6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." 6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. <u>Analyze proportional relationships and use them to solve real-world and mathematical problems</u> 7.RP.2c Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.	

Reading

Science

Engineering, Technology, and Applications of Science

MS-ETS1 Engineering Design

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
8. Obtaining, evaluating, and communicating information

Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Manage Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Auburn School District Framework: Robotics Foundations 2

Course: Robotics Foundations	Total Framework Hours: 90 Hours
CIP Code: 150406	Type: Exploratory
Career Cluster: Science, Technology, Engineering and Mathematics	Date Last Modified: Thursday, November 06, 2014

Resources and Standard used in Framework Development:

Standards used for this framework are from OSPI Model Framework for 150406 Robotics Foundations

Unit 1 FLL CHALLENGE

Hours: 60

Performance Assessment(s):

Design, build, and program a robot with accessories to complete components of the FLL Challenge board.
FIRST Lego League(FLL) group research project completion and presentation.
Evaluate design process through engineering logs and post-engineering reflection.

Leadership Alignment:

FIRST Lego League(FLL) group research project completion and presentation.

Standards and Competencies

Project Management and the Engineering Design Process

- Explain why engineers use a structured process to solve problems.
- Describe the design process and how it applies to this course.
- Maintain an engineer's notebook per industry standards.

Build and Test the VEX Robot

- Select and use appropriate hand tools, fasteners and electrical connectors to build the robot.
- Identify and describe the purpose and function the Remote Control, Motor Controllers, Microcontroller, PC, the various Sensors, Structural Components, and output devices.
- Verification of system functionality.

Movement

- Write and compile (download) programs from the PC to the microcontroller
- Program motor controls--speed/power and timing--to accelerate, move and turn in given directions

Robotic Sensors

- Identify and describe the functions of the various sensors on the robot (e.g., accelerometer, ultrasonic range finder, potentiometer, line sensors, limit switches)
- Use sensor feedback to the microcontroller to control robot behaviors
- Distinguish between Loops and Conditional statements and when best to use each
- Improve programming efficiency by creating named functions (defined commands) to control certain aspects of robot behavior.
- Apply Boolean algebra to enable the Ultrasonic and line sensors and algebra to calculate the necessary values (thresholds) to detect obstacles and avoid them.

District Power Standards

Using the Lego Mindstorms NXT/EV3 programming and build kits, or similar technology

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Comprehension and Collaboration:

SL.7.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.7.1a Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.7.1c Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

SL.7.1d Acknowledge new information expressed by others and, when warranted, modify their own views.

SL.7.2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

SL.7.3 Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.8.1a Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

SL.8.1c Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.

SL.8.1d Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

SL.8.2 Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

SL.8.3 Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.

Presentation of Knowledge and Ideas:

SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 on page 53 for specific expectations.)

SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

SL.8.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 8 Language standards 1 and 3 on page 53 for specific expectations.)

Health and Fitness

Language

Mathematics

CC: Ratios and Proportions (RP)

Analyze proportional relationships and use them to solve real-world and mathematical problems

7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $(\frac{1}{2})/(\frac{1}{4})$ miles per hour, equivalently 2 miles per hour.

7.RP.2 Recognize and represent proportional relationships between quantities.

7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

7.RP.2c Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.

Reading		
Science		
<u>Engineering, Technology, and Applications of Science</u> <u>MS-ETS1 Engineering Design</u> MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 2 CAREERS RESEARCH		Hours: 15
Performance Assessment(s):		
Presentation that includes education, salary, demand, and job skill requirements. Written research paper that includes education, salary, demand, and job skill requirements. Example 5-10 year plan for career attainment.		
Leadership Alignment:		
Conduct research using a variety of media sources Develop a plan and timeline for completing a project Investigate impact of chosen career, financially and economically, within global community		
Standards and Competencies		
Introduction to Robotics/Mechatronics and the Course - Discuss the education needed for specific career choices. - List jobs related to robotics, automation, embedded systems, and manufacturing. - Describe various career paths for STEM careers		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
<u>Presentation of Knowledge and Ideas:</u> SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
<u>Economics</u> <u>Economics 2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.</u> 2.1.1 Analyzes the costs and benefits of economic choices made by groups and individuals in the past or present 2.1.1 Analyzes the importance of financial literacy in making economic choices related to spending, saving, and investing.		

Writing

CC: Writing (7)

Text Types and Purposes:

W.7.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Production and Distribution of Writing:

W.7.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

W.7.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed. (Editing for content)

W.7.6 Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.

Research to Build and Present Knowledge:

W.7.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.

W.7.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

CC: Writing (8)

Text Types and Purposes:

W.8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Production and Distribution of Writing:

W.8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

W.8.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed. (Editing for content)

W.8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.

Research to Build and Present Knowledge:

W.8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

W.8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 3 ROVER		Hours: 15
Performance Assessment(s):		
Design and build a remotely controlled robot Complete a simulated Mars rover mission		
Leadership Alignment:		
Collaborate with a team to complete a task Establishment of a group leader to delegate/oversee duties within a group Delineate connections between the assigned project and global space exploration programs		
Standards and Competencies		
Movement - Write and compile (download) programs from the PC to the microcontroller - Program motor controls--speed/power and timing--to accelerate, move and turn in given directions - Use Boolean logic to control behavior: While loops Remote control - Map and calibrate the joystick buttons for remote control - Perform calculations on raw values to derive other important variables and their values - Program the robot to start on command from the remote control. District Power Standards Using the Lego Mindstorms NXT/EV3 programming and build kits, or similar technology		
Aligned to Washington State Standards		
Arts		
Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
<u>Engineering, Technology, and Applications of Science</u> <u>MS-ETS1 Engineering Design</u> MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. <u>Science and Engineering Practices</u> 1. Asking questions and defining problems		

2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others



Commercial Art

INTRODUCTION

Course Name	Commercial Art (Drawing 1 & 2, Graphic Design)	Grade Level(s)	9-12
Course Length	Drawing 1: Semester Drawing 2: Semester Graphic Design: 1 year Contract Study: 1 year	Course Code (s)	CTE 371, 372 375, 376, 377, 378

Course Description

Drawing I: Drawing is a semester long exploratory course that introduces students to traditional methods of drawing as well as means of computer generated drawing; art elements and foundational art skills will be the focus.

Drawing II: Drawing 2 is a one semester course that is continuation of the Drawing I course utilizing methods of art elements and principles; further development of foundational skills as the focus through portfolio preparation. Student voice is developed and demonstrated in culminating projects.

Graphic Design: This year long course (two semesters) combines the design skills of the artist with the technical production skills of the graphic designer to originate and produce graphic design. Students will utilize a combination of studio and computer generated design, culminating in a student portfolio. The course revolves around post-secondary and industry standard format.

Graphic Design-Contract Study: Further develops the skills of a graphic designer. Incorporates employability, community, social awareness skills required in the industry. The course builds on previous courses to combine artistic, design, and technical proficiencies.

Pathway Connections

Primary Connection

Arts, A/V Technology and Communication

Secondary Connection

Sample Sequence of Courses

Drawing 1, Drawing 2, Graphic Design, Contract Study

Cross Credit and/or College Credit

Fine Art, Tech Prep at Highline Community College



Basic Textbook	None
Equipment	1 to 1 Apple with graphic cards, keyboards large format photo quality ink jet printer, color laser printer, etching press, high production mat board cutter, drawing tablets, classroom iPad, high resolution scanner, button maker, block printing supplies.
Software	Adobe Creative Suite, Microsoft Office
Supplemental Materials	Adobe Certification, Certiport Tutorials, Precision Exams
Skills Gap Data (CTE Courses only)	<p>Multimedia artists - 6.3% Related: Animation, interactive tech, video graphics, special effects, digital arts, games and interactive media design, graphic design, web page and digital multimedia and info resources design.</p> <p>Photographer - 4.3% growth Related: Camera operator, television/vide/motion, film and video editors, photographic process workers and processing machine operators, set and exhibit designers, sound engineering technicians.</p> <p>Graphic Designer - 6.9% growth Specialized Design Services - 20.4% growth Art director, camera operator, TV/Video, commercial and industrial designer, fashion designer, fine artists, interior designer, makeup artist, set and exhibit designer, commercial and industrial designers, fashion designers, floral designers interior designers, landscape architecture, public relations, set and exhibits.</p> <p>Audio/Video Equipment Tech: 13.7% growth Multimedia Communication: 8.3% growth Related: Cinemetography, communications technician, Radio/TV broadcast, Desktop Publishing, Camera Operator, Motion Picture, Photography, Producer/Director, Sound Engineer, Film Editor, Broadcast.</p> <p>Desktop Publisher -.9% growth, 8 openings, avg \$41k Computer Operator, Film and Video Editors, Pre-press Technicians, Printing Press Operator.</p> <p>High current and future demand exists for individuals trained in the various aspects of multimedia communications. The expected increase is due largely to rapidly changing technology and the</p>



increased need for individuals with web, animation and design training/experience primarily due to expanding use of the internet. Locally, businesses frequently ask for students with basic skills in printing, photography, video production and graphic design for entry level positions. The Visual Communications curriculum is excellent preparation for post-secondary studies in all areas related to multimedia, at both local community colleges and 4-year colleges. <http://www.bls.gov/oco/>



Visual Arts POWER STANDARDS

Course Name Drawing I and Drawing II, Graphic Design **Grade Level(s)** 9, 10, 11, 12

1. Demonstrate understanding of visual arts concepts and vocabulary
2. Create, perform and respond using reading, writing and math standards related to the visual arts
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.
4. Understand and apply the design process through visual problem solving
5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.
6. Demonstrate art Processes, techniques and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences.
7. Collaborate to perform a variety of tasks
8. Critically analyze, interpret, describe and judge one's own work and the work of others.
9. Understand movements, artists, styles and genres in a cultural and historical context (place an time) as related to the visual arts.
10. Communicate and respond using narratives, reflections and artist statements
11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style
12. Create, prepare, present and professionally display original work for community exhibitions.
13. 13, Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in visual arts.

SKILLS GAP/LABOR MARKET DATA
Visual Arts/Graphics/Commercial Arts Program

Visual, Graphics, Commercial Arts Overall	
	<p>Multimedia artists - 6.3% Related: Animation, interactive tech, video graphics, special effects, digital arts, games and interactive media design, graphic design, web page and digital multimedia and info resources design.</p> <p>Photographer - 4.3% growth Related: Camera operator, television/vide/motion, film and video editors, photographic process workers and processing machine operators, set and exhibit designers, sound engineering technicians.</p> <p>Graphic Designer - 6.9% growth Specialized Design Services - 20.4% growth Art director, camera operator, TV/Video, commercial and industrial designer, fashion designer, fine artists, interior designer, makeup artist, set and exhibit designer, commercial and industrial designers, fashion designers, floral designers interior designers, landscape architecture, public relations, set and exhibits.</p> <p>Audio/Video Equipment Tech: 13.7% growth Multimedia Communication: 8.3% growth Related: Cinematography, communications technician, Radio/TV broadcast, Desktop Publishing, Camera Operator, Motion Picture, Photography, Producer/Director, Sound Engineer, Film Editor, Broadcast.</p> <p>Desktop Publisher -.9% growth, 8 openings, average \$41k Computer Operator, Film and Video Editors, Pre-press Technicians, Printing Press Operator.</p> <p>High current and future demand exists for individuals trained in the various aspects of multimedia communications. The expected increase is due largely to rapidly changing technology and the increased need for individuals with web, animation and design Training/experience primarily due to expanding use of the internet.</p> <p>Locally, businesses frequently ask for students with basic skills in printing, photography, video production and graphic design for entry level positions. The Visual Communications curriculum is excellent preparation for post-secondary studies in all areas related to multimedia, at both local community colleges and 4-year colleges.</p> <p>http://www.bls.gov/oco/</p>

Career and Technical Education 21st Century Skills for

Course Name Drawing/Graphic/Commercial Arts

School Year 2015-2016

LEARNING AND INNOVATION

Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.

21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Creativity and Innovation	Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	This is an on going process through out the course as part of the creative development a large body of visual art works. 1.A.1, 1A.2 Activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions . Manipulation of various art elements to create principle effects in art. 1.A.3 Self reflection both informally and and formally in written self evaluations.	Assessment is made on the out come of finished visual projects, generally at the end of a unit; may include evidence of multiple thumbnail sketches, pre planning, use of feedback as revisions for improvement, verbal communication, visual communication, and self evaluation is taken in account on each finished piece. This is part of the investigaive process in developing unique pieces of art. Some assessements are done informally through individual critiques with instructor, or group ciritiques as a class. Other assessments are done through written reflection or criteria rubrics.
	Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes		

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Critical Thinking and Problem Solving	Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur		
	Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation		
	Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	2.B.1 This is taught through out the course as students manipulate the elements of art (analyze the parts) to create a an overall unified desired principle The intended whole) in their visual arts piece. This is part of the Gestalt theory students strive to achieve in any finished visual work.	Assessed by the visual art come of each finished piece based of the criteria for the assignment.
	Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes		
	Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions		

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Communication and Collaboration	Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)		
	Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member		
Information Literacy	Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently		

LEARNING AND INNOVATION

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Flexibility and Adaptability	Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	4.B.3 This is taught in the Introductory unit: Artistic integrity and ethical practices are discussed through teacher guided group and individual discussions and critiques to develop students understanding of how this applies to their own designs. Comparisons will be made through Art history movements to demonstrate how multiple people may work on similar concepts while maintaining personal and artistic integrity.	Students will sign agreement regarding artistic integrity and ethical practice. Any work that is inspired by published images, photographs, copyrighted materials and/or work of other artists must show extensive and significant development beyond mere duplication and used only in the service of personal vision. This is assessed by students demonstrating ethical practices in all their art work.
	Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities		
	Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	7.B.1 and 7.B.2 Through out the course, in every unit. Individual and small group critiques both formally and informally with instructor and with class to make improvements in art work based on the criteria and desired effect(s).	Thorough observation and evidence that revisions are made in works based on constructive feedback. Or feedback is incorporated in subsequent work.
Initiative and Self-Direction	Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	This begins on the onset of the course as students understand the expectations of the Portfolio requirements and expectations. 8.A.1 Students will create proposals and personal outline to review with the instructor to help establish a realistic schedule in the 1 st quarter. 8.A.2 Periodic review of outcome of goals. Revise and adjust when applicable. Ongoing through out the course.	The student will demonstrate with completed quality work through out the course in each unit of study.

LEARNING AND INNOVATION

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Work Independently		
	8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	8.B.1 This is an expectation of the studio environment. Course employs studio production times following demonstrations, presentations and/or handouts on a unit or area of study throughout the course.	The student will demonstrate with completed quality work done in a timely manner through out the course in units of study. Assessed formally at the end of each unit as part of their Leadership/employability grade under work habits, participation, communication (how well student interprets and applies information).
	Be Self-Directed Learners		
	8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	8.C.1, 8.C.4 At the beginning of the course students and teacher will review their previous works and out comes to explore possible directions of investigative study. Periodic review upon completion of current work for reflection and revised direction of investigative study. 8.C.2, 8.C.3 One of the requirements of the course is to create an investigative body of visual art work with an area of focus that will show growth among the related pieces. This exemplifies the commitment to the learning process as each piece moves to the next level.	Periodic review through out the course should demonstrate growth over a period of time and become evident in the art produced. Creating a Concentration for the portfolio is application of reaching beyond current levels of expertise and demonstrates advance learning skills through the investigative body of work. Utilizes feedback through self reflection, group critiques, individual critiques with instructor and makes revisions for improvement in art work.
Social and Cross-Cultural	Interact Effectively with Others		
	9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner		
	Work Effectively in Diverse Teams		
	9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work		

LEARNING AND INNOVATION

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Productivity and Accountability	Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result		
	Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	10.B.1 a Students demonstrate ethical artistic practices in all units of study through the course. 10. B.1.b Organizational skills such as outlines, proposals, will be use in the first quarter to help students manage their portfolio projects effectively. 10.B.1.c Multi -task is sometimes required to move forward in the production of a body of art works. Students will need to continue work on current projects while thinking ahead on future projects. 10.B.1.d, 10.B.1.f, 10. B.h Students will present work in progress through out the course in the form of critiques. Students will also be presenting their finished portfolio components towards the third and fourth quarters. Students will be working in a studio enviroment, sharing supplies and materials, will need to respect not only their work but work of others. Students will be responsible for outcome of their works and will be asked to do written reflections at the end of each unit..	Assessment is made by evidence in the art work as well as written reflection and employability scoring at the end of a unit.
Leadership and Responsibility	Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power		

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21 st Century Skills		Where do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	In studio art environment students will need to be responsible and respectful of shared supplies, materials, and equipment as well as each others art work.	This is part of every unit end Leadership/employability evaluation under participation, citizenship and work habits.

LEARNING AND INNOVATION

21st Century Skills

Where do you teach this skill in your curriculum?

How do you teach this skill in your curriculum?

How do you assess this skill in your curriculum?

Think Creatively

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)
- 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Academic Thinking Skills & Strategies

- Questions Critically and Thinks Creatively
- Solves Problems Effectively
- Makes Connections

- 1.A.1 Drawing 2: Unit 1--Proportions Formative Assessment
- 1.A.2, 1.A.3 Drawing 2: Unit 4--Weekly Sketchbook Assignments
- 1.A.1 Drawing 1: Unit 2- Types of Line Project
 - Contour Drawing Rubric
 - Line Quality Formative Assessment
- 1.A.1 Drawing 1: Unit 3-Finding Shapes Formative Assessment
 - Drawing with Shapes Exercise
 - Sighting Introduction Formative Assessment
 - Negative Space Exercise
- 1.A.1 Graphic Design: Unit 7-Weekly Sketchbook Drawings
- 1.A.1 Contract Study: Unit 4-Weekly Sketchbook Drawings

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Work Creatively with Others

- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Communication & Collaboration Skills

- Offers Ideas and Makes Contributions
- Works Well with Others
- Respects and Values Others

Personal Attributes

- Exhibits a Strong Work Ethic
- Takes Personal Responsibility
- Demonstrates Resiliency
- Maintains Balance

1.B.2 Drawing 2: Unit 2-Elements of Art Projects

1.B.1 Drawing 1: Unit 7- Weekly Sketchbook Drawings

1.B.3 Drawing 2: Unit 4-Weekly Sketchbook Drawing Critiques

Implement Innovations

- 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

Personal Attributes

- Exhibits a Strong Work Ethic
- Takes Personal Responsibility
- Demonstrates Resiliency
- Maintains Balance

1.C.1 Drawing 2: Unit 4-Communicating Personal Voice-Weekly Sketchbook Drawings

Career and Technical Education 21st Century Skills

LEARNING AND INNOVATION

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21 st Century Skills	ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Academic Thinking Skills & Strategies <ul style="list-style-type: none"> • Questions Critically and Thinks Creatively • Solves Problems Effectively • Makes Connections 	2.A.1 Drawing 2: Unit 1-Figure Drawing Project 2.A.1 Drawing 2: Unit 2-Elements of Art Projects Graphic Design: Unit 1-What is Graphic Design? Formative Assessment Post-Secondary and Career Opportunities. Formative Assessment History of Graphic Design. Unit 2 - Elements of Art. Composition Presentations	2.A.1 Drawing 1: Unit 3- Finding Shapes Formative Assessment Drawing with Shapes Exercise Sighting Introduction Formative Assessment Negative Space Exercise Perspective Project View Finder Formative Assessment Graphic Design Contract Study. Adobe Certification	
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Academic Thinking Skills & Strategies <ul style="list-style-type: none"> • Questions Critically and Thinks Creatively • Solves Problems Effectively • Makes Connections 	2.B.1 Drawing 1: Unit 4- Vector vs. Raster Formative Assessment 2.B.1 Drawing 1: Unit 5- Value Scale Practice Formative Assessment Light and Form Project Observational Drawing Project 2.B.1 Drawing 2: Unit 3-Mixed Media Project, Digital Illustration Project Graphic Design Contract Study. Adobe Certification		

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	Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Academic Thinking Skills & Strategies <ul style="list-style-type: none"> • Questions Critically and Thinks Creatively • Solves Problems Effectively • Makes Connections 	2.C.1, 2.C.3 Graphic Design: Unit 2 - Elements of Art. Composition Presentations 2.C.5 Graphic Design Unit 6- File Format Review and Assessment Print Process - traditional and digital projects File Output Assessment Industry Standard Software Formation and Summative Assessments Creating Visuals using Digital and Traditional Methods 2.C. 5 Contract Study. Unit 1. Career Exploration and Planning. 2.C.4 Graphic Design: Unit 4-Letter Forms and Structure Project and Assessment 2.C.3 Graphic Design Contract Study. Adobe Certification
	Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Academic Thinking Skills & Strategies <ul style="list-style-type: none"> • Questions Critically and Thinks Creatively • Solves Problems Effectively • Makes Connections 	2.D.1 Drawing 1: Unit 4-Introduction to Adobe Illustrator Activity Elements of Design Computer Drawing Project 2.D.2 Drawing 2: Unit 1-Reference & Sighting Formative Assessment 2.D.1, 2.D.2 Graphic Design. Unit 2 - Elements of Art. Composition Presentations Unit 3. Design Process. Concept Process. Typography

Career and Technical Education 21st Century Skills

LEARNING AND INNOVATION

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21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts	Communications & Collaboration Skills <ul style="list-style-type: none"> • Offers Ideas and Makes Contributions • Works Well with Others 	3.A.1 Drawing 1: Unit 6- Facial Feature Formative Assessment Proportion Formative Assessment Planes of the Face/Body Formative Assessment Portrait Project and Self Reflection		

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Instructors _____

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<p>3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions</p> <p>3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)</p> <p>3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact</p> <p>3.A.5 Communicate effectively in diverse environments (including multi-lingual)</p>	<ul style="list-style-type: none"> • Respects and Values Others <p>Literacy & Language</p> <ul style="list-style-type: none"> • Writes clearly and effectively ... for a variety of audiences and purposes • Reads, interprets, analyzes, and evaluates ... texts • Understands and applies the commonly accepted rules and conventions • Communicates effectively in a language other than English <p>Information and Communication Technology (ICT)</p> <ul style="list-style-type: none"> • Demonstrates information communication, and media literacy • Understands the relationship of technology to productivity and quality of life • Presents information for a variety of audiences and purposes using a range of ICT Tools 	<p>3.A.2 Graphic Design: Unit 4 - Visual Communication with Type Project</p> <p>3.A.3 Graphic Design Contract Study. Unit 2. Mentor 1st year students in Graphic Design course</p>
<p>Collaborate with Others</p> <p>3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams</p> <p>3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal</p> <p>3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member</p>	<p>Communications & Collaboration Skills</p> <ul style="list-style-type: none"> • Offers Ideas and Makes Contributions • Works Well with Others • Respects and Values Others <p>Personal Attributes</p> <ul style="list-style-type: none"> • Exhibits a Strong Work Ethic • Takes Personal Responsibility • Demonstrates Resiliency • Maintains Balance 	<p>3.B.3 Drawing 2: Unit 4 Communication Personal Voice-Weekly Sketchbook Assignments</p> <p>3.B.3 Contract Study. Unit 2. Mentor 1st year student in Graphic 1st Year Class</p>

Course _____ Instructors _____ Date _____

Career and Technical Education 21st Century Skills

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

People in the 21st century live in a technology and media-suffused environment, marked by various characteristics, including: 1) access to an abundance of information, 2) rapid changes in technology tools, and 3) the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit a range of functional and critical thinking skills related to information, media and technology.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Information and Communication Technology (ICT) <ul style="list-style-type: none"> Demonstrates information communication, and media literacy Understands the relationship of technology to productivity and quality of life Presents information for a variety of audiences and purposes using a range of ICT Tools Academic Thinking Skills & Strategies <ul style="list-style-type: none"> Questions Critically and Thinks Creatively Solves Problems Effectively Makes Connections 	4.A.1 Drawing 2: Unit 2-Elements of Art Projects (Image References) W.B.3 Drawing 2: Unit 2-Elements of Art Projects (Copyright) 4.B.2 Graphic Design. Unit 2 - Elements of Art. Composition Presentations 4.A.1 Drawing 2: Unit 3-Digital Illustration Project		
	Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information				

Career and Technical Education 21st Century Skills

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Communications & Collaboration Skills <ul style="list-style-type: none"> Offers Ideas and Makes Contributions Works Well with Others Respects and Values Others Personal Attributes <ul style="list-style-type: none"> Exhibits a Strong Work Ethic Takes Personal Responsibility Demonstrates Resiliency Maintains Balance 	7.A.1, 7.B.1 Graphic Design: Unit 5- Logo Design Student design and apply targets in design branding in logo packages Student will use and implement design principles in concept development of their layout 7.B.2, 7.B.1 Drawing 2: Unit 2-Elements of Art Projects 7.B.2, 7.B.1 Drawing 2: Unit 3-Pen and Ink Critique, Charcoal Critique, Color Pencil Critique, Mixed Media Critique		
	Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Communications & Collaboration Skills <ul style="list-style-type: none"> Offers Ideas and Makes Contributions Works Well with Others Respects and Values Others Personal Attributes <ul style="list-style-type: none"> Exhibits a Strong Work Ethic Takes Personal Responsibility 	7.B.1 Graphic Design. Unit 2 - Elements of Art. Composition Presentations		

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- Demonstrates Resiliency
- Maintains Balance

Career and Technical Education 21st Century Skills

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Personal Attributes <ul style="list-style-type: none"> • Exhibits a Strong Work Ethic • Takes Personal Responsibility • Demonstrates Resiliency • Maintains Balance 	8.B.1 Drawing 1, Drawing 2, Graphic Design: All Units 8.A.1 Drawing 1 Unit 1-Right/Left Brain Self Assessment Exercise Observational Drawing Techniques 8.B.1 Drawing 2: Unit 1-Figure Drawing Assignment		
	Work Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Personal Attributes <ul style="list-style-type: none"> • Exhibits a Strong Work Ethic • Takes Personal Responsibility • Demonstrates Resiliency • Maintains Balance 	8.A.1. Graphic Design: Unit 3. Design Process. Skatedeck Project 8.C.1 Contract Study: Unit 3-Portfolio, Adobe Certification		

Course _____		Instructors _____	Date _____
	Be Self-Directed Learners	Personal Attributes	8.B.1 Contract Study: All Units
	8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise	<ul style="list-style-type: none"> • Exhibits a Strong Work Ethic • Takes Personal Responsibility • Demonstrates Resiliency • Maintains Balance 	
	8.C.2 Demonstrate initiative to advance skill levels towards a professional level		
	8.C.3 Demonstrate commitment to learning as a lifelong process		
	8.C.4 Reflect critically on past experiences in order to inform future progress		

Career and Technical Education 21st Century Skills

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Communications & Collaboration Skills <ul style="list-style-type: none"> Offers Ideas and Makes Contributions Works Well with Others Respects and Values Others 	9.A.1 Graphic Design: Unit 1-What is Graphic Design? Collage Project		
	Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Communications & Collaboration Skills <ul style="list-style-type: none"> Offers Ideas and Makes Contributions Works Well with Others Respects and Values Others Local & Global Citizenship Skills <ul style="list-style-type: none"> Exhibit Civic Responsibility Maintain a Local Perspective Maintain a Global Perspective 			

Career and Technical Education 21st Century Skills

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Personal Attributes <ul style="list-style-type: none"> Exhibits a Strong Work Ethic Takes Personal Responsibility Demonstrates Resiliency Maintains Balance Career Planning & Life Management <ul style="list-style-type: none"> Understands and develops entrepreneurial and management skills and strategies 	10.A.1 Drawing 2: Unit 1-Figure Drawing Project 10.B.1 Drawing 2: Unit 2-Elements of Art Projects 10.A.2 Drawing 2: All Units-Unit 1: Figure Drawing Project, Unit 2: Elements of Art Project 10.A.2, 10.B.1.f Graphic Design: Unit 1-What is Graphic Design? Formative Assessment Post-Secondary and Career Opportunities. Formative Assessment History of Graphic Design 10.A.1 Graphic Design: Unit 5 - Digital and Traditional Illustration Logo Poster Cover Art Product Design Layout Portfolio Development 10.B.1 Graphic Design: Unit 4- Formatting with type demonstrated in a project. Portfolio Review/Professional Portfolio Creation		
	Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be	Communications & Collaboration Skills <ul style="list-style-type: none"> Offers Ideas and Makes Contributions Works Well with Others Respects and Values Others Personal Attributes <ul style="list-style-type: none"> Exhibits a Strong Work Ethic Takes Personal 			

Course _____

Instructors _____

Date _____

- | | | | |
|----------|--|---------------------------|--|
| | reliable and punctual | Responsibility | |
| 10.B.1.e | Present oneself professionally and with proper etiquette | • Demonstrates Resiliency | |
| 10.B.1.f | Collaborate and cooperate effectively with teams | • Maintains Balance | |
| 10.B.1.g | Respect and appreciate team diversity | | |
| 10.B.1.h | Be accountable for results | | |

Career and Technical Education 21st Century Skills

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

21 st Century Skills		ASD Student Profile Interdisciplinary Skills and attributes ASD Interdisciplinary Content Knowledge	Where do you teach this skill in your curriculum?	How do you teach this skill in your curriculum?	How do you assess this skill in your curriculum?
	Guide and Lead Others	Personal Attributes <ul style="list-style-type: none"> Exhibits a Strong Work Ethic Takes Personal Responsibility Demonstrates Resiliency Maintains Balance Career Planning & Life Management <ul style="list-style-type: none"> Understands and develops entrepreneurial and management skills and strategies Academic Thinking Skills & Strategies <ul style="list-style-type: none"> Questions Critically and Thinks Creatively Solves Problems Effectively Makes Connections 			
	11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal				
	11.A.2 Leverage strengths of others to accomplish a common goal				
	11.A.3 Inspire others to reach their very best via example and selflessness				
	11.A.4 Demonstrate integrity and ethical behavior in using influence and power				
			11.A.2 Drawing 2: Unit 2-Elements Principles of Art Project (Group Design, Critique)		
			11.B.1 Contract Study. Unit 3. Lead discussions of Graphic Design related topics, Unit 4. Sketchbook. Students explore their personal style in a variety of different assignments		

Course _____		Instructors _____	Date _____
	Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Local & Global Citizenship Skills <ul style="list-style-type: none"> • Exhibit Civic Responsibility • Maintain a Local Perspective • Maintain a Global Perspective 	



Drawing I



COURSE OUTLINE

Course Name Drawing 1 **Grade Level(s)** 9-12

Drawing is a semester long exploratory course that introduces students to traditional methods of drawing as well as means of computer generated drawing; art elements and foundational art skills will be the focus.

1. Classroom Culture and Safety

- A. Icebreaker drawing
- B. Syllabus
- C. Right Brain exercise
- D. Observational drawing techniques

2. Element of Line and Texture

- A. Types of Line Project
- B. Contour
- C. Line Quality Practice

3. Elements of Shape and Space

- A. Finding Shapes in Pictures
- B. Drawing with shapes
- C. Sighting Introduction
- D. Negative Space
- E. Perspective
- F. View finders

4. Computer Support of the Elements of Art

- A. Intro to Adobe Illustrator
- B. Apply Elements of Design to computer generated drawing
- C. Intro to the concept of Vector vs. Raster

5. Elements of Value and Form

- A. Value Practice
- B. Light and Form
- C. Observational Drawing



6. Applying the Elements to Portraiture

- A. Features
- B. Proportions
- C. Planes

7. Communicating Personal Voice

- A. Sketchbook Assignments

Auburn School District Framework: Drawing 1

Course: Graphic Design/Commercial and Advertising Art

Total Framework Hours: 90 Hours

CIP Code: 500402

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, December 30, 2015

Resources and Standard used in Framework Development:

Standards used are from PrintEd 2010, SkillsUSA and Teacher workshop identified specific skills as outlined in the OSPI Model Framework for 500402 Graphic Design/Commercial and Advertising Art.

Unit 1 CLASSROOM CULTURE AND SAFETY

Hours: 6

Performance Assessment(s):

Icebreaker Drawing
Syllabus Project
Right/Left Brain Self Assessment and Exercise
Observational Drawing Techniques Formative Assessment

Leadership Alignment:

Collaborate with Others
3. B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal.

Interact Effectively with Others
9. A.1 Know when it is appropriate to listen and when to speak.
9. A.2 Conduct themselves in a respectable, professional manner.

Studio Environment: work habits, effort, cooperation

Standards and Competencies

Standard P: Design Principles
2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).
ASD Visual Arts Power Standards
1. Demonstrate understanding of visual arts concepts and vocabulary
5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.
7. Collaborate to perform a variety of tasks
13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in visual arts.

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.
1.2 Develops arts skills and techniques.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Unit 2 ELEMENT OF LINE AND TEXTURE**Hours: 10****Performance Assessment(s):**

Types of Line Project
Contour Drawing Rubric
Line Quality Formative Assessment

Leadership Alignment:

Studio Environment: work habits, effort, cooperation
Individual Learning: applying theory, problem solving and using critical and creative thinking skills while understanding outcomes of related decisions.
Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Think Creatively

1. A.1 Use a wide range of idea creation techniques (such as brainstorming).

Reason Effectively

2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.

Standards and Competencies

Standard P: Design Principles

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.

2. Create and produce using a variety of mark making applications utilizing a variety of mediums.

4. Demonstrate drawing from observation

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

6. Demonstrate art Processes, techniques and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences.

8. Critically analyze, interpret, describe and judge one's own work and the work of others.

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

2.3 Applies a responding process to an arts performance and/or presentation of dance, music, theatre and visual arts):

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Unit 3 ELEMENT OF SPACE AND SHAPE**Hours: 12****Performance Assessment(s):**

Finding Shapes Formative Assessment
Drawing with Shapes Exercise
Sighting Introduction Formative Assessment
Negative Space Exercise
Perspective Project
View Finder Formative Assessment

Leadership Alignment:

Studio Environment: work habits, effort, cooperation
Individual Learning: applying theory, problem solving and using critical and creative thinking skills while understanding outcomes of related decisions.
Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Think Creatively

1. A.1 Use a wide range of idea creation techniques (such as brainstorming).

Reason Effectively

2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.

Standards and Competencies

Standard P: Design Principles

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem
3. Develop thematic compositions using a variety of techniques (sketchbooks)
4. Develop compositions using traditional wet/Dry materials
6. Drawing – Material, life drawing, observational, 2D/3D, still/life drawing, light/shadow

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
4. Understand and apply the design process through visual problem solving

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

- Explores, gathers, and interprets information from diverse sources.
- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
- Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.
- Reflects for the purpose of self-evaluation and improvement of the creative work.
- Refines work based on feedback, self-reflection, and aesthetic criteria.
- Analyzes the structure, context and/or aesthetics of the work.
- Describes what is seen, felt and/or heard (perceived/experienced).

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 4 COMPUTER SUPPORT OF ELEMENTS OF ART**Hours: 16****Performance Assessment(s):**

Introduction to Adobe Illustrator Activity
Elements of Design Computer Drawing Project
Vector vs. Raster Formative Assessment

Leadership Alignment:

Studio Environment: work habits, effort, cooperation
Individual Learning: applying theory, problem solving and using critical and creative thinking skills while understanding outcomes of related decisions.
Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision
Reason Effectively
2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
Use Systems Thinking
2. B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.
Solve Problems
2. D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways.

Standards and Competencies**Standard O: Digital Illustration**

1. Demonstrate an understanding of the differences between raster and vector files.
2. Use the appropriate graphics program to create a design or logo using manipulated type (rotated, circled, extended, tints and fills, etc.).
3. Create or trace drawings/photographs using a vector illustration program.
4. Create or edit images in a raster based program using layers; transparencies; layer modes; masks; and, selections, etc.
6. Demonstrate a functional knowledge of computer menus, shortcut keys, and palettes in illustration software.
7. Create a single color vector graphic.
8. Create a vector graphic using tints, fills, and color.
10. Trace a bitmap drawing and convert to a vector.
11. Edit an existing piece of vector art.

Standard P: Design Principles

1. Identify the basic principles of design (i.e., unity; contrast; proportions; balance; emphasis; and, rhythm).
2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.
2. Create and produce using a variety of mark making applications utilizing a variety of mediums.
3. Develop and communicate ideas thru visual problem solving utilizing the use of traditional and/or digital means.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

- 2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):
- Explores, gathers, and interprets information from diverse sources.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

5 - Use appropriate tools strategically.

6 - Attend to precision.

Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Unit 5 ELEMENTS OF VALUE AND FORM**Hours: 22****Performance Assessment(s):**

Value Scale Practice Formative Assessment
Light and Form Project
Observational Drawing Project

Leadership Alignment:

Studio Environment: work habits, effort, cooperation
Individual Learning: applying theory, problem solving and using critical and creative thinking skills while understanding outcomes of related decisions.
Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Use Systems Thinking
2. B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.

Standards and Competencies

Standard P: Design Principles

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.
2. Create and produce using a variety of mark making applications utilizing a variety of mediums.
3. Develop and communicate ideas thru visual problem solving utilizing the use of traditional and/or digital means.
4. Demonstrate drawing from observation
6. Demonstrate and apply the use of proportion, depth, viewpoint, and/or perspective.
9. Apply color to promote a mood or effect for visual communication.
10. Demonstrate the development of the creative process through research, sketching and execution.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.
4. Understand and apply the design process through visual problem solving

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

- 1.1 Understands and applies arts concepts and vocabulary.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

- 2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):
- 2.3 Applies a responding process to an arts performance and/or presentation of dance, music, theatre and visual arts):

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing

21st Century Skills

LEARNING AND INNOVATION	INFORMATION, MEDIA AND TECHNOLOGY SKILLS	LIFE AND CAREER SKILLS
Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 6 APPLYING THE ELEMENTS OF ART TO PORTRAITURE**Hours: 19****Performance Assessment(s):**

Facial Feature Formative Assessment
Proportion Formative Assessment
Planes of the Face/Body Formative Assessment
Portrait Project and Self Reflection

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Communicate Clearly

3. A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts.

Make Judgments and Decisions

2. C.2 Analyze and evaluate major alternative points of view..

2. C.4 Interpret information and draw conclusions based on the best analysis.

2. C.5 Reflect critically on learning experiences and processes.

Standards and Competencies

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem
3. Develop thematic compositions using a variety of techniques (sketchbooks)
4. Develop compositions using traditional wet/Dry materials
6. Drawing – Material, life drawing, observational, 2D/3D, still/life drawing, light/shadow
8. Illustration – Materials, styles, techniques.

Standard W: Concept Development

3. Thumbnails

Standard WR 4: Problem Solving

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.
3. Develop and communicate ideas thru visual problem solving utilizing the use of traditional and/or digital means.
4. Demonstrate drawing from observation
6. Demonstrate and apply the use of proportion, depth, viewpoint, and/or perspective.
10. Demonstrate the development of the creative process through research, sketching and execution.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
2. Create, perform and respond using reading, writing and math standards related to the visual arts
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.
4. Understand and apply the design process through visual problem solving
5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.
8. Critically analyze, interpret, describe and judge one's own work and the work of others.
10. Communicate and respond using narratives, reflections and artist statements

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
- Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.
- Reflects for the purpose of self-evaluation and improvement of the creative work.
- Refines work based on feedback, self-reflection, and aesthetic criteria.

2.2 Applies a performance and/or presentation process to the arts (dance, music, theatre and visual arts):

- Analyzes the structure, context and/or aesthetics of the work.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 2 - Reason abstractly and quantitatively.

Reading

CC: Reading Informational Text

Integration of Knowledge and Ideas (11-12)

7 - Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

Science

Physical Science

Inquiry (Conducting Analysis and Thinking Logically)

9-12 INQB: Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying the data.

Application (Science, Technology, and Society)

9-12 APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 7 COMMUNICATING PERSONAL VOICE**Hours: 5****Performance Assessment(s):**

Weekly Sketchbook Drawings

Leadership Alignment:

Think Creatively

1. A.1 Use a wide range of idea creation techniques (such as brainstorming).

Work Creatively with Others (Examples Below)

1. B.1 Develop, implement and communicate new ideas to others effectively.

Standards and Competencies

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem
3. Develop thematic compositions using a variety of techniques (sketchbooks)
4. Develop compositions using traditional wet/Dry materials

ASD Drawing I & II Standards

10. Demonstrate the development of the creative process through research, sketching and execution.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

Aligned to Washington State Standards**Arts**

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Explores, gathers, and interprets information from diverse sources.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing

21st Century Skills

LEARNING AND INNOVATION	INFORMATION, MEDIA AND TECHNOLOGY SKILLS	LIFE AND CAREER SKILLS
Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others



Drawing 2



COURSE OUTLINE

Course Name Drawing 2 **Grade Level(s)** 9-12

Drawing is a semester long exploratory course that introduces students to traditional methods of drawing as well as means of computer generated drawing; art elements and foundational art skills will be the focus.

1. Observational Drawing

- A. Proportions
- B. Figure Drawing
- C. Reference Techniques

2. Medium and Canvas/Paper Exploration

- A. Pen and Ink
- B. Charcoal
- C. Color Pencil
- D. Pastel
- E. Collage
- F. Mixed Media
- G. Digital Illustration

3. Principles of Art

- A. Unity and Variety
- B. Rhythm and Movement
- C. Hierarchy
- D. Emphasis
- E. Balance
- F. Proportion
- G. Pattern

4. Personal Voice

- A. Sketchbooks
- B. Critique

Auburn School District Framework: Drawing 2

Course: Graphic Design/Commercial and Advertising Art

Total Framework Hours: 90 Hours

CIP Code: 500402

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, December 30, 2015

Resources and Standard used in Framework Development:

Standards used are from PrintEd 2010, SkillsUSA and Teacher workshop identified specific skills as outlined in the OSPI Model Framework for 500402 Graphic Design/Commercial and Advertising Art.

Unit 1 OBSERVATIONAL DRAWING

Hours: 30

Performance Assessment(s):

Proportions Formative Assessment
Figure Drawing Project
Reference & Sighting Formative Assessment

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.
Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision
Use and Manage Information
4. B.1 Use information accurately and creatively for the issue or problem at hand.
Reason Effectively
2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.

Reason Effectively
2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
Use Systems Thinking
2. B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.
Solve Problems
2. D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways.
2. D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions.

Standards and Competencies

Standard P: Design Principles

1. Identify the basic principles of design (i.e., unity; contrast; proportions; balance; emphasis; and, rhythm).
2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

Standard V: Visual Techniques Drawing and Painting

6. Drawing – Material, life drawing, observational, 2D/3D, still/life drawing, light/shadow
8. Illustration – Materials, styles, techniques.

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.
4. Demonstrate drawing from observation
6. Demonstrate and apply the use of proportion, depth, viewpoint, and/or perspective.
7. Demonstrate basic facial proportion using drawing skills.

8. Demonstrate basic figure and gesture drawing skills.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

4. Understand and apply the design process through visual problem solving

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
- Reflects for the purpose of self-evaluation and improvement of the creative work.
- Refines work based on feedback, self-reflection, and aesthetic criteria.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 2 PRINCIPLES OF ART

Hours: 25

Performance Assessment(s):

This unit will involve multiple works to develop understanding of arranging and organizing elements and principles in visual compositions for specific effects. Students may use both traditional and or computer generated drawing methods to achieve and demonstrate this knowledge.

Unity and Variety Project
Rhythm and Movement Project
Hierarchy Project
Emphasis Project
Balance Project
Proportion Project
Pattern Project

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Think Creatively

1. A.1 Use a wide range of idea creation techniques (such as brainstorming).

1. A.2 Create new and worthwhile ideas (both incremental and radical concepts).

1. A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts.

Work Creatively with Others

1. B.1 Develop, implement and communicate new ideas to others effectively.

1. B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work.

1. B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas.

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Reason Effectively

2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.

Communicate Clearly

3. A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

3. A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact.

Standards and Competencies

Standard O: Digital Illustration

1. Demonstrate an understanding of the differences between raster and vector files.
3. Create or trace drawings/photographs using a vector illustration program.
7. Create a single color vector graphic.
8. Create a vector graphic using tints, fills, and color.

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem
4. Develop compositions using traditional wet/Dry materials
6. Drawing – Material, life drawing, observational, 2D/3D, still/life drawing, light/shadow
8. Illustration – Materials, styles, techniques.

Standard W: Concept Development

1. Brainstorming,
2. Concept sketching
3. Thumbnails

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.
5. Draw to communicate visually using a variety of subjects or themes to develop personal style.
9. Apply color to promote a mood or effect for visual communication.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
2. Create, perform and respond using reading, writing and math standards related to the visual arts
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.
4. Understand and apply the design process through visual problem solving

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

- 1.1 Understands and applies arts concepts and vocabulary.
- 1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

- 2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):
 - Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
 - Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.
 - Reflects for the purpose of self-evaluation and improvement of the creative work.
 - Refines work based on feedback, self-reflection, and aesthetic criteria.
- 2.2 Applies a performance and/or presentation process to the arts (dance, music, theatre and visual arts):
 - Interprets meaning through personal understanding of the work and/or performance.
 - Presents, exhibits, and produces work and/or performance for others.
 - Reflects and self-evaluates work and/or performance to set goals.

Arts 3.0 The student communicates through the arts.

- 3.1 Uses the arts to express feelings and present ideas.
- 3.3. Develops personal aesthetic criteria to communicate artistic choices.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 2 - Reason abstractly and quantitatively.
- 6 - Attend to precision.

Reading

CC: Reading Informational Text

Craft and Structure (9-10)

4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word

Science

Physical Science

Inquiry (Conducting Analysis and Thinking Logically)

9-12 INQC: Conclusions must be logical, based on evidence, and consistent with prior established knowledge.

Application (Science, Technology, and Society)

9-12 APPB: The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 3 MEDIUM AND CANVAS/PAPER EXPLORATION**Hours: 20****Performance Assessment(s):**

Medium Exploration Formative Assessment

Pen and Ink Project

Charcoal Project

Color Pencil Project

Pastel Project

Collage Project

Mixed Media Project

Digital Illustration Project

This is an introduction on how to identifying various color schemes from the color wheel to apply color theory techniques in drawing and how to apply it in different mediums. This is the foundation for the projects utilizing color theory practices (may include layering color, juxtapositioning color, realistic rendering, non representational color, etc.)

Leadership Alignment:

Individual Skills: Student will be involveld in activities that require applying theory, problem-sovling and using critical and creative thincking skills whlie understanding outcomes of related decisions.

Community and Career Skills: Work hapbits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, percision

Use Systems Thinking

2. B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.

Make Judgments and Decisions

2. C.3 Synthesize and make connections between information and arguments.

2. C.4 Interpret information and draw conclusions based on the best analysis.

2. C.5 Reflect critically on learning experiences and processes.

Standards and Competencies

Standard P: Design Principles

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

6. Demonstrate an understanding of color theory by describing primary, secondary, and tertiary colors including hue, tint, value and shade, and the effect of light and distance on color.

9. Demonstrate an understanding of color relationships (complimentary, analogous, monochromatic, etc.).

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem

4. Develop compositions using traditional wet/Dry materials

8. Illustration – Materials, styles, techniques.

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.

3. Develop and communicate ideas thru visual problem solving utilizing the use of traditional and/or digital means.

9. Apply color to promote a mood or effect for visual communication.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☒ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 4 COMMUNICATING PERSONAL VOICE

Hours: 15

Performance Assessment(s):

Weekly Sketchbook Assignment
Critique (Self Reflection, Small Group, and Class)

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, precision

Prepare culminating work for presentation.

Work Creatively with Others

1. B.1 Develop, implement and communicate new ideas to others effectively.

1. B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work.

1. B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas.

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes Implement Innovations (Examples Below)

1. C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur.

Think Creatively

1. A.1 Use a wide range of idea creation techniques (such as brainstorming).

1. A.2 Create new and worthwhile ideas (both incremental and radical concepts).

1. A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts.

Be Self-Directed Learners (Examples Below)

8. C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise.

8. C.2 Demonstrate initiative to advance skill levels towards a professional level.

8. C.3 Demonstrate commitment to learning as a lifelong process.

8. C.4 Reflect critically on past experiences in order to inform future progress.

Standards and Competencies

Standard P: Design Principles

1. Identify the basic principles of design (i.e., unity; contrast; proportions; balance; emphasis; and, rhythm).

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).

3. Create thumbnails and rough drafts by sketching. Use markers or colored pencils to show color.

6. Demonstrate an understanding of color theory by describing primary, secondary, and tertiary colors including hue, tint, value and shade, and the effect of light and distance on color.

9. Demonstrate an understanding of color relationships (complimentary, analogous, monochromatic, etc.).

Standard V: Visual Techniques Drawing and Painting

1. Demonstrate skills used to define and analyze a given problem

3. Develop thematic compositions using a variety of techniques (sketchbooks)

4. Develop compositions using traditional wet/dry materials

6. Drawing – Material, life drawing, observational, 2D/3D, still/life drawing, light/shadow

8. Illustration – Materials, styles, techniques.

Standard W: Concept Development

1. Brainstorming,

2. Concept sketching

3. Thumbnails

4. Roughs

ASD Drawing I & II Standards

1. Recognize, analyze, and apply the principles and elements of art and design in illustration to develop original, creative and strong compositions.

2. Create and produce using a variety of mark making applications utilizing a variety of mediums.

3. Develop and communicate ideas thru visual problem solving utilizing the use of traditional and/or digital means.

5. Draw to communicate visually using a variety of subjects or themes to develop personal style.

9. Apply color to promote a mood or effect for visual communication.

10. Demonstrate the development of the creative process through research, sketching and execution.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.

6. Demonstrate art Processes, techniques and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences.

8. Critically analyze, interpret, describe and judge one's own work and the work of others.

10. Communicate and respond using narratives, reflections and artist statements

11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Explores, gathers, and interprets information from diverse sources.
- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
- Reflects for the purpose of self-evaluation and improvement of the creative work.
- Refines work based on feedback, self-reflection, and aesthetic criteria.
- Presents work to others in a performance, exhibition, and/or production.

2.2 Applies a performance and/or presentation process to the arts (dance, music, theatre and visual arts):

- Analyzes the structure, context and/or aesthetics of the work.
- Interprets meaning through personal understanding of the work and/or performance.
- Presents, exhibits, and produces work and/or performance for others.
- Reflects and self-evaluates work and/or performance to set goals.

2.3 Applies a responding process to an arts performance and/or presentation of dance, music, theatre and visual arts):

Arts 3.0 The student communicates through the arts.

3.1 Uses the arts to express feelings and present ideas.

3.3. Develops personal aesthetic criteria to communicate artistic choices.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
<u>CC: Mathematical Practices (MP)</u> 1 - Make sense of problems and persevere in solving them. 2 - Reason abstractly and quantitatively.
Reading
<u>CC: Reading Informational Text</u>
Science
<u>Physical Science</u> <u>Inquiry (Conducting Analysis and Thinking Logically)</u> 9-12 INQA: Scientists generate and evaluate questions to investigate the natural world. <u>Application (Science, Technology, and Society)</u> 9-12 APPC: Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others



Graphic Design



COURSE OUTLINE

Course Name Graphic Design **Grade Level(s)** 10-12

Drawing is a semester long exploratory course that introduces students to traditional methods of drawing as well as means of computer generated drawing; art elements and foundational art skills will be the focus.

1. Introduction to Graphic Design

- A. What is Graphic Design?
- B. Post-Secondary and Career Opportunities
- C. History

2. Principles and Elements

- A. Line
- B. Shape
- C. Value
- D. Form
- E. Texture
- F. Color
- G. Typography
- H. Contrast
- I. Balance
- J. Emphasis
- K. Unity and Variety
- L. Hierarchy
- M. Rhythm

3. Design Process

- A. Strategy
- B. Concept
- C. Execution
- D. Presentation
- E. Audience
- F. Client Relation
- G. Professionalism
- H. Ethics
- I. Critique



4. Typography

- A. Letter Forms and Structure
- B. Visual Communication with Type
- C. Layout
- D. Formatting

5. Design Application

- A. Logo
- B. Poster
- C. Cover Art
- D. Product Design
- E. Portfolio Review

6. Production

- A. Print Process
- B. File Format
- C. File Output
- D. Industry Standard Software
- E. Creating Visuals using Digital and Traditional Methods

Auburn School District Framework: Graphic Design

Course: Graphic Design/Commercial and Advertising Art

Total Framework Hours: 180 Hours

CIP Code: 500402

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, December 30, 2015

Resources and Standard used in Framework Development:

Standards used are from PrintEd 2010, SkillsUSA and Teacher workshop identified specific skills as outlined in the OSPI Model Framework for 500402 Graphic Design/Commercial and Advertising Art.

Unit 1 INTRODUCTION TO GRAPHIC DESIGN AND CAREER ANALYSIS

Hours: 25

Performance Assessment(s):

Students will brainstorm, working independently and/or in groups to identify the role of Graphic Design.
Summative assessment and application of concepts throughout course work.

Leadership Alignment:

Community and Career Skills: Work habits, punctuality,
Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, perscistion

Standards and Competencies

Standard A: Industry Overview

1. Define the role of graphics in the free enterprise system.

Standard WR 7: Ethics and Legal responsibilities

WR-7.1 Evaluate and justify decisions based on ethical reasoning.

Aligned to Washington State Standards

Arts

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.1. Demonstrates and analyzes the connections among the arts disciplines.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 2 DESIGN CONCEPTS**Hours: 40****Performance Assessment(s):**

Graphic Design Rubrics:

Students demonstrates visual development strategies through sketches, thumbnails, roughs, comprehensives and/or presentations.

Students utilize analysis of target audience and writing a design brief in preparation of visual art works.

Students create designs that demonstrate an ability to recognize and utilize the elements of art and design principles

Students apply understanding of the psychology and the meaning of color choices and schemes in their work.

Students begin the process of creating works to incorporate in a professional portfolio. This is an on going process culminating year end.

Leadership Alignment:

1.A.1Use a wide range of idea creation techniques (brainstorming etc...)

1.B.1Develop, implement and communicate new ideas to others effectively

1.B.2Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work

1.B.3Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

1.C.1Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

2.C.2Effectively analyze and evaluate major alternative points of view

2.D.1Effectively solve different kinds of non-familiar problems in both conventional and innovative ways

3.A.1Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

3.A.1Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions

3.A.2Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

3.B.1Demonstrate ability to work effectively and respectfully with diverse teams

3.B.2Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal

4.B.1Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information

5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors

5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media

6.A.1Use technology as a tool to research, organize, evaluate and communicate information

6.A.3Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies

7.B.1. Incorporate feedback effectively

7.B.2. Deal positively with praise, setbacks and criticism

8.A.3. Utilize time and manage workload efficiently

9.A.2 Conducts self in a respectable, professional manner

10.A.2. Prioritizes, plans and manages work to achieve the intended result

11.A.1. Uses interpersonal and problem-solving skills to influence and guide others toward a goal

Standards and Competencies

Standard P: Design Principles

1. Identify the basic principles of design (i.e., unity; contrast; proportions; balance; emphasis; and, rhythm).
2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).
3. Create thumbnails and rough drafts by sketching. Use markers or colored pencils to show color.
5. Brainstorm keywords for a design concept based on customer need and target audience.

Standard X: Portfolio

1. Explore and identify content of a professional portfolio
2. Select, organize, develop and refine a marketable portfolio

Aligned to Washington State Standards**Arts**Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

- Identifies audience and purpose.
- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
- Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.
- Refines work based on feedback, self-reflection, and aesthetic criteria.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

3.3. Develops personal aesthetic criteria to communicate artistic choices.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

1 - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Science

Social Studies

Writing

CC: Writing (9-10)

Production and Distribution of Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☐ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 3 DIGITAL SKILLS AND DIGITAL COLOR**Hours: 50****Performance Assessment(s):**

Graphic Design Rubrics:

Students demonstrate understanding of software types and the specific applications of Adobe Illustrator, Photoshop, InDesign in visual arts projects.

Knowledge of raster and vector images through use of software programs in art projects.

Identify file management strategies (pdf, jpeg, png, resolution, pixels).

Ability to scan and use images from a digital camera. Digital storage on external devices, cloud, in addition to transmitting images

Applies understanding of copyright and fair use guidelines in art works, incorporating the use of royalty free images and typography.

Understand basic printing technologies; Apply working knowledge of the different uses of color - Grayscale vs printing color (CMYK) and in electronic displays (RGB).

*Students explore the potential of digital portfolios as an option for on going development of portfolio. This is an on going process culminating year end.

Leadership Alignment:

Individual Skills: Student will be involved in activities that require problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions..

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risk-taking, inquisitiveness, attending, persistence, precision

Standards and Competencies

Standard C: Digital File Preparation

3. Describe the difference between a raster image and a vector graphic image.

7. Identify various file formats and their extensions: .doc; .qxd; .pdf; .tif; .eps; .rtf; .raw; .jpg; .bmp; .txt; .indd; .psd; .ai; .pub; .html; .gif; .xls; .zip; .dmg; .png; .dng.

Standard F: Digital File Output

2. Explain the purpose of proofing.

Standard O: Digital Illustration

1. Demonstrate an understanding of the differences between raster and vector files.

6. Demonstrate a functional knowledge of computer menus, shortcut keys, and palettes in illustration software.

Standard X: Portfolio

2. Select, organize, develop and refine a marketable portfolio

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input checked="" type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Performance Assessment(s):

Graphic Design Rubric

Student design and apply targets in layout project

Student will use and implement design principles in concept development of their layout

*Students begin the process of creating works to incorporate in a professional portfolio. This is an on going process culminating year end.

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, persistence

Standards and Competencies

Standard N: Page Layout

Advertising and Design

1. Select appropriate page layout software for a given job.
2. Set text with appropriate margins; formatting; gutters; and, proper leading.
4. Design and produce a document using desired fonts; styles; margins; indents; tabs; and, colors.
7. Create documents using grids; templates; master pages; paragraph style sheets; and, character style sheets.
20. Demonstrate text alignment (flush left, flush right, center), vertical justification (top, center, bottom justified), and object alignment and distribution.
23. Apply appropriate paragraph formatting to text (indents, spaces before and after, drop caps, etc.).
25. Design and produce a document using specified type faces, sizes, leading, margins, indents, tabs, and colors.
26. Identify appropriate professional software for inputting words, creating illustrations, editing images, and laying out pages.
28. Place or get images.

Standard P: Design Principles

1. Identify the basic principles of design (i.e., unity; contrast; proportions; balance; emphasis; and, rhythm).
3. Create thumbnails and rough drafts by sketching. Use markers or colored pencils to show color.
4. Pitch a concept to demonstrate an understanding of the relationship between message; color; typography; images; and, layout.
7. Critique a layout to determine if it meets the customer's needs, and suggest improvements.

Standard X: Portfolio

1. Explore and identify content of a professional portfolio
2. Select, organize, develop and refine a marketable portfolio

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Identifies audience and purpose.
- Implements choices of arts elements, principles, foundations, skills, and techniques in a creative work.

2.2 Applies a performance and/or presentation process to the arts (dance, music, theatre and visual arts):

- Identifies audience and purpose of the work and/or performance.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

Comprehension and Collaboration (9-10)

1 - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

- Presentation of Knowledge and Ideas (9-10)

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

2 - Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Manage Goals and Time <input type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Unit 5 LOGO DESIGN**Hours: 20****Performance Assessment(s):**

Graphic Design Rubric

Student design and apply targets in design branding in logo package

Student will use and implement design principles in concept development of their layout

*Developing work is an on going process to be incorporated in culminating year end portfolio.

Students begin the process of creating works to incorporate in a professional portfolio. This is an on going process culminating year end.

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, persistence

Standards and Competencies

Standard O: Digital Illustration

2. Use the appropriate graphics program to create a design or logo using manipulated type (rotated, circled, extended, tints and fills, etc.).
3. Create or trace drawings/photographs using a vector illustration program.
7. Create a single color vector graphic.

Standard P: Design Principles

3. Create thumbnails and rough drafts by sketching. Use markers or colored pencils to show color.
4. Pitch a concept to demonstrate an understanding of the relationship between message; color; typography; images; and, layout.
8. Demonstrate an understanding of corporate identity including how branding affects consumer recognition.

Standard X: Portfolio

1. Explore and identify content of a professional portfolio
2. Select, organize, develop and refine a marketable portfolio

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 6 TYPOGRAPHY**Hours: 25****Performance Assessment(s):**

Graphic Design Rubric

Student design and apply targets in design branding in logo packages

Student will use and implement design principles in concept development of their layout

*Developing work is an on going process to be incorporated in culminating year end portfolio.

Leadership Alignment:

Individual Skills: Student will be involved in activities that require applying theory, problem-solving and using critical and creative thinking skills while understanding outcomes of related decisions.

Community and Career Skills: Work habits, punctuality,

Enhancing Behaviors: Risking, inquisitiveness, attending, persistence, persistence

Standards and Competencies

Standard M: Type

1. Illustrate x-height; mean-line; base-line; ascenders; descenders; serifs; leading; and, their roles in measuring and designing with type.
4. Distinguish between display (headline) type and body (text) type by their point sizes, styles, and uses.
5. List the major type faces/font families and their uses.
6. Explain letter spacing; tracking; kerning; baseline shift; and, horizontal scale.
7. Demonstrate the type arrangements: flush left–ragged right; flush right–ragged left; centered; justified; force justified; and, widows and orphans.
1. Measure type in points using the appropriate tools.
6. Explain letter spacing, tracking, and kerning of type characters.

Standard P: Design Principles

2. Identify the basic elements of design (i.e., line; shape; direction; size; texture; value; and, color).
3. Create thumbnails and rough drafts by sketching. Use markers or colored pencils to show color.

Standard X: Portfolio

1. Explore and identify content of a professional portfolio
2. Select, organize, develop and refine a marketable portfolio

Aligned to Washington State Standards**Arts**

- 1.1 Understands and applies arts concepts and vocabulary.
- 1.2 Develops arts skills and techniques.
 - Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.
 - Reflects for the purpose of self-evaluation and improvement of the creative work.
 - Refines work based on feedback, self-reflection, and aesthetic criteria.
- 3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>



COURSE OUTLINE

Course Name Graphic Design Contract Study **Grade Level(s)** 11-12

Contract Study further develops skills in graphic design. Incorporates employability, community and social awareness skills required in the industry. This course builds on previous classes to provide artistic design and technical proficiency.

1. Role of a Graphic Designer

- A. Career exploration
- B. Planning

2. Leadership and Group Skills

- A. Assist First-Year Students
- B. Lead Discussions about Graphic Design Related Topics
- C. Presentations

3. Industry Skills

- A. Adobe Certification
- B. Portfolio Project Aligning with Industry Standards

4. Sketchbook Assignments

- A. Explore Personal Style
- B. Variety of Different Assignments

Auburn School District Framework: Graphic Design Contract Study

Course: Graphic Design/Commercial and Advertising Art

Total Framework Hours: 180 Hours

CIP Code: 500402

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, December 30, 2015

Resources and Standard used in Framework Development:

Standards used are from PrintEd 2010, SkillsUSA and Teacher workshop identified specific skills as outlined in the OSPI Model Framework for 500402 Graphic Design/Commercial and Advertising Art.

Unit 1 ROLE OF A GRAPHIC DESIGN

Hours: 10

Performance Assessment(s):

Career Exploration and Planning

Leadership Alignment:

- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
- 2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
- 2. C.4 Interpret information and draw conclusions based on the best analysis.
- 8. C.2 Demonstrate initiative to advance skill levels towards a professional level.
- 9. A.2 Conduct themselves in a respectable, professional manner.

Standards and Competencies

Standard A: Industry Overview

- 15. Define counterfeiting and copyright laws.

Standard X: Portfolio

- 1. Explore and identify content of a professional portfolio
- 2. Select, organize, develop and refine a marketable portfolio

Standard WR 1: Career Planning

WR-1.10 Apply knowledge gained from individual assessment to a set of goals and a career plan

ASD Graphic Design Power Standards

- 1. Demonstrate understanding of visual arts concepts and vocabulary
- 4. Understand and apply the design process through visual problem solving
- 11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style
- 13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in visual arts.

Aligned to Washington State Standards

Arts

- Reflects and self-evaluates work and/or performance to set goals.
- 4.1. Demonstrates and analyzes the connections among the arts disciplines.
- 4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening

- 1b - Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
<p>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)</p> <p>4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 2 LEADERSHIP/GROUP SKILLS**Hours: 30****Performance Assessment(s):**

Mentor 1st year students in Graphic Design course
Lead discussions of Graphic Design related topics
Presentations

Leadership Alignment:

1. B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work.
3. B.1 Demonstrate ability to work effectively and respectfully with diverse teams.
9. A.1 Know when it is appropriate to listen and when to speak.
9. A.2 Conduct themselves in a respectable, professional manner.
11. A.3 Inspire others to reach their very best via example and selflessness.
11. A.4 Demonstrate integrity and ethical behavior in using influence and power.

Standards and Competencies

Standard WR 2: Personal Success

WR-2.3 Use interpersonal skills to facilitate effective teamwork;

WR-2.7 Identify skills that can be transferable among a variety of careers.

ASD Graphic Design Power Standards

5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.

7. Collaborate to perform a variety of tasks

ASD Visual Arts Power Standards

5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.

7. Collaborate to perform a variety of tasks

Aligned to Washington State Standards**Arts**

- Presents work to others in a performance, exhibition, and/or production.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

1b - Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

4 - Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

1a - Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Unit 3 INDUSTRY SKILLS

Hours: 120

Performance Assessment(s):

Adobe Certification

Portfolio projects that align with industry standards

Create a portfolio to present to industry leaders and secondary educational platforms

Leadership Alignment:

- 2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation.
- 4. B.1 Use information accurately and creatively for the issue or problem at hand.
- 4. B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information.
- 6. A.1 Use technology as a tool to research, organize, evaluate and communicate information.
- 8. C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise.
- 10. A.1 Set and meet goals, even in the face of obstacles and competing pressures.
- 10. A.2 Prioritize, plan and manage work to achieve the intended result.
- 10. B.1a Work positively and ethically.
- 10. B.1b Manage time and projects effectively.
- 10. B.1c Multi-task.
- 10. B.1d Participate actively, as well as be reliable and punctual.

Standards and Competencies

Standard D: Image Capture

- 1. Explain basic scanning hardware.
- 4. Capture digital images using a scanner and digital camera.
- 5. Demonstrate appropriate scanner/program operations for line artwork and continuous tone in both black/white and color.
- 7. Download a digital image from a stock photography website or CD.
- 8. Scale a raster image using the proper settings in order to maintain the appropriate resolution for print or web.
- 9. Edit a raster image by using color correction; tone control; cropping; and, scaling, etc.
- 13. Describe uses and limitations of basic scanner software.
- 18. Transfer images from a camera and scanner to a host computer.
- 24. Download a digital image from a stock photography web site or compact disc (CD) and resize according to specifications provided.
- 25. Using bitmap editing software, retouch, crop, make modifications, color corrections, and levels adjustments to prepare an image to print correctly on a printing press.

Standard N: Page Layout

- 1. Select appropriate page layout software for a given job.
- 4. Design and produce a document using desired fonts; styles; margins; indents; tabs; and, colors.
- 28. Place or get images.
- 29. Demonstrate cropping images.

Standard O: Digital Illustration

- 5. Create a spot color illustration or logo using Pantone Matching System® (PMS) or other color matching system, and view or print separations.
- 7. Create a single color vector graphic.
- 8. Create a vector graphic using tints, fills, and color.
- 9. Create a vector graphic using manipulated type.
- 10. Trace a bitmap drawing and convert to a vector.

Standard V: Visual Techniques Drawing and Painting

- 1. Demonstrate skills used to define and analyze a given problem
- 3. Develop thematic compositions using a variety of techniques (sketchbooks)

4. Develop compositions using traditional wet/Dry materials
7. Painting – Materials, styles, Techniques
8. Illustration – Materials, styles, techniques.

Standard W: Concept Development

1. Brainstorming,
2. Concept sketching
3. Thumbnails
4. Roughts
5. Mockups

Standard X: Portfolio

1. Explore and identify content of a professional portfolio
2. Select, organize, develop and refine a marketable portfolio

ASD Graphic Design Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary
2. Create, perform and respond using reading, writing and math standards related to the visual arts
3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.
4. Understand and apply the design process through visual problem solving
5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.
6. Demonstrate art Processes, techniques and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences.
7. Collaborate to perform a variety of tasks
8. Critically analyze, interpret, describe and judge one's own work and the work of others.
10. Communicate and respond using narratives, reflections and artist statements
11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style
12. Create, prepare, present and professionally display original work for community exhibitions.
13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in visual arts.

ASD Visual Arts Power Standards

4. Understand and apply the design process through visual problem solving
5. Demonstrate ethical behavior and comply with fair use and copyright rules and expectations.
6. Demonstrate art Processes, techniques and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences.
11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style
12. Create, prepare, present and professionally display original work for community exhibitions.
13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in visual arts.

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

- 1.1 Understands and applies arts concepts and vocabulary.
- 1.4 Understands and applies audience conventions in a variety of arts settings and performances.
 - Identifies audience and purpose.
 - Reflects for the purpose of self-evaluation and improvement of the creative work.
 - Refines work based on feedback, self-reflection, and aesthetic criteria.
 - Presents work to others in a performance, exhibition, and/or production.
 - Selects artistic resources, materials and/or repertoire to create, perform and present.
 - Interprets meaning through personal understanding of the work and/or performance.

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

3.3. Develops personal aesthetic criteria to communicate artistic choices.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening

CC: College and Career Readiness Anchor Standards for Speaking and Listening

5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 4 SKETCHBOOK**Hours: 20****Performance Assessment(s):**

Students explore their personal style in a variety of different assignments

*Students begin the process of creating works to incorporate in a professional portfolio. This is an on going process culminating year end.

Leadership Alignment:

4. A.1 Access information efficiently (time) and effectively (sources).

8. C.3 Demonstrate commitment to learning as a lifelong process.

9. B.2 Respond open-mindedly to different ideas and values.

Standards and Competencies

ASD Graphic Design Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

8. Critically analyze, interpret, describe and judge one's own work and the work of others.

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions.

4. Understand and apply the design process through visual problem solving

Aligned to Washington State Standards**Arts**

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

3.1 Uses the arts to express feelings and present ideas.

Communication - Speaking and Listening

6 - Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11-12 Language standards 1 and 3 on page 54 for specific expectations.)

Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing
21st Century Skills

LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Mange Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others
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Visual Communications

SKILLS GAP/LABOR MARKET DATA
Visual Communication Program

Visual/Digital Arts Communication Overall	
Visual/Digital Arts Communication	<ul style="list-style-type: none">• Multimedia artists – 6.3%• Related: Animation, interactive tech, video graphics, special effects, digital arts, games and interactive media design, graphic design, web page and digital multimedia and info resources design.• Photographer – 4.3% growth• Related: Camera operator, television/vide/motion, film and video editors, photographic process workers and processing machine operators, set and exhibit designers, sound engineering technicians.• Graphic Designer – growth 6.9%• Specialized Design Services– 20.4% growth• Art director, camera operator, TV/Video, commercial and industrial designer, fashion designer, fine artists, interior designer, makeup artist, set and exhibit designer, commercial and industrial designers, fashion designers, floral designers interior designers, landscape architecture, public relations, set and exhibits• Audio/Video Equipment Tech: 13.7% growth• Multimedia Communication: 8.3% growth• Related: cinematography, communications technician, Radio/TV broadcast, Desktop Publishing, Camera Operator, Motion Picture, Photography, Producer/Director, Sound Engineer, film editor, broadcast,• Desktop Publisher – .9% growth, 8 openings, average \$41k• Computer operator, film and video editors, prepress technicians, printing press operator.• High current and future demand exists for individuals trained in the various aspects of multimedia communications. The expected increase is due largely to rapidly changing technology and the increased need for individuals with web, animation and design training/experience primarily due to expanding use of the internet. Locally, businesses frequently ask for students with basic skills in printing, photography, video production and graphic design for entry level positions. The Visual Communications curriculum is excellent preparation for post-secondary studies in all areas related to multimedia, at both local community colleges and 4-year colleges.• http://www.bls.gov/oco/

Auburn School District Framework: Visual Communications 1-2

Course: Video Production Technology/Technician

Total Framework Hours: 180 Hours

CIP Code: 100202

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, January 27, 2016

Resources and Standard used in Framework Development:

Standards and resources used for this framework are from SkillsUSA Blueprint for Assessment for Television (Video) Production and NOCTI Job Ready Assessment Blueprints for Television Production and Broadcasting and Journalism.

Unit 1 ELEMENTS OF ART AND PRINCIPLES OF DESIGN

Hours: 20

Performance Assessment(s):

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of Products
Precision Exams

Leadership Alignment:

City of Auburn high school student art show
SkillsUSA Pin Design
SkillsUSA T-shirt Design
SkillsUSA Advertising Design

Standards and Competencies

Standard 10: Creative Production

- Balance Complexity and Order

National Core Arts Standards

VA:Re8.1.1a - Interpret artwork using evidence found in the work

VA:Cn10.1.1a - The process of developing ideas

ASD Visual Arts Power Standards

1. Demonstrate understanding of visual arts concepts and vocabulary

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions

7. Collaborate to perform a variety of tasks

Aligned to Washington State Standards

Arts

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 3.0 The student communicates through the arts.

3.1 Uses the arts to express feelings and present ideas.

3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Comprehension and Collaboration

- 1 - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- 2 - Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
- 3 - Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

Presentation of Knowledge and Ideas

- 5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Health and Fitness

Language

CC: College and Career Readiness Anchor Standards for Language

Conventions of Standard English

Knowledge of Language

Vocabulary Acquisition and Use

- 4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
- 6 - Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Mathematics

Reading

CC: College and Career Readiness Anchor Standards for Reading

Key Ideas and Details

- 1 - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

Science

Social Studies

Writing

CC: Writing (9-10)

- 2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 2 DESIGN FUNDAMENTALS/CONCEPTS**Hours: 25****Performance Assessment(s):**

Vocab test
Self and peer evaluation
Evaluation of Products using rubric
Precision Exams

Leadership Alignment:

City of Auburn high school student art show
SkillsUSA Pin Design
SkillsUSA T-shirt Design
SkillsUSA Advertising Design
SkillsUSA Job Skills Demo A
SkillsUSA American Spirit

Standards and Competencies

National Core Arts Standards
VA:Re8.1.la - Interpret artwork using evidence found in the work
VA:Cn10.1.la - The process of developing ideas
OSPI Frameworks
C1.10 - Define elements of art
C1.11 - Define principles of design
C3.5 - Understand and utilize design process workflow
ASD Vis Com I Power Standards
2 - Identify and use design concepts
6 - Understand and use the design process

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

1.2 Develops arts skills and techniques.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

- Identifies audience and purpose.
- Uses ideas, foundations, skills and techniques to develop dance, music, theatre and visual art.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.4. Understands how the arts influence and reflect culture/civilization, place and time.

Communication - Speaking and Listening

4 - Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Health and Fitness
Language
Mathematics
<u>CC: Number and Quantity (N)</u> 1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.* 3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*
Reading
<u>CC: Reading Informational Text</u> 4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper). 6 - Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose. <u>Integration of Knowledge and Ideas (11-12)</u>
Science
Social Studies
Writing
<u>CC: Writing (9-10)</u> 2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. 3c - Use a variety of techniques to sequence events so that they build on one another to create a coherent whole. 3d - Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 3 COPYRIGHT AND DIGITAL ETHICS**Hours: 10****Performance Assessment(s):**

Self and peer evaluation of adherence to rules
Evaluation of Products using rubric
Presentation based on rubric
Precision Exams

Leadership Alignment:

SkillsUSA competitions

Standards and Competencies

Standard WR 7: Ethics and Legal responsibilities

WR-7.1 Evaluate and justify decisions based on ethical reasoning.

WR-7.4 Interpret and explain written organizational policies and procedures.

WR-7.7 Responsibilities of Internet use (using the Internet efficiently and ethically for work, identifying the risks of posting personal and work information on the internet, social networking sites, job search sites, taking measures to avoid internet security risks such as viruses, malware)

WR-7.8 Discuss legal issues associated with locating and retrieving information from the internet

WR-7.9 Understand Acceptable Use Policy, Copyright and Fair Use Laws

WR-7.11 Utilize information from electronic communication sources

WR-7.13 Understand Intellectual Properties rights

ASD Power Standards

4 - understand and adhere to fair use and copyright

Aligned to Washington State Standards**Arts**

- Selects artistic resources, materials and/or repertoire to create, perform and present.
- Presents, exhibits, and produces work and/or performance for others.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening**Health and Fitness****Language****Mathematics****Reading**

CC: Reading Informational Text

Key Ideas and Details (11-12)

Integration of Knowledge and Ideas (11-12)

Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input type="checkbox"/> Manage Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 4 DESIGN PROCESS**Hours: 10****Performance Assessment(s):**

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of products using rubric
Collection of examples using rubric
Precision Exams

Leadership Alignment:

City of Auburn high school student art show
SkillsUSA Pin Design
SkillsUSA T-shirt Design

Standards and Competencies

Standard 4: Problem Solving using critical thinking, creativity and innovation.

- Select potential solutions based on reasoned criteria
- Implement and evaluate solution(s)
- Demonstrate skills used to define and analyze a given problem
- Explain strategies used to formulate ideas, proposals and solutions to problems
- Implement and evaluate solution(s)

National Core Arts Standards

VA:Re8.1.1a - Interpret artwork using evidence found in the work

VA:Cn10.1.1a - The process of developing ideas

OSPI Frameworks

C1.10 - Define elements of art

C1.11 - Define principles of design

C3.5 - Understand and utilize design process workflow

ASD Vis Com I Power Standards

2 - Identify and use design concepts

6 - Understand and use the design process

ASD Vis Com 1

ASD Vis Com Learning Targets

Identify target audience

Determine client/project criteria

Analyze message/method

Brainstorm solutions

Create and Revise Thumbnails/Storyboards

Provide input/feedback/evaluation to self generated projects, peer projects, and client projects

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

Arts 3.0 The student communicates through the arts.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

Integration of Knowledge and Ideas (9-10)

Science

Social Studies

Writing

CC: Writing (9-10)

Text Types and Purposes

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Performance Assessment(s):

Journalism Photography for yearbook and newspaper
Composition Pre and Post Assessment
Project Rubrics
Precision Exams

Leadership Alignment:

Skills USA Digital Photography
City of Auburn Art Exhibition
Community Student Art Shows
Production for Clients

Standards and Competencies**Standard 2: Personal Success**

- Identify skills that can be transferable among a variety of careers.
- Identify time management and task prioritization skills
- Demonstrate self-management skills

Standard 5: Health and Safety

- Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments..
- Identify practices used to avoid accidents

Standard 6: Teamwork and Cooperation

- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

Standard 7: Ethics and Legal Responsibilities

- Copyright
- The Fair Use Act
- Public Domain

Standard 9: Technical

- Depth of Field

Standard 10: Creative Production

- Defining Composition
- Static/Dynamic Composition
- Leading/Closing the Subject
- Rule of Thirds
- Balance Complexity and Order
- Movement and Meaning
- Foreground/Background Framing
- Basic Camera Angles
- Camera Mounts and Tripod/Camera Pan Heads

Standard 11: Lighting

- Existing (Natural) Light

ASD Power Standards

- 1 - Identify and use photographic composition
- 3 - Identify and use a variety of software

- 4 - understand and adhere to fair use and copyright
 - 9 - Identify and use appropriate printing processes
- ASD Digital Photography Power Standards
- 2. Discuss and debate the possible intention of various photographs
 - 3. Encourage and accept critical assessment
 - 10. Understand the concept of depth of field and how to control it
 - 12. Use in-camera exposure meters
 - 13. Shoot effectively with a variety of light sources

Aligned to Washington State Standards

Arts

- Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.
- Arts 2.0 The student demonstrates thinking skills using artistic processes.
- Arts 3.0 The student communicates through the arts.
- Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 5 - Use appropriate tools strategically.
- 6 - Attend to precision.

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

Integration of Knowledge and Ideas (11-12)

- 7 - Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

CC: Reading for Literacy in History/Social Studies

Key Ideas and Details (9-10)

- 10 - By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

Science

Social Studies

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

Text Types and Purposes

2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

Production and Distribution of Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

6 - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 6 AUDIO/VIDEO**Hours: 30****Performance Assessment(s):**

Product Rubrics
Critiques
Self/Peer Evaluation
Performance Based Products
Precision Exams

Leadership Alignment:**Standards and Competencies**

Standard 2: Personal Success

- Use effective time-management and goal-setting strategies;
- Demonstrate self-management skills
- Value the importance of professionalism, including reliability, honesty, responsibility, and ethics

Standard 8: Production Overview

- Production overview

Standard 10: Creative Production

- Defining Composition
- Rule of Thirds
- Movement and Meaning
- Foreground/Background Framing
- Basic Camera Angles
- Basic Camera Moves Pan/Tilt/Dolly/Truck/Pedestal

Standard 12: Audio

- Multi-Track Recording
- Audio Levels
- Audio Recording, Editing and Playback

Equipment

DSLR Camera and Lenses

Microphones

Video Camera

Studio Lighting

Studio Backdrops

Computer Peripherals

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

Arts 3.0 The student communicates through the arts.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
<u>CC: Mathematical Practices (MP)</u> 1 - Make sense of problems and persevere in solving them. 2 - Reason abstractly and quantitatively. 6 - Attend to precision. 7 - Look for and make use of structure.
Reading
Science
Social Studies
Writing
<u>CC: Writing (9-10)</u> <u>Text Types and Purposes</u> 2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. 3 - Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☐ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☐ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☐ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☐ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 7 PRINTING PROCESSES**Hours: 25****Performance Assessment(s):**

Product Rubrics
Peer and Self Assessment
Precision Exams

Leadership Alignment:

Skills USA
Client Work

Standards and Competencies

ASD Vis Com I Power Standards

- 2 - Identify and use design concepts
- 3 - Identify and use a variety of software
- 4 - understand and adhere to fair use and copyright
- 5 - Communicate a specific message to a target audience
- 6 - Understand and use the design process
- 7 - Learn and practice effective collaboration
- 9 - Identify and use appropriate printing processes

ASD Vis Com II Power Standards

- 4. Students will understand and adhere to copyright, digital ethics and expectations in the classroom
- 6. Students will analyze and use basic and advanced features of computer hardware/software
- 7. Students will analyze and use file management and storage
- 8. Students will analyze and use equipment and tools needed for capture/input
- 9. Students will analyze and use equipment and tools needed for creation/conversion/output

Aligned to Washington State Standards**Arts**

- Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.
- Arts 2.0 The student demonstrates thinking skills using artistic processes.
- Arts 3.0 The student communicates through the arts.
- Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening**Health and Fitness****Language****Mathematics**

CC: Mathematical Practices (MP)

- 1 - Make sense of problems and persevere in solving them.
- 6 - Attend to precision.
- 8 - Look for and express regularity in repeated reasoning.

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

Integration of Knowledge and Ideas (9-10)

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☐ Reason Effectively
- ☐ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☐ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 8 EQUIPMENT AND TOOL SAFETY**Hours: 10****Performance Assessment(s):**

Safety Quiz
Observation

Leadership Alignment:**Standards and Competencies****Standard 5: Health and Safety**

- Read chemical, product, and equipment labels to determine appropriate health and safety considerations
- Identify, describe and demonstrate personal, shop and job site safety practices and procedures
- Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus
- Locate emergency equipment in your lab, shop, and classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits
- Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom
- Describe safety practices and procedures to be followed when working with and around electricity
- Demonstrate proper workspace cleaning procedures
- Identify practices used to avoid accidents

Aligned to Washington State Standards**Arts****Communication - Speaking and Listening****Health and Fitness****Language****Mathematics****Reading**

CC: Reading Informational Text
Key Ideas and Details (9-10)

Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Performance Assessment(s):

Auburn Art Show
Classroom Projects and Presentations
State and National Competitions
School Art Shows and Presentations

Leadership Alignment:

SkillsUSA
District and State Competitions

Standards and Competencies

Standard 10: Creative Production

- Rule of Thirds
- Control the Number of Prime Objects
- Foreground/Background Framing
- Basic Camera Angles
- Camera Mounts and Tripod/Camera Pan Heads
- Basic Camera Moves Pan/Tilt/Dolly/Truck/Pedestal

Standard 11: Lighting

- Studio and Field Light Levels
- Types of Lamps
- Lighting Instruments
- Area Lighting
- Existing (Natural) Light

Standard WR 6: Teamwork and Cooperation

WR-6.2 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

WR-6.5 Cooperates rather than compete with team members

OSPI Frameworks

C6.6 - Apply photographic elements of composition

C6.12 - Use software to perform alterations to digital images

C6.11 - Knowledge of light source to capture correct exposure and mood

ASD Vis Com II Power Standards

1. Students will identify and use lighting equipment and effects to achieve a variety of results
3. Students will identify and use appropriate software, resolution, image formats, and printing processes to achieve intended output/results
11. Students will create a portfolio of their work

Aligned to Washington State Standards**Arts**Arts 3.0 The student communicates through the arts.

- 3.1 Uses the arts to express feelings and present ideas.
- 3.2 Uses the arts to communicate for a specific purpose.

Communication - Speaking and Listening

Presentation of Knowledge and Ideas (11-12)

4 - Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Presentation of Knowledge and Ideas

4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Auburn School District Framework: Visual Communications 3-4

Course: Video Production Technology/Technician

Total Framework Hours: 180 Hours

CIP Code: 100202

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, January 27, 2016

Resources and Standard used in Framework Development:

Standards and resources used for this framework are from SkillsUSA Blueprint for Assessment for Television (Video) Production and NOCTI Job Ready Assessment Blueprints for Television Production and Broadcasting and Journalism.

Unit 1 ELEMENTS OF ART AND PRINCIPLES OF DESIGN

Hours: 20

Performance Assessment(s):

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of Products
Precision Exams

Leadership Alignment:

Skills USA

Standards and Competencies

National Core Arts Standards
Anchor Standard 8: Interpret intent and meaning in artistic work
Anchor Standard 9: Apply criteria to evaluate artistic work
ASD Vis Com II Power Standards
2. Students will identify and intentionally use design concepts to achieve intended results
ASD Visual Arts Power Standards
1. Demonstrate understanding of visual arts concepts and vocabulary

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.1 Understands and applies arts concepts and vocabulary.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<u>CC: Reading Informational Text</u> <u>Key Ideas and Details (9-10)</u>		
Science		
Social Studies		
Writing		
<u>CC: College and Career Readiness Anchor Standards for Writing</u> <u>Production and Distribution of Writing</u>		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input type="checkbox"/> Communicate Clearly <input type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Unit 2 MEDIA LITERACY/MESSAGE**Hours: 25****Performance Assessment(s):**

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of Products
Precision Exams

Leadership Alignment:

Skills USA
Auburn Regional Film Festival

Standards and Competencies

Standard 10: Creative Production

- Form vs. Content
- Clearly Establish Your Objectives

National Core Arts Standards

Anchor Standard 6: Convey meaning through the presentation of artistic work.

Anchor Standard 7: Perceive and analyze artistic work

Anchor Standard 8: Interpret intent and meaning in artistic work

Anchor Standard 9: Apply criteria to evaluate artistic work

Anchor Standard 11: Relate artistic ideas and works with societal, cultural and historical context to deepen understanding

ASD Vis Com II Power Standards

2. Students will identify and intentionally use design concepts to achieve intended results

ASD Visual Arts Power Standards

8. Critically analyze, interpret, describe and judge one's own work and the work of others

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

Arts 3.0 The student communicates through the arts.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening**Health and Fitness****Language****Mathematics****Reading**

CC: Reading Informational Text

Key Ideas and Details (9-10)

7 - Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

Science

Social Studies

Writing

CC: Writing (9-10)

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

2a - Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

2d - Use precise language and domain-specific vocabulary to manage the complexity of the topic.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 3 COPYRIGHT AND DIGITAL ETHICS**Hours: 10****Performance Assessment(s):**

Self and peer evaluation of adherence to rules
Evaluation of Products using rubric
Presentation based on rubric
Precision Exams

Leadership Alignment:**Standards and Competencies**

Standard 7: Ethics and Legal Responsibilities

- Evaluate and justify decisions based on ethical reasoning.
- Interpret and explain written organizational policies and procedures.
- Invasion of Privacy
- Libel and Slander
- Copyright
- Talent and Location Releases
- The Fair Use Act
- Public Domain
- Securing Rights to Music
- News Bias

Standard WR 7: Ethics and Legal responsibilities

WR-7.1 Evaluate and justify decisions based on ethical reasoning.

WR-7.2 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.

WR-7.3 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.

WR-7.5 Collaborate with classmates in researching or reviewing an Acceptable Use Policy

WR-7.8 Discuss legal issues associated with locating and retrieving information from the internet

WR-7.9 Understand Acceptable Use Policy, Copyright and Fair Use Laws

WR-7.12 WR-7. Understand End User License Agreements (EULA)

WR-7.13 Understand Intellectual Properties rights

ASD Vis Com II Power Standards

4. Students will understand and adhere to copyright, digital ethics and expectations in the classroom

ASD Visual Arts Power Standards

5. Demonstrate ethical behavior and comply with with fair use and copyright rules and expectations

Aligned to Washington State Standards**Arts**

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.2. Demonstrates and analyzes the connections between the arts and other content areas.

Communication - Speaking and Listening		
Health and Fitness		
Language		
Mathematics		
Reading		
<p>CC: Reading Informational Text</p> <p>Integration of Knowledge and Ideas (9-10)</p> <p>8 - Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.</p>		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input type="checkbox"/> Think Creatively</p> <p><input type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input checked="" type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input checked="" type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 4 CAREER**Hours: 15****Performance Assessment(s):**

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of Products
Precision Exams

Leadership Alignment:

Skills USA
Guest Speakers/Job Shadow
Mentorship

Standards and Competencies

Standard 1: Career Planning: explores/analyze personal interests and aptitudes as they relate to education and career planning.

- Complete, discuss, and analyze the results of personality, career interest, and aptitude assessments;
- Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest;
- Create a personal career portfolio including academic, certification and technical-skill requirement, career opportunities, expected wages, skills and aptitude necessary and the impact of technology on careers of personal interest.
- Determine academic/training or certification requirements for transition from one learning level to the next and explore opportunities for earning credit/certifications in high school such as advanced placement, tech prep, International Baccalaureate, college in the high school, military and apprenticeship opportunities.
- Develop and analyze tables, charts, and graphs related to career interests and make oral presentation regarding the career pathway of your choice.
- Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning.
- Identify how performance on assessments such as the SAT®, ACT®, ASVAB®, COMPASS® and ACCUPLACER® impact personal academic and career goals.
- Prepare a personal budget reflecting desired lifestyle and compare and contrast at least three careers of interest in regards to salary expectations and education/training costs.
- Prepare a program of study for at least one career of interest
- Apply knowledge gained from individual assessment to a set of goals and a career plan
- Develop strategies to make an effective transition from school to career
- Identify industry certification opportunities

ASD Vis Com II Power Standards

10. Students will research a career related to Visual Communications

ASD Visual Arts Power Standards

13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in the visual arts

Aligned to Washington State Standards**Arts**

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading for Literacy in Science and Technical Subjects

Craft and Structure (9-10)

4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Integration of Knowledge and Ideas (9-10)

7 - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

10 - By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

6 - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

9 - Draw evidence from literary or informational texts to support analysis, reflection, and research.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☐ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☐ Manage Goals and Time
- ☒ Work Independently
- ☐ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☐ Manage Projects
- ☐ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 5 PROFESSIONAL PORTFOLIO**Hours: 30****Performance Assessment(s):**

Classroom-based assessment
Vocab test
Self and peer evaluation
Evaluation of Products
Portfolio

Leadership Alignment:

Skills USA
Local Competitions

Standards and Competencies

Standard 3: Employability and Entrepreneurship skills for professional and workplace success:

- Demonstrate effective verbal, nonverbal, written, and electronic communication skills;
- Complete activities using project- and time-management techniques.
- Exhibit productive work habits, ethical practices, and a positive attitude;
- Identify how to prioritize work to fulfill responsibilities and meet deadlines;

National Core Arts Standards

Anchor Standard 2: Organize and develop artistic ideas and work

Anchor Standard 6: Convey meaning through the presentation of artistic work.

ASD Vis Com II Power Standards

11. Students will create a portfolio of their work

ASD Visual Arts Power Standards

11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style

12. Create, prepare, present and professionally display original work for community exhibitions

13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in the visual arts

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

Arts 3.0 The student communicates through the arts.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening
Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing

CC: College and Career Readiness Anchor Standards for Writing

2 - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

6 - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

21st Century Skills

LEARNING AND INNOVATION	INFORMATION, MEDIA AND TECHNOLOGY SKILLS	LIFE AND CAREER SKILLS
Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations	Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information	Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible
Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems	Media Literacy <input checked="" type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products	Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners
Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	Information, Communications, and Technology (ICT Literacy) <input type="checkbox"/> Apply Technology Effectively	Social and Cross-Cultural <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams
		Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results
		Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Unit 6 HISTORICAL TIMELINE**Hours: 20****Performance Assessment(s):**

Precision Exams
Projects
Classroom Based Assessments

Leadership Alignment:

Skills USA

Standards and Competencies

National Core Arts Standards
Anchor Standard 7: Perceive and analyze artistic work
Anchor Standard 11: Relate artistic ideas and works with societal, cultural and historical context to deepen understanding
OSPI Frameworks
C1.10 - Define elements of art
C1.11 - Define principles of design
ASD Vis Com II Power Standards
5. Students will understand the key elements of the historical timeline related to Visual Communications
ASD Visual Arts Power Standards
1. Demonstrate understanding of visual arts concepts and vocabulary
9. Understand movements, artists, styles, and genres in a cultural and historical context (place and time) as related to the visual arts

Aligned to Washington State Standards**Arts**

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

Communication - Speaking and Listening**Health and Fitness****Language****Mathematics****Reading**

CC: Reading for Literacy in History/Social Studies
Key Ideas and Details (9-10)
Key Ideas and Details (11-12)

Science**Social Studies**

History

History 4.1: Understands historical chronology.

History 4.2: Understands and analyzes causal factors that have shaped major events in history.

History 4.3: Understands that there are multiple perspectives and interpretations of historical events.

Writing

CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects (9-10)

Research to Build and Present Knowledge

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☐ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☐ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☐ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 7 CRITIQUE**Hours: 15****Performance Assessment(s):**

Auburn City Art Show
Class Presentations
Elements of Design and Principles Pre and Post Assessments
Precision Exams
Projects

Leadership Alignment:

Skills USA
Auburn City Art Show

Standards and Competencies

National Core Arts Standards
VA:Re8.1.la - Interpret artwork using evidence found in the work
Anchor Standard 4: Select, analyze, and interpret artistic work for presentation
Anchor Standard 7: Perceive and analyze artistic work
Anchor Standard 8: Interpret intent and meaning in artistic work
Anchor Standard 9: Apply criteria to evaluate artistic work
OSPI Frameworks
C1.10 - Define elements of art
C1.11 - Define principles of design
ASD Vis Com II Power Standards
2. Students will identify and intentionally use design concepts to achieve intended results
ASD Visual Arts Power Standards
8. Critically analyze, interpret, describe and judge one's own work and the work of others
9. Understand movements, artists, styles, and genres in a cultural and historical context (place and time) as related to the visual arts

Aligned to Washington State Standards**Arts**

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.
2.3 Applies a responding process to an arts performance and/or presentation of dance, music, theatre and visual arts):

Communication - Speaking and Listening

Comprehension and Collaboration (9-10)
Presentation of Knowledge and Ideas (11-12)

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
<p>CC: College and Career Readiness Anchor Standards for Writing</p> <p>1 - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p>		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input checked="" type="checkbox"/> Analyze Media</p> <p><input type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input type="checkbox"/> Be Responsible to Others</p>

Unit 8 EQUIPMENT, TOOLS AND SAFETY**Hours: 15****Performance Assessment(s):**

Precision Exams
Classroom Assessments
Projects
Classroom Safety Exams and Performance Rubric

Leadership Alignment:

Skills USA
Contract Customer Work

Standards and Competencies

Standard 9: Technical

- HDMI, Component, and Composite Video
- Type of Lenses
- Focal length/Angle of View
- F-Stops/Lens Speed/Iris
- Depth of Field
- Digital Compression

Standard 11: Lighting

- Lighting Instruments
- Camera-mounted Lights
- Area Lighting
- Existing (Natural) Light
- Lighting Controls

Standard WR 5: Health and Safety

WR-5.1 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.

WR-5.2 Explain emergency procedures to follow in response to workplace accidents.

WR-5.17 Locate emergency equipment in your lab, shop, and classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits

WR-5.18 Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom

WR-5.19 Describe safety practices and procedures to be followed when working with and around electricity

WR-5.21 Demonstrate proper workspace cleaning procedures

WR-5.24 Illustrate procedures used to handle emergency situations and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures

WR-5.25 Identify practices used to avoid accidents

WR-5.26 Identify and describe fire protection, precautions and response procedures

National Core Arts Standards

Anchor Standard 5: Develop and refine artistic techniques and work for presentation.

OSPI Frameworks

C6.6 - Apply photographic elements of composition

C6.12 - Use software to perform alterations to digital images

C6.11 - Knowledge of light source to capture correct exposure and mood

ASD Vis Com II Power Standards

1. Students will identify and use lighting equipment and effects to achieve a variety of results

3. Students will identify and use appropriate software, resolution, image formats, and printing processes to achieve intended output/results
4. Students will understand and adhere to copyright, digital ethics and expectations in the classroom
6. Students will analyze and use basic and advanced features of computer hardware/software
7. Students will analyze and use file management and storage
8. Students will analyze and use equipment and tools needed for capture/input
9. Students will analyze and use equipment and tools needed for creation/conversion/output

ASD Visual Arts Power Standards

13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in the visual arts

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

Integration of Knowledge and Ideas (9-10)

Science		
Social Studies		
Writing		
21st Century Skills		
LEARNING AND INNOVATION Creativity and Innovation <input type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and Manage Information Media Literacy <input type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Unit 9 COMPETITION**Hours: 30****Performance Assessment(s):**

Auburn Art Show
Classroom Projects
State and National Competitions
School Art Shows and Presentations

Leadership Alignment:

Skills USA
District and State Competitions

Standards and Competencies

Standard 10: Creative Production

- Rule of Thirds
- Control the Number of Prime Objects
- Basic Camera Angles
- Camera Mounts and Tripod/Camera Pan Heads
- Basic Camera Moves Pan/Tilt/Dolly/Truck/Pedestal

Standard 11: Lighting

- Studio and Field Light Levels
- Types of Lamps
- Lighting Instruments
- Area Lighting
- Existing (Natural) Light

Standard WR 6: Teamwork and Cooperation

WR-6.2 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

WR-6.5 Cooperates rather than compete with team members

National Core Arts Standards

Anchor Standard 3: Refine and complete artistic work

Anchor Standard 6: Convey meaning through the presentation of artistic work.

OSPI Frameworks

C6.6 - Apply photographic elements of composition

C6.12 - Use software to perform alterations to digital images

C6.11 - Knowledge of light source to capture correct exposure and mood

ASD Vis Com II Power Standards

1. Students will identify and use lighting equipment and effects to achieve a variety of results
3. Students will identify and use appropriate software, resolution, image formats, and printing processes to achieve intended output/results
11. Students will create a portfolio of their work

ASD Visual Arts Power Standards

5. Demonstrate ethical behavior and comply with with fair use and copyright rules and expectations
6. Demonstrate art processes, techniques, and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences
8. Critically analyze, interpret, describe and judge one's own work and the work of others

Aligned to Washington State Standards

Arts

Arts 3.0 The student communicates through the arts.

Communication - Speaking and Listening

Presentation of Knowledge and Ideas (11-12)

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Presentation of Knowledge and Ideas

Health and Fitness		
Language		
Mathematics		
Reading		
Science		
Social Studies		
Writing		
21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input type="checkbox"/> Implement Innovations</p> <p>Creative Thinking and Problem Solving</p> <p><input type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgements and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input type="checkbox"/> Access and Evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input checked="" type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications, and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Mange Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>

Auburn School District Framework: Visual Communications Contract Study

Course: Video Production Technology/Technician

Total Framework Hours: 360 Hours

CIP Code: 100202

Type: Preparatory

Career Cluster: Arts, Audio/Video Technology & Communications

Date Last Modified: Wednesday, January 27, 2016

Resources and Standard used in Framework Development:

Standards and resources used for this framework are from SkillsUSA Blueprint for Assessment for Television (Video) Production and NOCTI Job Ready Assessment Blueprints for Television Production and Broadcasting and Journalism.

Unit 1 PORTFOLIO/CAREER

Hours: 45

Performance Assessment(s):

Student Portfolio
Public Shows
Competition Rubric
Competition Results

Leadership Alignment:

Skills USA
Auburn Art Show

Standards and Competencies

Standard 1: Career Planning: explores/analyze personal interests and aptitudes as they relate to education and career planning.

Standard 3: Employability and Entrepreneurship skills for professional and workplace success:

Standard WR 1: Career Planning

Standard WR 2: Personal Success

Standard WR 3: Employability and Entrepreneurship

National Core Arts Standards

Anchor Standard 3: Refine and complete artistic work

Anchor Standard 4: Select, analyze, and interpret artistic work for presentation

Anchor Standard 5: Develop and refine artistic techniques and work for presentation.

Anchor Standard 6: Convey meaning through the presentation of artistic work.

ASD Vis Com II Power Standards

1. Students will identify and use lighting equipment and effects to achieve a variety of results
2. Students will identify and intentionally use design concepts to achieve intended results
3. Students will identify and use appropriate software, resolution, image formats, and printing processes to achieve intended output/results
4. Students will understand and adhere to copyright, digital ethics and expectations in the classroom
6. Students will analyze and use basic and advanced features of computer hardware/software
7. Students will analyze and use file management and storage
8. Students will analyze and use equipment and tools needed for capture/input
9. Students will analyze and use equipment and tools needed for creation/conversion/output
10. Students will research a career related to Visual Communications
11. Students will create a portfolio of their work

ASD Visual Arts Power Standards

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions
5. Demonstrate ethical behavior and comply with with fair use and copyright rules and expectations
6. Demonstrate art processes, techniques, and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences
8. Critically analyze, interpret, describe and judge one's own work and the work of others
11. Select, organize, develop and refine a portfolio that demonstrates mastery and personal style
12. Create, prepare, present and professionally display original work for community exhibitions
13. Research, analyze and apply workplace expectations, safety guidelines and skill requirements for careers in the visual arts

Aligned to Washington State Standards

Arts

Arts 3.0 The student communicates through the arts.

Communication - Speaking and Listening

Presentation of Knowledge and Ideas (11-12)

Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing

21st Century Skills		
<p>LEARNING AND INNOVATION</p> <p>Creativity and Innovation</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations <p>Creative Thinking and Problem Solving</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input type="checkbox"/> Solve Problems <p>Communication and Collaboration</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others 	<p>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information <p>Media Literacy</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products <p>Information, Communications, and Technology (ICT Literacy)</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Apply Technology Effectively 	<p>LIFE AND CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <ul style="list-style-type: none"> <input type="checkbox"/> Adapt to Change <input type="checkbox"/> Be Flexible <p>Initiative and Self-Direction</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p>Social and Cross-Cultural</p> <ul style="list-style-type: none"> <input type="checkbox"/> Interact Effectively with Others <input type="checkbox"/> Work Effectively in Diverse Teams <p>Productivity and Accountability</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Guide and Lead Others <input type="checkbox"/> Be Responsible to Others

Unit 2 LEADERSHIP**Hours: 65****Performance Assessment(s):**

Precision Exams
Classroom Assessments
Personal and Team Evaluations

Leadership Alignment:

Collaborate within teams to produce client work
Skills USA
State and national competitions

Standards and Competencies**Standard 2: Personal Success**

- Develop personal goals using SMART (Specific Measurable Attainable Realistic Timely), objectives and strategies.
- Use interpersonal skills to facilitate effective teamwork;
- Use a problem-solving model and critical-thinking skills to make informed decisions;
- Use effective time-management and goal-setting strategies;
- Demonstrate self-management skills
- Describe the importance of having a positive attitude and techniques that boost morale
- Show initiative by coming up with unique solutions and taking on extra responsibilities
- Value the importance of professionalism, including reliability, honesty, responsibility, and ethics
- Demonstrate a respect for diversity and its benefit to the workplace

Standard 3: Employability and Entrepreneurship skills for professional and workplace success:

- Demonstrate effective verbal, nonverbal, written, and electronic communication skills;
- Evaluate the impact of positive and negative personal choices, including use of electronic communications such as social networking sites;
- Model characteristics of effective leadership, teamwork, and conflict management;
- Explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population; and
- Complete activities using project- and time-management techniques.
- Demonstrate dependability, punctuality, and initiative;
- Model appropriate business and personal etiquette in the workplace;
- Explain the importance of setting goals and demonstrate the ability to set, reach, and evaluate goals

Standard 6: Teamwork and Cooperation

- Employ leadership skills to accomplish organizational goals and objectives.
- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
- Conduct and participate in meetings to accomplish work tasks.
- Employ mentoring skills to inspire and teach others.

Standard 7: Ethics and Legal Responsibilities

- Evaluate and justify decisions based on ethical reasoning.
- Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.
- Interpret and explain written organizational policies and procedures.

Standard WR 2: Personal Success

WR-2.3 Use interpersonal skills to facilitate effective teamwork;

WR-2.5 Use effective time-management and goal-setting strategies;

Standard WR 3: Employability and Entrepreneurship

WR-3.1 Demonstrate effective verbal, nonverbal, written, and electronic communication skills;

WR-3.3 Model characteristics of effective leadership, teamwork, and conflict management;

WR-3.11 Exhibit productive work habits, ethical practices, and a positive attitude;

Standard WR 6: Teamwork and Cooperation

WR-6.1 Employ leadership skills to accomplish organizational goals and objectives.

WR-6.2 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

WR-6.3 Conduct and participate in meetings to accomplish work tasks.

WR-6.4 Employ mentoring skills to inspire and teach others.

WR-6.5 Cooperates rather than compete with team members

WR-6.6 Offers/seeks suggestions, opinions, and information to team members.

WR-6.7 Listens to and considers the ideas of team members.

WR-6.8 Supports group decision even if not in total agreement.

WR-6.9 Communicates changes or problems to team members.

WR-6.10 Treat everybody with respect and understanding

WR-6.11 Employ mentoring skills to inspire and teach others.

ASD Visual Arts Power Standards

5. Demonstrate ethical behavior and comply with with fair use and copyright rules and expectations

7. Collaborate to perform a variety of tasks

8. Critically analyze, interpret, describe and judge one's own work and the work of others

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

1.4 Understands and applies audience conventions in a variety of arts settings and performances.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):

Arts 3.0 The student communicates through the arts.

3.2 Uses the arts to communicate for a specific purpose.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

Communication - Speaking and Listening

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Comprehension and Collaboration

Presentation of Knowledge and Ideas

Health and Fitness
Language
Mathematics
Reading
Science
Social Studies
Writing
21st Century Skills

LEARNING AND INNOVATION Creativity and Innovation <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations Creative Thinking and Problem Solving <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgements and Decisions <input checked="" type="checkbox"/> Solve Problems Communication and Collaboration <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	INFORMATION, MEDIA AND TECHNOLOGY SKILLS Information Literacy <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and Manage Information Media Literacy <input checked="" type="checkbox"/> Analyze Media <input checked="" type="checkbox"/> Create Media Products Information, Communications, and Technology (ICT Literacy) <input checked="" type="checkbox"/> Apply Technology Effectively	LIFE AND CAREER SKILLS Flexibility and Adaptability <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible Initiative and Self-Direction <input checked="" type="checkbox"/> Mange Goals and Time <input checked="" type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners Social and Cross-Cultural <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams Productivity and Accountability <input checked="" type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results Leadership and Responsibility <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others
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Unit 3 COMPETITION**Hours: 70****Performance Assessment(s):**

Auburn Art Show
School Competitions
Skills USA Competitions
Client Based Work

Leadership Alignment:

Skills USA
Team Leadership for Client Work

Standards and Competencies

Standard 6: Teamwork and Cooperation

- Employ leadership skills to accomplish organizational goals and objectives.
- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
- Conduct and participate in meetings to accomplish work tasks.

Standard 7: Ethics and Legal Responsibilities

- Copyright
- Public Domain

Standard WR 3: Employability and Entrepreneurship

WR-3.1 Demonstrate effective verbal, nonverbal, written, and electronic communication skills;

WR-3.8 Demonstrate dependability, punctuality, and initiative;

WR-3.10 Model appropriate business and personal etiquette in the workplace;

Standard WR 6: Teamwork and Cooperation

WR-6.2 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

Standard WR 7: Ethics and Legal responsibilities

WR-7.13 Understand Intellectual Properties rights

National Core Arts Standards

Anchor Standard 3: Refine and complete artistic work

Anchor Standard 4: Select, analyze, and interpret artistic work for presentation

Anchor Standard 5: Develop and refine artistic techniques and work for presentation.

Anchor Standard 6: Convey meaning through the presentation of artistic work.

Anchor Standard 9: Apply criteria to evaluate artistic work

OSPI Frameworks

C1.10 - Define elements of art

C1.11 - Define principles of design

Aligned to Washington State Standards**Arts**

Arts 3.0 The student communicates through the arts.

Communication - Speaking and Listening

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Presentation of Knowledge and Ideas

- 4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task,
- 5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
- 6 - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

Production and Distribution of Writing

- 4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- 5 - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
- 6 - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☐ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☐ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☐ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Manage Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Unit 4 CLIENT WORK**Hours: 180****Performance Assessment(s):**

Create, Present, and Revise Products for Clients
Client Feedback
Classroom Analysis and Critique

Leadership Alignment:

Skills USA
Team Products for Clients

Standards and Competencies

Standard 3: Employability and Entrepreneurship skills for professional and workplace success:

- Demonstrate effective verbal, nonverbal, written, and electronic communication skills;
- Complete activities using project- and time-management techniques.
- Exhibit productive work habits, ethical practices, and a positive attitude;

Standard 5: Health and Safety

- Identify, describe and demonstrate personal, shop and job site safety practices and procedures
- Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus
- Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom
- Describe safety practices and procedures to be followed when working with and around electricity
- Demonstrate proper workspace cleaning procedures

Standard WR 2: Personal Success

WR-2.3 Use interpersonal skills to facilitate effective teamwork;

Standard WR 3: Employability and Entrepreneurship

WR-3.3 Model characteristics of effective leadership, teamwork, and conflict management;

WR-3.11 Exhibit productive work habits, ethical practices, and a positive attitude;

Standard WR 4: Problem Solving

WR-4.1 Employ critical thinking skills independently and in teams to solve problems and make decisions.

WR-4.4 Conduct technical research to gather information necessary for decision-making

WR-4.7 Explain strategies used to formulate ideas, proposals and solutions to problems

WR-4.8 Select potential solutions based on reasoned criteria

WR-4.9 Implement and evaluate solution(s)

Standard WR 5: Health and Safety

WR-5.11 Illustrate a safe environment for students in printing

WR-5.13 Read chemical, product, and equipment labels to determine appropriate health and safety considerations

WR-5.14 Identify, describe and demonstrate personal, shop and job site safety practices and procedures

WR-5.15 Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus

WR-5.18 Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom

WR-5.19 Describe safety practices and procedures to be followed when working with and around electricity

WR-5.20 Illustrate proper handling and storage practices, including working with hazardous materials, disposal, and recycling

WR-5.21 Demonstrate proper workspace cleaning procedures

Standard WR 6: Teamwork and Cooperation

WR-6.1 Employ leadership skills to accomplish organizational goals and objectives.

WR-6.2 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.

WR-6.3 Conduct and participate in meetings to accomplish work tasks.

WR-6.6 Offers/seeks suggestions, opinions, and information to team members.

Standard WR 7: Ethics and Legal responsibilities

WR-7.2 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies.

WR-7.8 Discuss legal issues associated with locating and retrieving information from the internet

WR-7.9 Understand Acceptable Use Policy, Copyright and Fair Use Laws

WR-7.13 Understand Intellectual Properties rights

National Core Arts Standards

Anchor Standards 1: Generate and conceptualize artistic ideas and work

Anchor Standard 2: Organize and develop artistic ideas and work

Anchor Standard 3: Refine and complete artistic work

Anchor Standard 4: Select, analyze, and interpret artistic work for presentation

Anchor Standard 6: Convey meaning through the presentation of artistic work.

OSPI Frameworks

C6.6 - Apply photographic elements of composition

C6.12 - Use software to perform alterations to digital images

C6.11 - Knowledge of light source to capture correct exposure and mood

ASD Vis Com II Power Standards

1. Students will identify and use lighting equipment and effects to achieve a variety of results
2. Students will identify and intentionally use design concepts to achieve intended results
3. Students will identify and use appropriate software, resolution, image formats, and printing processes to achieve intended output/results
4. Students will understand and adhere to copyright, digital ethics and expectations in the classroom
6. Students will analyze and use basic and advanced features of computer hardware/software
8. Students will analyze and use equipment and tools needed for capture/input
9. Students will analyze and use equipment and tools needed for creation/conversion/output

ASD Visual Arts Power Standards

3. Understand, analyze and intentionally apply aesthetic critical thinking using the elements of art and principles of design to create original compositions
5. Demonstrate ethical behavior and comply with with fair use and copyright rules and expectations
6. Demonstrate art processes, techniques, and skills using traditional and digital media to produce works of art for expression, specific purposes and audiences

Aligned to Washington State Standards

Arts

Arts 1.0 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts 2.0 The student demonstrates thinking skills using artistic processes.

Arts 3.0 The student communicates through the arts.

Arts 4.0 The student makes connections within and across the arts to other disciplines, life, cultures and work.

4.4. Understands how the arts influence and reflect culture/civilization, place and time.

Communication - Speaking and Listening

CC: College and Career Readiness Anchor Standards for Speaking and Listening

Presentation of Knowledge and Ideas

- 4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task,
- 5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
- 6 - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- ☒ Think Creatively
- ☒ Work Creatively with Others
- ☒ Implement Innovations

Creative Thinking and Problem Solving

- ☒ Reason Effectively
- ☒ Use Systems Thinking
- ☒ Make Judgements and Decisions
- ☒ Solve Problems

Communication and Collaboration

- ☒ Communicate Clearly
- ☒ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- ☒ Access and Evaluate Information
- ☒ Use and Manage Information

Media Literacy

- ☒ Analyze Media
- ☒ Create Media Products

Information, Communications, and Technology (ICT Literacy)

- ☒ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- ☒ Adapt to Change
- ☒ Be Flexible

Initiative and Self-Direction

- ☒ Mange Goals and Time
- ☒ Work Independently
- ☒ Be Self-Directed Learners

Social and Cross-Cultural

- ☒ Interact Effectively with Others
- ☒ Work Effectively in Diverse Teams

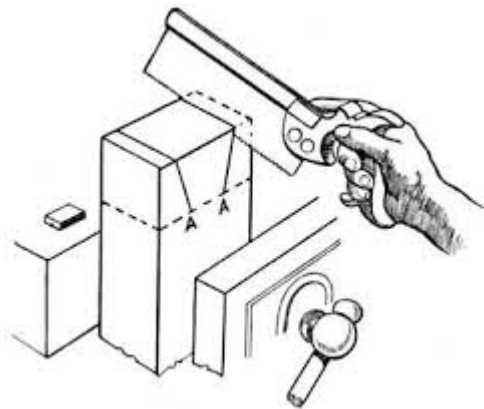
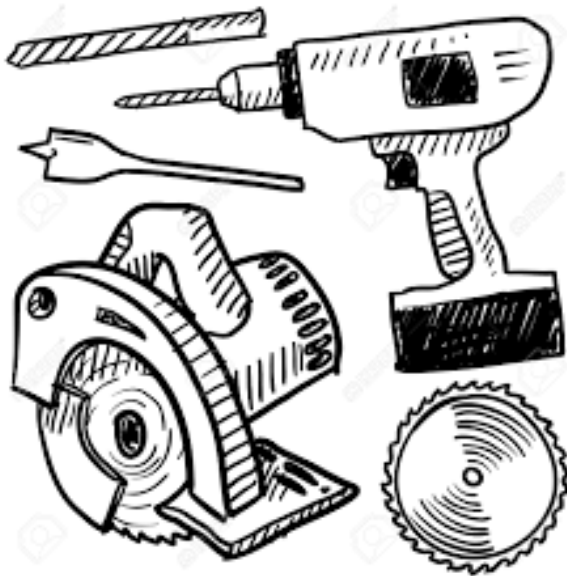
Productivity and Accountability

- ☒ Manage Projects
- ☒ Produce Results

Leadership and Responsibility

- ☒ Guide and Lead Others
- ☒ Be Responsible to Others

Woodworking and Design



INTRODUCTION

Course Name	Woodworking and Design	Grade Level(s)	9-12
Woodworking and Design 1-2	Auburn School District	2015-2016	

Course Description	A program that is a blend of the traditional woodshop and STEM. The program is aimed at any student interested in the world of work. Students will build a variety projects, some required and others selected or designed by the student. Through the construction of projects the student will learn to operate a wide variety of woodworking machines. Construction techniques and processes found in the building and cabinet trades will be explored. Students will be introduced to the integration of STEM and woodworking with the use CNC equipment, Laser Cutting / Engraving, and software. Upon completion of this course students will have a good foundation of safe equipment operation, manufacturing concepts, and construction practices.
Description of Need Skills Gap	Demand for woodworkers will grow from increases in population, personal income, and business expenditures, in addition to the continuing need for repair and renovation of residential and commercial properties. Therefore, opportunities should be particularly good for woodworkers who specialize in such items as moldings, cabinets, stairs, and windows. Prospects will be best for highly skilled woodworkers with knowledge of computer-controlled machine tool operation. In May 2014, median hourly earnings of carpenters were \$23.36. Cabinetmakers earn an average of \$17.17. The anticipated growth in the construction trades over the next 7 years is 24.2%. CNC operators average an annual income of \$45,900, with an expected growth of 27%. Someone employed in manufacturing will earn \$45,000, with a growth of 10.8% over the next 7 years. Source: Bureau of Labor Statistics
Program of Study	Architecture and Construction
Primary Connection	Engineering, Science, Technology
Secondary Connection	Arts and Communication
Sample Scope and Sequence Opportunities for Students	WW&D 1 CTE 455, → WW&D 2 CTE 456 → WW&D 3 CTE 457, → WW&D 4 CTE 458, → WW&D 5 CTE 461, → WW&D 6 CTE 462. Post secondary opportunities through articulation with Green River Community College, Local Apprenticeships. National Certification through Woodworkers Career Alliance (WCA) and National Center for Construction Education and Research (NCCER)
Cross Credit	Math (does not satisfy NCAA or 4 year college entrance) Fine Arts (Woodworking 5-6)

Basic Textbook	Carpentry by: Gaspar Lewis, Delmar Publishers, 1995																														
Equipment	Industrial Woodworking Machinery, Portable Power Tools, Hand Tools, Computer Integrated Machines, Personal Computers.																														
Software	ArtCam, MasterCam, ShopBot, MS Publisher, MS Word, MS Excel, PowerPoint																														
Supplemental Materials	<p>Wood Smith, books 1-130 Wood Magazine Fine Wood Working Woodworkers Journal Popular Woodworking</p> <p><u>Reference Books:</u></p> <p>Wood: Technology and processes by John Feirer Carpentry and building construction by J. Feirer, G. Hutchings, M. Feirer Cabinetmaking and Millwork by Feirer, Bennett Construction Systems by Polette, Landers Introduction to technology by West</p> <p><u>Videos:</u></p> <p>Shopware Educational Systems: Machine Safety Videos:</p> <table> <tr> <td>Disc & Belt Sanders Safety and Operation</td> <td>SW109H</td> </tr> <tr> <td>Table Saw Safety and Operation</td> <td>SW111H</td> </tr> <tr> <td>Radial Arm Saw Safety and Operation</td> <td>SW112H</td> </tr> <tr> <td>Band Saw Safety and Operation</td> <td>SW113H</td> </tr> <tr> <td>Thickness Planer Safety and Operation</td> <td>SW114H</td> </tr> <tr> <td>Jointer Safety and Operation</td> <td>SW115H</td> </tr> <tr> <td>Wood Lathe Safety and Operation</td> <td>SW116H</td> </tr> <tr> <td>Shaper Safety and Operation</td> <td>SW117H</td> </tr> <tr> <td>Scroll Saw Safety and Operation</td> <td>SW118H</td> </tr> <tr> <td>Drill Press Safety and Operation</td> <td>SW119H</td> </tr> <tr> <td>Portable sander safety & operations</td> <td>SW121H</td> </tr> <tr> <td>Portable Circular Saw safety & operations</td> <td>SW122H</td> </tr> <tr> <td>Saber Saw safety & operations</td> <td>SW123H</td> </tr> <tr> <td>Portable Drill Safety & operations</td> <td>SW124H</td> </tr> <tr> <td>Router Safety & operations</td> <td>SW125H</td> </tr> </table> <p>Meridian Educational Corporation: Safety and Procedure Videos:</p> <p>Miter Joints Chamfers and Bevels Cutting Curves and Circles</p>	Disc & Belt Sanders Safety and Operation	SW109H	Table Saw Safety and Operation	SW111H	Radial Arm Saw Safety and Operation	SW112H	Band Saw Safety and Operation	SW113H	Thickness Planer Safety and Operation	SW114H	Jointer Safety and Operation	SW115H	Wood Lathe Safety and Operation	SW116H	Shaper Safety and Operation	SW117H	Scroll Saw Safety and Operation	SW118H	Drill Press Safety and Operation	SW119H	Portable sander safety & operations	SW121H	Portable Circular Saw safety & operations	SW122H	Saber Saw safety & operations	SW123H	Portable Drill Safety & operations	SW124H	Router Safety & operations	SW125H
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	<p> Crosscutting Gluing and Clamping Joinery Intro to Construction Erecting Substructures Blueprints: planning A Enclosing, finishing, & landscape Project design & site prep. Installing utilities Electricity Cabinet doors & hinges Cabinet drawers Ripping Dados and rabbets </p> <p> Home Improvement Construction Videos: D.I.Y. Video Corp. </p> <table> <tr> <td>Basic Carpentry</td><td># 2</td></tr> <tr> <td>Exterior Remodeling</td><td># 8</td></tr> <tr> <td>Electrical</td><td># 9</td></tr> <tr> <td>Decks</td><td># 11</td></tr> <tr> <td>Drywall</td><td># 14</td></tr> <tr> <td>Walls</td><td># 19</td></tr> </table> <p> A fine Homebuilding video workshop with Larry Haun Taunton books & Videos </p> <p> Framing Walls Framing floors & stairs Framing roofs </p> <p> Cambridge Educational The long & short of it: how to measure </p>	Basic Carpentry	# 2	Exterior Remodeling	# 8	Electrical	# 9	Decks	# 11	Drywall	# 14	Walls	# 19
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Exterior Remodeling	# 8												
Electrical	# 9												
Decks	# 11												
Drywall	# 14												
Walls	# 19												

Woodworking and Design is articulated with Green River Community College. For more information, see an instructor or a Career Counselor.

WHAT'S TECH PREP?

Tech Prep is a unique program that allows students to get a head start on college while still in high school. With a grade of "B" or above, high school students will earn *free** college credit - up to 45 in all - for their Tech Prep-certified classes. Because colleges and business and labor leaders are Tech Prep partners, students can be sure that they are getting the skills and training they need for today's jobs

TECH PREP IS GOOD FOR STUDENTS

Students win by:

- Getting college credits free. Tech Prep students save on college tuition costs by earning credits--up to 45--while still in high school.
- Receiving guaranteed admission to community college. Because they already have college credits when they apply. Tech Prep students receive priority registration when they enter community college.
- Getting valuable hands-on work experiences. Tech Prep students learn about the world of work through mentorship's, job shadowing, and on-the-job experience in different career fields.
- Graduating from college earlier. Because Tech Prep students get college credit for qualifying classes, they save money *and* time.
- Landing a good job--faster. Close to 20,000 jobs in Washington State are unfilled each year because applicants don't have the necessary post-high school training. Tech Prep students can also expect to earn more--with an associate's (two-year) community college degree, they will make almost three times more than a high school graduate.

TECH PREP IS GOOD FOR BUSINESSES

Businesses win by:

- Providing training opportunities for students. Tech Prep business partners have a pool of potential employees who are trained with the skills needed in the workplace.
- Getting the chance to look at potential employees before hiring. Tech Prep businesses can "try before they buy" because they have an opportunity to see a student's skills and strengths firsthand.
- Providing meaningful learning experiences for students and benefits for the community. Tech Prep businesses and the entire community benefit from the service students are providing.



COURSE OUTLINE

Course Name	Woodworking and Design	Grade Level(s)	9-12
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CIP 480701 A course that generally prepares individuals to apply technical knowledge and skills to create and design, lay out and shape stock; assemble wooden articles or subassemblies; mark; bind; saw, carve, and sand wooden products; repair wooden articles, and use a variety of hand and power tools.

- 1. Introduction to Woodworking and Design**
 - A. Course Goals and Expectations
 - B. Woodworker Career Alliance (WCA) Certification
 - C. Basic Shop Safety Rules
 - D. Introduction to Careers
 - E. Employer and Employee Relationships
 - F. Employment Applications
 - G. Resumes
- 2. Facility Management**
 - A. Employer Employee Expectations and Responsibilities
 - B. Facility Leadership Roles
 - C. Time Management
 - D. Communications and Following Directions
- 3. General Safety**
 - A. Personal Safety and Safety for Others
 - B. Clean and Safe Working Environment
 - C. Identifying Acceptable Safety Practices
 - D. First Aid
 - E. Material Safety Data Sheets (MSDS)
- 4. Designing, Planning, and Scheduling**
 - A. Design Process
 - B. Project Planning
 - C. Working Drawings
 - D. Bill of Materials
 - E. Project Procedural Plan
 - F. Project Construction
 - G. Scheduling
 - H. Quality Control

- 5. Measuring and Layout**
 - A. Reading Fractional Measurements
 - B. Reading Metric Measurements
 - C. Differences Between Standard and Metric Scale
 - D. Reading and understanding scale
 - E. Layout Tools
 - F. Project Layout
- 6. Applied Mathematics**
 - A. Calculate Board Feet and Square Feet
 - B. Measurement with Fractions
 - C. Measurement with Decimals
 - D. Measurement with Metrics
 - E. Converting to and from: Fractions, Decimals, Metrics
- 7. Wood Characteristics and Terminology**
 - A. Wood Terminology
 - B. Wood Characteristics
 - C. Identification of Wood Species
 - D. Identify Wood in Manufactured Products
 - E. Wood Selection
- 8. Hand Tool Safety**
 - A. Safe Practices
 - B. Identify Common Hand Tools
 - C. Major Parts of Hand Tools
 - D. Selection of the Correct Tool
 - E. Proper Hand Tool Use
- 9. Stationary Machine Safety**
 - A. Safe Practices
 - B. Identify Machine Parts, Their Functions, and the Controls
 - C. Selection of the Correct Tool
 - D. Proper Stationary Machinery Use
- 10. Portable Power Tool Safety**
 - A. Safe Practices
 - B. Selection of the Correct Tool
 - C. Proper Portable Power Tools
- 11. Computer Technology**
 - A. Familiarity with Computer Applications in the Industry
 - B. Familiarity with Industry Hardware
 - C. Laser Technology and Applications
 - D. CAD, CAM, CNC Machining

- 12. Jigs, Fixtures and Clamps**
 - A. Clamping Methods
 - B. Using Clamps
- 13. Gluing and Laminating**
 - A. Wood Glues and Adhesives
 - B. Methods and Application
- 14. Joinery**
 - A. Size and Squaring Stock
 - B. Wood Joints
 - C. Joint Strength
 - D. Using Joints
- 15. Mechanical Fasteners**
 - A. Nails and Screws
 - B. Fastener Selection
 - C. Using Fasteners
- 16. Abrasives**
 - A. How Abrasives are Made
 - B. Identifying Abrasives
 - C. Techniques of Use
- 17. Finishing Techniques**
 - A. Preparation
 - B. Damage Repair
 - C. Safety Handling
 - D. Application
- 18. Leadership**
 - A. Team unity/ Diversity
 - B. Leadership Team and Individual Competitions
 - C. 21st Century Skills
- 19. Application of Acquired Woodworking Skills**
 - A. Project Design and Construction
 - B. Safe Machine and Tool operation
 - C. Industry Certification

WOODWORKING AND DESIGN POWER STANDARDS 2012-2013

The student will...

1. Woodworking Design 1 & 2

- a. Understand and identify the core concepts of; course expectations, career fields, time management, and planning, material uses and scheduling as they pertain to woodworking.
- b. Perform trade specific mathematical calculations for the purpose of; designing, material selection, material costs, construction from plans and scheduling as well as identify, understand and use measurement tools associated with this field to industry standard.
- c. Identify, understand and perform acceptable safety practices and policies pertaining to work areas and; the proper use of hand tools, portable power tools, stationary equipment and CNC machinery.
- d. Identify, perform and understand tasks showing proper use of applications that; hold, join, and fasten as well as prepare and finish materials.
- e. Identify, understand and perform the proper use of group dynamics, diversity training, problem solving, and employer employee relations.

2. Woodworking Design 3-6

- a. Understand and identify the core concepts of; course expectations, career fields, time management, leadership, and planning, material uses including artistic material uses and scheduling as they pertain to woodworking.
- b. Perform trade specific mathematical calculations for the purpose of; designing, material selection, material costs, construction from plans, scheduling and codes as well as identify, understand and use measurement tools associated with this field to industry standard.
- c. Identify, understand and perform acceptable safety practices and policies pertaining to work areas and; the proper use of hand tools, portable power tools, stationary equipment and CNC machinery.
- d. Identify, perform and understand tasks showing proper use of applications that; hold, join, and fasten as well as prepare and finish materials with artistic quality.

- e. Identify, understand and perform the proper use of group dynamics, diversity training, problem solving, and employer employee relations.

Woodworking and Design



To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

Woodworking and Design ** LEARNING AND INNOVATION SKILLS **	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences

	SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Conferences & Contests

Woodworking and Design

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy 6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

Woodworking and Design

** LIFE AND CAREER SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project

new ideas and increase both innovation and quality of work	
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to: 10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests

ARCHITECTURE & CONSTRUCTION PATHWAY
OSPI Curriculum Approval
2015-2016

SKILLS GAP/LABOR MARKET DATA
Woodworking & Design

<div>Woodworking & Design 1-6</div> <div>Bench Carpenter Cabinetmaker</div>	<p>Demand for woodworkers will grow from increases in population, personal income, and business expenditures, in addition to the continuing need for repair and renovation of residential and commercial properties. Therefore, opportunities should be particularly good for woodworkers who specialize in such items as moldings, cabinets, stairs, and windows. Prospects will be best for highly skilled woodworkers with knowledge of computer-controlled machine tool operation. In May 2014, median hourly earnings of carpenters were \$23.36. Cabinetmakers earn an average of \$17.17. The anticipated growth in the construction trades over the next 7 years is 24.2%. CNC operators average an annual income of \$45,900, with an expected growth of 27%. Someone employed in manufacturing will earn \$45,000, with a growth of 10.8% over the next 7 years. Source: Bureau of Labor Statistics</p> <table><tr><th rowspan="2">United States</th><th colspan="2">Employment</th><th rowspan="2">Percent Change</th><th rowspan="2">Projected Annual Job Openings ¹</th></tr><tr><th>2012</th><th>2022</th></tr><tr><td>Cabinetmakers and Bench Carpenters</td><td>86,200</td><td>89,700</td><td>+4%</td><td>1,040</td></tr></table> <table><tr><th rowspan="2">Washington</th><th colspan="2">Employment</th><th rowspan="2">Percent Change</th><th rowspan="2">Projected Annual Job Openings ¹</th></tr><tr><th>2012</th><th>2022</th></tr><tr><td>Cabinetmakers and Bench Carpenters</td><td>1,860</td><td>2,080</td><td>+12%</td><td>40</td></tr></table> <p>National Data Source: Bureau of Labor Statistics, Occupational Employment Statistics Survey State Data Source: Washington Occupational Wages</p>	United States	Employment		Percent Change	Projected Annual Job Openings ¹	2012	2022	Cabinetmakers and Bench Carpenters	86,200	89,700	+4%	1,040	Washington	Employment		Percent Change	Projected Annual Job Openings ¹	2012	2022	Cabinetmakers and Bench Carpenters	1,860	2,080	+12%	40
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<div>Woodworking & Design 1-6</div> <div>Frame Carpenter</div>	<p>Median Wages: \$39,940 yearly \$19.20 hourly Number of Jobs 2012: 901,200 Job Outlook, 2012-2022: 24% increase (Much faster than average) Employment Change, 2012-2022: 218,200 Source: Internet at http://www.bls.gov/ooh/construction-and-extraction/carpenters.htm</p>																								

Woodworking & Design 1-6 Painters, Construction and Maintenance	Median Wages: \$35,190 yearly \$16.92 hourly Number of Jobs 2012: 901,200 Job Outlook, 2012-2022: 20% increase <u>(Much faster than average)</u> Employment Change, 2012-2022: 62,600 Source: on the Internet http://www.bls.gov/ooh/construction-and-extraction/painters-construction-and-maintenance.htm
Woodworking & Design 1-6 Construction Management	Median Wages: \$82,790 yearly \$39.80 hourly Number of Jobs 2012: 202,200 Job Outlook, 2012-2022: 26% increase <u>(Much faster than average)</u> Employment Change, 2012-2022: 53,000 Source: Internet at http://www.bls.gov/ooh/management/construction-managers.htm
Woodworking & Design 1-6 Interior Design	Median Wages: \$58,860 yearly \$28.30 hourly Number of Jobs 2012: 485,000 Job Outlook, 2012-2022: 16% increase <u>(Much faster than average)</u> Employment Change, 2012-2022: 78,200 Source: Internet at http://www.bls.gov/ooh/business-and-financial/cost-estimators.htm



Woodworking Foundations

Course: Woodworking and Design 1 and 2		Total Framework Hours up to: 180
CIP Code: 480701	<input checked="" type="checkbox"/> Exploratory <input type="checkbox"/> Preparatory	Date Last Modified: 10/24/2015
Career Cluster: Manufacturing		Cluster Pathway: Production

COMPONENTS AND ASSESSMENTS

Performance Assessments: Multiple choice, essay, true false questions that exhibit a student's understanding of the knowledge being assessed.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.

Competencies	Total Learning Hours for Unit: 3
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Competency Unit 1: Introduction to Woodworking and Design

- | | |
|-----|--|
| 1.1 | Evaluate industries, organizations, and careers based on multiple sources of research and information. |
| 1.2 | Assess interest areas to determine potential career pathways or courses of study. |
| 1.3 | Develop a career plan with alternatives. |
| 1.4 | Complete job applications and related employee documents; including resume's and cover letters. |
| 1.5 | Apply job search skills to seek, evaluate, apply for, and accept employment. |
| 1.6 | Demonstrate employability skills needed to get and keep a job. |

Aligned Washington State Standards

Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.1.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text

Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Multiple choice, essay, true false questions that exhibit a student's understanding of the knowledge being assessed. Demonstration and application of employability skills.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.	
Competencies	Total Learning Hours for Unit: 2
Competency Unit 2.0: Facility Management	
2.1	Apply strategies to enhance effectiveness of all types of communications in the workplace.
2.2	Apply basic writing skills and strategies to work related documents.
2.3	Apply basic skills for work related oral communication.
2.4	Demonstrate effective negotiation and conflict resolution.
2.5	Apply active listening skills to obtain and clarify information.
2.6	Apply strategies to communicate with others in a diverse workforce.
Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.3.2 Locate and organize information from a variety of sources and media.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Students complete written and practical safety exam covering personal safety equipment, safe shop practices and safe shop environments.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.	
Competencies	Total Learning Hours for Unit: 5
Competency Unit 3.0	General Safety
3.1	Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.
3.2	Explain procedures for documenting and reporting hazards to appropriate authorities.
3.3	Illustrate a safe environment for students in the woodworking shop.
3.4	Identify, describe and demonstrate the effective use of Material Safety Data Sheets (MSDS).
3.5	Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE).
3.6	Locate emergency equipment in the woodworking lab; eyewash station, first aid kit, fire extinguisher, emergency shut off switches, exits.
3.7	Illustrate safe body mechanics and lifting techniques.
3.8	Illustrate proper handling and storage of materials, including hazardous materials, disposal, and recycling.
3.9	Describe safety practices and procedures to be followed when working around electricity.
3.10	Demonstrate proper workspace cleaning procedures.
Aligned Washington State Standards	
Educational Technology	1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1.Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student’s understanding of the knowledge being assessed. 3. Graphic representations that reveal a student’s understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 14
Competency Unit 4.0	Designing, Planning, and Scheduling.
4.1	Apply design elements: shapes, textures, lines and colors to create functional and attractive millwork and cabinets.
4.2	Apply principles of design, harmony, repetitions, balance and proportion.
4.3	Sketch a project using manual drawing techniques.
4.4	Use drafting tools to create a pictorial and working drawing.
4.5	Create cutting diagrams.
4.6	Read and interpret sketches, orthographic projections, and isometric diagrams to develop a manufacturing plan.
4.7	Evaluate an existing bill of materials for accuracy.
4.8	Determine the cost of materials a millwork/cabinetmaking project.
4.9	Optimize available materials from a cutting diagram.
4.10	Compare and contrast the cost of a specific project using different materials.
4.11	List the sequence of cutting out parts.
4.12	List the sequence of assembly.
4.13	List the sequence of finishing steps.
Aligned Washington State Standards	
Arts	1.1 Understand arts concepts and vocabulary.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships

	A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 10
Competency Unit 5.0:	Measuring and Layout
5.1	Accurately read fractional measurements to 1/16 th of an inch.
5.2	Accurately and efficiently manipulate common fractions.
5.3	Accurately measure an object using the metric scale.
5.4	Differentiate between the standard inch and metric scales.
5.5	Identify and select the proper measuring and layout tools needed for a specific task.
5.6	Demonstrate accurate use of common measuring and layout tools.
Aligned Washington State Standards	
Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. <u>Quantities</u> Reason quantitatively and use units to solve problems. N -Q 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics

Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

COMPONENTS AND ASSESSMENTS

Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.

Competencies

Total Learning Hours for Unit: 15

Competency Unit 6.0

Applied Mathematics

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| 6.1 | Accurately calculate board footage and square footage using an algebraic formula. |
| 6.2 | Determine an accurate estimate of material needed through plan interpretation. |
| 6.3 | Add, subtract, multiply, and divide whole numbers with and without a calculator. |
| 6.4 | Add, subtract, multiply, and divide fractions. |
| 6.5 | Add, subtract, multiply, and divide decimals. |
| 6.6 | Convert decimals to fractions and fractions to decimals with and without a calculator. |
| 6.7 | Recognize the basic geometrical shapes used in the woodworking industry. |
| 6.8 | Recognize common angles used in the woodworking industry. |
| 6.9 | Demonstrate geometrical theorems used to determine if a project is square. |

Aligned Washington State Standards

Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

COMPONENTS AND ASSESSMENTS

Performance Assessments: The student will identify hardwoods and softwoods. The student will identify various sheet goods and describe their characteristics and uses. The student will be able to identify and describe the characteristic and uses of various solid surface and laminate materials. The student will identify various veneers and describe their characteristics and uses.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.

Competencies

Total Learning Hours for Unit: 7

Competency Unit 7.0

Wood Characteristics and Terminology

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| 7.1 | Define the difference between hardwoods and softwoods. |
| 7.2 | Identify a minimum of five (5) species of hardwood and its characteristics that are common to the millwork and cabinet industry. |
| 7.3 | Identify a minimum of five (5) species of softwood and its characteristics that are common to the millwork and cabinet industry. |
| 7.4 | Identify common defects found in wood and list possible solutions. |
| 7.5 | Identify a minimum of four (4) types of panel products used in the woodworking industries. |
| 7.6 | Explain the use of various panel products and their uses in the woodworking industries. |
| 7.7 | Describe the cutting and handling techniques used for sheet goods. |
| 7.8 | Compare and contrast the advantages and disadvantages of sheet goods versus solid wood stock. |
| 7.9 | Identify the types of pattern matching in veneers. |

Aligned Washington State Standards

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| Arts | 1.1 Understand arts concepts and vocabulary |
| Language | L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text. |
| Math | 6&7.RP Understand ratio concepts and use ratio reasoning to solve problems
6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
A-CED Create equations that describe numbers or relationships
A-REI Understand solving equations as a process of reasoning and explain the reasoning |
| Reading | RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics |
| Science | 9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge.
9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies. |
| Social Studies | 2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices. |

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS		
Performance Assessments: Students will pass written identification assessments, performance based safety hand tool. In addition, students will demonstrate safe and proper use of hand tools for an assigned task.		
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)		
Standards and Competencies		
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.		
Competencies		Total Learning Hours for Unit: 5
Competency Unit 8.0		Hand Tool Safety
8.1	The student will demonstrate the proper use of measuring and layout tools necessary to complete a project.	
8.1.1	Demonstrate the accurate use of common measuring and layout tools.	
8.1.2	Select the proper layout tools for specific tasks.	
8.2	The student will demonstrate the proper use of cutting tools.	
8.2.1	Select the proper cutting tools for specific operations.	
8.2.2	Demonstrate the safe and proper use of specific hand-cutting tools.	
8.2.3	Select tools for cutting curves and straight cuts.	
8.2.4	Select the most appropriate blade for a given operation.	
8.3	The student will demonstrate the proper use of striking tools.	
8.3.1	Demonstrate the safe and proper use of specific striking tools.	
8.4	The student will demonstrate the proper use of hand-shaping tools.	
8.4.1	Select the proper hand-shaping tools for specific operations.	
8.4.2	Demonstrate the safe and proper use of hand-shaping tools.	
Aligned Washington State Standards		
Educational Technology	2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning 2.3.2 Select and use online applications.	
Health and Fitness	2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices. 2.4: Acquires skills to live safely and reduce health risks.	
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.	
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems	

Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Students will pass written safety tests, performance based safety tests for each piece of power equipment. In addition students will demonstrate safe and proper operation of stationary power machinery for an assigned task.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.	
Competencies	Total Learning Hours for Unit: 15
Competency Unit 9.0:	Stationary Machine Safety
9.1.1	Complete all safety training for each machine listed below.
9.1.2	Demonstrate ability to accurately set up each machine for standard operations.
9.1.3	Perform safe common operations on each machine listed below.
9.1.3 A	Mitersaw
9.1.3 B	Planer
9.1.3 C	Jointer
9.1.3 D	Tablesaw
9.1.3 E	Drillpress
9.1.3 F	Bandsaw
9.1.3 G	Scrollsaw
9.1.3 H	Router Table
9.1.3 I	Belt / Disc Sander
9.1.3 J	Spindle Sander
9.1.3 K	Wide Belt Sander
9.1.3 L	Wood Lathe
Aligned Washington State Standards	
Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely.

	3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will pass written safety tests, performance based safety tests for each piece of portable power tools. In addition students will demonstrate safe and proper operation of portable power tools for an assigned task.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.

Competencies	Total Learning Hours for Unit: 10
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Competency Unit 10.0:	Portable Power Tool Safety
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10.1	Complete all safety training for each machine listed below.
10.2	Demonstrate ability to accurately set up each machine for standard operations.
10.3	Perform safe common operations on each machine listed below.
10.3 A	Circular Saw
10.3 B	Saber Saw (Jig Saw)
10.3 C	Corded Drill
10.3 D	Cordless Drill
10.3 E	Router
10.3 F	Belt Sander
10.3 G	Finishing Sander
10.3 H	Biscuit Joiner
10.3 I	Pneumatic Nailers

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.

Language	RST.7 Integrate and evaluate multiple sources if information presented in diverse formats, and media (e.g. quantitative data, video, multimedia in order to address a question or solve a problem.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will demonstrate knowledge and understanding of safe operation of CNC and Laser equipment, through manufacturing of project parts.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.

Competencies	Total Learning Hours for Unit: 8
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Competency Unit 11.0:	Computer Technology
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| 11.1 | Apply knowledge and understanding of safety standards while operating a CNC router or mill. |
| 11.2 | Demonstrate understanding of machine initialization, programming, tool selection, and hold down techniques. |
| 11.3 | Demonstrate understanding and application of CAD and CAM software programs. |
| 11.4 | Design and produce a project part using the CNC router. |
| 11.5 | Demonstrate knowledge and understanding of safety standards while operating the Laser Engraver. |
| 11.6 | Demonstrate a knowledge of laser design software (Microsoft Publisher, CoralDraw, etc.) |
| 11.7 | Demonstrate understanding of machine initialization, programming, and operation. |
| 11.8 | Demonstrate ability to design a laser project incorporating text and graphics. |
| 11.9 | Understand and give examples of the application of computer technology in the woodworking industry. |

Aligned Washington State Standards

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| Arts | 1.1 Understand arts concepts and vocabulary
4.5.1 Understands how arts knowledge and skills are used in the world of work, including careers in the arts. |
| Educational Technology | 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
2.2.1 Develop skills to use technology effectively.
2.2.2 Use a variety of hardware to support learning. |
| Health and Fitness | 2.4: Acquires skills to live safely and reduce health risks. |
| Language | L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text. |
| Math | 6&7.RP Understand ratio concepts and use ratio reasoning to solve problems
6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
A-CED Create equations that describe numbers or relationships
A-REI Understand solving equations as a process of reasoning and explain the reasoning
Solve equations and inequalities in one variable |

	Reason quantitatively and use units to solve problems. N -Q 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Demonstrate proper selection and application of clamps, fixtures, and other hold down devices used in the woodworking industry.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies	Total Learning Hours for Unit: 2
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Competency Unit 12.0: Jigs, Fixtures, and Clamps

12.1	Identify basic woodworking clamps; bar clamps, parallel clamps, quick clamps, strap clamps, etc.
12.2	Demonstrate proficiency in application of clamping devices.
12.3	Identify the application of basic woodworking jigs or fixtures; v-blocks, drilling jigs, turntables, etc.
12.4	Demonstrate proficiency in the application of woodworking fixtures.

Aligned Washington State Standards

Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Educational Technology	2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Demonstrate proper selection and application of common woodworking glues and adhesives.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 2

Competency Unit 13.0: Gluing and Laminating

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| 13.1 | Identify common woodworking glues and explain the advantages and disadvantages of each. |
| 13.2 | Demonstrate preparation steps for gluing or laminating. |
| 13.3 | Explain possible causes of a glue joint failure. |
| 13.4 | Compare and contrast between an adhesive and common woodworking glues. |

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of basic woodworking joints; butt, edge, face, miter, dado, groove, rabbet.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 8

Competency Unit 14.0:

Joinery

14.1	Correctly identify a; butt, edge, face, miter, dado, groove, rabbet joints.
14.2	Compare and contrast joints commonly used in the woodworking industries, (i.e., strength, appearance and ease of construction).
14.3	Select the correct type of wood joint used for a specific application and material.
14.4	Demonstrate the application of the 7 basic joints through project construction.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	2.2.1 Develop skills to use technology effectively
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting
Writing	3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of mechanical fasteners used in woodworking; nails, staples, screws, and specialty hardware.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 2

Competency Unit 15.0: Mechanical Fastners

- | | |
|------|---|
| 15.1 | Define the purposes for metallic fasteners in woodworking. |
| 15.2 | Select the proper metallic fasteners for specific applications. |
| 15.3 | Demonstrate the proper use of metallic fasteners for specific applications. |

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	2.2.1 Develop skills to use technology effectively
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of abrasives used in woodworking.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 2

Competency Unit 16.0:

Abrasives

- | | |
|------|---|
| 16.1 | The student will use various abrasives to prepare a project for a finish. |
| 16.2 | Identify common abrasives used in the woodworking industry. |
| 16.3 | Compare and contrast the differences in grit size and paper grades used in manufacturing sandpaper. |
| 16.4 | Select the proper grit sizes and sequences for shaping and smoothing operations. |
| 16.5 | Comply with the health and safety factors used in working with abrasives. |

Aligned Washington State Standards

Health and Fitness	2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of fillers, stains, sealers, and finishes used in the woodworking industry.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 5

Competency Unit 17.0: Finishing Techniques

17.1	Comply with the health and safety regulations required for working with woodworking stains and finishes.
17.2	Select and apply the proper type of filler material for a specific application.
17.3	Select the proper type of stain for a specific application.
17.4	Demonstrate proper application methods for different types of stains.
17.5	Select the proper type of sealer and demonstrate proper application for a specified need.
17.6	Select material and demonstrate proper application methods for various top coat materials; wipe on, brush, or spray products.
17.7	Explain the advantages and disadvantages associated with common finishing products; polyurethane, lacquer, varnishes, and oils.
17.8	Demonstrate cleaning procedures for various types of sealer and finish coats.
17.9	Review MSDS information provided for finishing materials applied.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	2.2.1 Develop skills to use technology effectively
Health and Fitness	2.1.1 Practice personal safety 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics

Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will participate in various classroom leadership roles and activities. Students will be encouraged to join and participate in a CTSO: SkillsUSA or the Technology Student Association.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard E: The student will identify, understand, and perform the proper use of group dynamics, diversity training, problem solving techniques, and employee / employer relationships.

Competencies	Total Learning Hours for Unit: 5
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Competency Unit 18.0:	Leadership
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18.1	The student will demonstrate the ability to identify, organize, plan, and allocate resources.
18.2	Time—Select goal-relevant activities, rank them, allocate time, and prepare and follow schedules
18.3	Money—Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives
18.4	Materials and Facilities—Acquires, store, allocate, and use materials or space efficiently
18.5	Participates as a Member of a Team—Contribute to group effort
18.6	Teach Others New Skills—Help others to apply concepts, theories, recognizing training needs and conveying job information.
18.7	Work with Diversity—Work well with people from diverse backgrounds
18.8	Apply leadership skills learned through SkillsUSA / TSA in the classroom setting.

Aligned Washington State Standards

Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 2.2.2 Use a variety of hardware to support learning
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will construct projects applying the standards taught through the competencies taught: safety, applied math, plan reading, machine and tool use, material selection, joinery, assembly systems, and finishing techniques.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C, D: (1) Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.
(2) Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 60

Competency Unit 19.0:

Application of Acquired Skills

19.1	Complete required safety assessments.
19.2	Accurately complete a bill of materials. (cutting list, board footage calculations)
19.3	Select appropriate materials.
19.4	Demonstrate ability to accurately set-up and safely operate machinery required for the project.
19.5	Explain the proper sequence of machining steps to accurately square lumber. Demonstrate this process.
19.6	Demonstrate knowledge of suitable joinery. Layout and machine joints as needed.
19.7	Demonstrate proper gluing techniques.
19.8	Demonstrate selection and proper use of mechanical fasteners.
19.9	Demonstrate knowledge of suitable construction techniques or assembly processes.
19.10	Demonstrate proper pre-finishing techniques.
19.11	Demonstrate knowledge and application of suitable finishing processes.
19.12	Complete a project evaluation sheet.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Health and Fitness	2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.

Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	<p>6&7.RP Understand ratio concepts and use ratio reasoning to solve problems</p> <p>6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p> <p>A-CED Create equations that describe numbers or relationships</p> <p>A-REI Understand solving equations as a process of reasoning and explain the reasoning</p> <p>Solve equations and inequalities in one variable</p> <p>1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>2. Define appropriate quantities for the purpose of descriptive modeling.</p> <p>3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>
Reading	<p>RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics</p>
Science	<p>9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p>
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	<p>1.1.1 Applies a variety of listening strategies to accommodate the listening situation.</p> <p>1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information.</p> <p>2.2.2 Applies skills and strategies to contribute responsibly in a group setting.</p>
Writing	<p>3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.</p> <p>3.3.6 Uses complete sentences in writing.</p>



Woodworking and Design

To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LEARNING AND INNOVATION SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

Woodworking and Design

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

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6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	
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<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LIFE AND CAREER SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards

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	Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to:	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests



COURSE OUTLINE

Course Name **Woodworking and Design 3 & 4** Grade Level(s) **10-12**

A program that is a blend of the traditional woodshop and technology. The program is for students who have successfully completed Woodworking 1 and 2. Concepts and Standards taught are a continuation of basic skills developed in the pre-requisite courses. Students will build a variety projects, some required and others selected or designed by the student. Through the construction of projects the student will learn to operate a wide variety of woodworking machines. Construction techniques and processes found in the building and cabinet trades will be explored. Students will be introduced to the integration of technology and woodworking with the use CNC equipment and software. Upon completion of this course students will have a good foundation of safe equipment operation and construction practices.

1. **Woodworking and Design 3 & 4**
 - A. Course Goals and Expectations
 - B. Woodworkers Career Alliance (WCA) Certification
 - C. Advanced Shop Safety Rules
 - D. Woodworking Careers
 - E. Art Concepts in Woodworking
2. **Facility Management**
 - A. Employer Employee Expectations and Responsibilities
 - B. Facility Leadership Roles
 - C. Time Management
 - D. Communications and Following Directions
3. **General Safety**
 - A. Personal Safety and Safety for Others
 - B. Clean and Safe Working Environment
 - C. Identifying Acceptable Safety Practices
 - D. First Aid
 - E. Material Safety Data Sheets (MSDS)
4. **Designing, Planning, and Scheduling**
 - A. In Depth Design Process
 - B. Design and Art Concepts
 - C. Detailed Project Planning
 - D. Working Drawings and Detailed Joinery
 - E. Bill of Materials and Efficient Material Usage
 - F. Project Construction
 - G. Scheduling in Projects and Mass-Production
 - H. Quality Control

5. **Construction, Working Drawings and Building Codes**
 - A. Identify types of Working Drawings
 - B. Interpreting Working Drawings
 - C. Reading and Using an Architect Scale
 - D. Identification of common lines types
6. **Measuring and Layout**
 - A. Proficient use of Fractional Measurements
 - B. Accurate use of Layout Tools
 - C. Capable use of Standard and Metric Scale
 - D. Efficient Material Utilization
 - E. Layout of; angles, arcs and curves
 - F. Accurate Project Layout
7. **Applied (Trades) Mathematics**
 - A. Proficient Calculations and Applications of Formulas
 - B. Using and Converting Fractions
 - C. Using and Converting Decimals
 - D. Estimating Skills
 - E. Calculator Usage
8. **Wood Characteristics and Terminology**
 - A. Characteristics and uses of Softwoods
 - B. Characteristics and uses of Hardwoods
 - C. Integration Art Concepts
 - D. Industry Terminology
 - E. Characteristics of Manufactured Wood Products
 - F. Overview of Industrial Construction Materials/Techniques
9. **Hand Tool Safety**
 - A. Safe Hand Tool Practices
 - B. Hand Tool Identification and Terminology
 - C. Tool Care and Sharpening Techniques
10. **Stationary Machine Safety**
 - A. Safe Practices and Inspection
 - B. Safe and Accurate Machine Operation
 - C. Basic and Advanced Stationary Machinery Set Up
11. **Portable Power Tool Safety**
 - A. Safe Practices
 - B. Identification of Function and Controls
 - C. Proficient Tool Set Up and Safe Operation
12. **Computer Technology**
 - A. CAD, CAM, and CNC Machinery
 - B. Laser Applications in Woodworking

13. **Jigs, Fixtures and Clamps**
 - A. Clamping Techniques
 - B. Fixtures and Jig Selection
 - C. Design and Building Jigs / Fixtures
14. **Gluing and Laminating**
 - A. Safe Practices
 - B. Wood Glue Selection / Application
 - C. Adhesive Selection / Application
15. **Advanced Joinery**
 - A. Size and Squaring Stock
 - B. Advanced Wood Joints (Example; Mortise and Tenon)
 - C. Joint Strength
 - D. Selection and Using Appropriate Joints
 - E. Application of Art Concepts and Design through Joinery
16. **Finish Applications**
 - A. Safety Techniques
 - B. Finish Material selection
 - C. Application Methods
 - D. Clean Up and Care
 - E. MSDS materials
17. **Floor and Exterior Wall Framing & Concrete Work**
 - A. Construction Tools Identification and Terminology
 - B. Floor Joist Systems
 - C. Western Platform Framing Systems
 - D. Roof Framing Systems
 - E. Concrete Form Building
 - F. Estimating Materials
18. **Application of Acquired Skills**
 - A. Project Design and Construction
 - B. Safe Machine and Tool operation
 - C. Industry Certification
19. **Leadership**
 - A. Team unity/ Diversity
 - B. Leadership Team and Individual Competitions
 - C. 21st Century Skills



Woodworking Foundations

Course: Woodworking and Design 3 and 4		Total Framework Hours up to: 180
CIP Code: 480701	<input checked="" type="checkbox"/> Exploratory <input type="checkbox"/> Preparatory	Date Last Modified: 10/24/2015
Career Cluster: Manufacturing		Cluster Pathway: Production

COMPONENTS AND ASSESSMENTS

Performance Assessments: Multiple choice, essay, true false questions that exhibit a student's understanding of the knowledge being assessed.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.

Competencies	Total Learning Hours for Unit: 2
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Competency Unit 1: Introduction to Woodworking and Design 3 and 4

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| 1.1 | Evaluate industries, organizations, and careers based on multiple sources of research and information. |
| 1.2 | Assess interest areas to determine potential career pathways or courses of study. |
| 1.3 | Develop a career plan with alternatives. |
| 1.4 | Complete job applications and related employee documents; including resume's and cover letters. |
| 1.5 | Apply job search skills to seek, evaluate, apply for, and accept employment. |
| 1.6 | Explore Industry Certification opportunities. (WCA, NCCER, Precision Exams) |

Aligned Washington State Standards

Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.1.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text.

	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Multiple choice, essay, true false questions that exhibit a student's understanding of the knowledge being assessed. Demonstration and application of employability skills.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.	
Competencies	Total Learning Hours for Unit: 2
Competency Unit 2.0: Facility Management	
2.1	Apply strategies to enhance effectiveness of all types of communications in the workplace.
2.2	Apply basic writing skills and strategies to work related documents.
2.3	Apply basic skills for work related oral communication.
2.4	Demonstrate effective negotiation and conflict resolution.
2.5	Apply active listening skills to obtain and clarify information.
2.6	Apply strategies to communicate with others in a diverse workforce.
Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.3.2 Locate and organize information from a variety of sources and media.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Students complete written and practical safety exam covering personal safety equipment, safe shop practices and safe shop environments.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.	
Competencies	Total Learning Hours for Unit: 5
Competency Unit 3.0	General Safety
3.1	Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.
3.2	Explain procedures for documenting and reporting hazards to appropriate authorities.
3.3	Illustrate a safe environment for students in the woodworking shop.
3.4	Identify, describe and demonstrate the effective use of Material Safety Data Sheets (MSDS).
3.5	Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE).
3.6	Locate emergency equipment in the woodworking lab; eyewash station, first aid kit, fire extinguisher, emergency shut off switches, exits.
3.7	Illustrate safe body mechanics and lifting techniques.
3.8	Illustrate proper handling and storage of materials, including hazardous materials, disposal, and recycling.
3.9	Describe safety practices and procedures to be followed when working around electricity.
3.10	Demonstrate proper workspace cleaning procedures.
Aligned Washington State Standards	
Educational Technology	1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 8
Competency Unit 4.0	Designing, Planning, and Scheduling.
4.1	Apply design elements: shapes, textures, lines and colors to create functional and attractive millwork and cabinets.
4.2	Apply principles of design, harmony, repetitions, balance and proportion.
4.3	Sketch a project using manual drawing techniques.
4.4	Use drafting tools to create a pictorial and working drawing.
4.5	Create cutting diagrams.
4.6	Read and interpret sketches, orthographic projections, and isometric diagrams to develop a manufacturing plan.
4.7	Evaluate an existing bill of materials for accuracy.
4.8	Determine the cost of materials a millwork/cabinetmaking project.
4.9	Optimize available materials from a cutting diagram.
4.10	Compare and contrast the cost of a specific project using different materials.
4.11	List the sequence of cutting out parts.
4.12	List the sequence of assembly.
4.13	List the sequence of finishing steps.
Aligned Washington State Standards	
Arts	1.1 Understand arts concepts and vocabulary.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships

	A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
<i>Standards and Competencies</i>	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 5
Competency Unit 5.0: Construction, Working Drawings, and Building Codes	
5.1	Identify types of Working Drawings.
5.2	Interpreting Working Drawings.
5.3	Reading and using an Architects scale.
5.4	Identification of common line types.
<i>Aligned Washington State Standards</i>	
Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. <u>Quantities</u> Reason quantitatively and use units to solve problems. N -Q 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 5
Competency Unit 6.0:	Measuring and Layout
6.1	Accurately read fractional measurements to 1/16 th of an inch.
6.2	Accurately and efficiently manipulate common fractions.
6.3	Accurately measure an object using the metric scale.
6.4	Efficient Material Utilization.
6.5	Layout of angles, arcs, and curves.
6.6	Accurate Project Layout.
Aligned Washington State Standards	
Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. <u>Quantities</u> Reason quantitatively and use units to solve problems. N -Q 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics

Science	9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

COMPONENTS AND ASSESSMENTS

Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.

Competencies

Total Learning Hours for Unit: 10

Competency Unit 7.0

Applied (Trades) Mathematics

7.1	Proficient Calculations and Applications of Formulas.
7.2	Using and Converting Fractions.
7.3	Using and Converting Decimals.
7.4	Add, subtract, multiply, and divide fractions.
7.5	Add, subtract, multiply, and divide decimals.
7.6	Develop Material Estimating Skills
7.7	Calculator Usage.
7.8	Application of Geometry and Algebra principals used in the woodworking industry.

Aligned Washington State Standards

Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

COMPONENTS AND ASSESSMENTS

Performance Assessments: The student will identify hardwoods and softwoods. The student will identify various sheet goods and describe their characteristics and uses. The student will be able to identify and describe the characteristic and uses of various solid surface and laminate materials. The student will identify various veneers and describe their characteristics and uses.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry.

Competencies		Total Learning Hours for Unit: 5
Competency Unit 8.0		Wood Characteristics and Terminology
8.1	Characteristics and uses of softwoods.	
8.2	Characteristics and uses of hardwoods.	
8.3	Integration of Visual Art Concepts.	
8.4	Industry Terminology.	
8.5	Characteristics of Manufactured Wood Products.	
8.6	Overview of Industrial Construction Materials and Techniques.	
Aligned Washington State Standards		
Arts	1.1 Understand arts concepts and vocabulary	
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.	
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning	
Reading	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics	
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.	
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.	
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.	
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.	

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Students will pass written identification assessments, performance based safety hand tool. In addition, students will demonstrate safe and proper use of hand tools for an assigned task.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.	
Competencies	Total Learning Hours for Unit: 5
Competency Unit 9.0	Hand Tool Safety
9.1	Safe Hand Tool Practices.
9.2	Hand Tool Identification and Terminology.
9.3	Tool care and Sharpening Techniques.
Aligned Washington State Standards	
Educational Technology	2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning 2.3.2 Select and use online applications.
Health and Fitness	2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices. 2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Students will pass written safety tests, performance based safety tests for each piece of power equipment. In addition students will demonstrate safe and proper operation of stationary power machinery for an assigned task.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.	
Competencies	Total Learning Hours for Unit: 15
Competency Unit 10.0:	Stationary Machine Safety
10.1	Safe Practices and Inspection.
10.2	Demonstrate ability to accurately set up each machine for standard and advanced machining operations.
10.3	Safe and Accurate Machine Operations.
10.4	Complete all safety training for each machine.
Aligned Washington State Standards	
Educational Technology	2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will pass written safety tests, performance based safety tests for each piece of portable power tools. In addition students will demonstrate safe and proper operation of portable power tools for an assigned task.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.

Competencies	Total Learning Hours for Unit: 5
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Competency Unit 11.0:	Portable Power Tool Safety
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11.1	Complete all safety training for each machine listed below.
11.2	Demonstrate ability to accurately set up each machine for standard operations.
11.3	Perform safe common operations on each machine listed below.

Aligned Washington State Standards

Educational Technology	1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results. 2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks. 2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.2 Analyzes how environmental factors impact health. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	RST.7 Integrate and evaluate multiple sources if information presented in diverse formats, and media (e.g. quantitative data, video, multimedia in order to address a question or solve a problem.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will demonstrate knowledge and understanding of safe operation of CNC and Laser equipment, through manufacturing of project parts.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C: Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery.

Competencies

Total Learning Hours for Unit: 12

Competency Unit 12.0: Computer Technology

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| 12.1 | Apply knowledge and understanding of safety standards while operating a CNC router or mill. |
| 12.2 | Demonstrate understanding of machine initialization, programming, tool selection, and hold down techniques. |
| 12.3 | Demonstrate understanding and application of CAD and CAM software programs. |
| 12.4 | Design and produce a project part using the CNC router. |
| 12.5 | Demonstrate knowledge and understanding of safety standards while operating the Laser Engraver. |
| 12.6 | Demonstrate a knowledge of laser design software (Microsoft Publisher, CoralDraw, etc.) |
| 12.7 | Demonstrate understanding of machine initialization, programming, and operation. |
| 12.8 | Demonstrate ability to design a laser project incorporating text and graphics. |
| 12.9 | Understand and give examples of the application of computer technology in the woodworking industry. |

Aligned Washington State Standards

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| Arts | 1.1 Understand arts concepts and vocabulary
4.5.1 Understands how arts knowledge and skills are used in the world of work, including careers in the arts. |
| Educational Technology | 1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
2.2.1 Develop skills to use technology effectively.
2.2.2 Use a variety of hardware to support learning. |
| Health and Fitness | 2.4: Acquires skills to live safely and reduce health risks. |
| Language | L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text. |
| Math | 6&7.RP Understand ratio concepts and use ratio reasoning to solve problems
6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
A-CED Create equations that describe numbers or relationships
A-REI Understand solving equations as a process of reasoning and explain the reasoning
Solve equations and inequalities in one variable |

	<p>Reason quantitatively and use units to solve problems. N -Q</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	<p>RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics</p>
Science	<p>9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge.</p> <p>9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.</p>
Speaking and Listening	<p>1.1.1 Applies a variety of listening strategies to accommodate the listening situation.</p> <p>1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information.</p> <p>2.2.2 Applies skills and strategies to contribute responsibly in a group setting.</p>
Writing	<p>3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.</p> <p>3.3.6 Uses complete sentences in writing.</p>

COMPONENTS AND ASSESSMENTS

Performance Assessments: Demonstrate proper selection and application of clamps, fixtures, and other hold down devices used in the woodworking industry.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies	Total Learning Hours for Unit: 2
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Competency Unit 13.0:	Jigs, Fixtures, and Clamps
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13.1	Clamping Techniques.
13.2	Fixture and Jig Selection.
13.3	Design and manufacturing of jigs and fixtures.
13.4	Demonstrate proficiency in the application of woodworking fixtures.

Aligned Washington State Standards

Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Educational Technology	2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Demonstrate proper selection and application of common woodworking glues and adhesives.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 2

Competency Unit 14.0: Gluing and Laminating

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|------|--|
| 14.1 | Safe gluing practices. |
| 14.2 | Wood Glue Selection and Application. |
| 14.3 | Adhesive Selection and Application. |
| 14.4 | Compare and contrast between an adhesive and common woodworking glues. |

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of basic woodworking joints; butt, edge, face, miter, dado, groove, rabbet.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies	Total Learning Hours for Unit: 10
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Competency Unit 15.0:	Advanced Joinery
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15.1	Squaring and Sizing of stock.
15.2	Advanced Wood Joint Identification and Terminology (Example: Mortise and Tenon)
15.3	Joint Strength.
15.4	Selection and usage of appropriate wood joints.
15.5	Application of Visual Art Concepts and Design utilizing joinery.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary 3.3 Develops personal aesthetic criteria to communicate artistic choices.
Educational Technology	2.2.1 Develop skills to use technology effectively
Health and Fitness	2.4: Acquires skills to live safely and reduce health risks.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting
Writing	3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Identify and demonstrate proper application of fillers, stains, sealers, and finishes used in the woodworking industry.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard D: Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies	Total Learning Hours for Unit: 4
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Competency Unit 16.0:	Finishing Applications
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16.1	Comply with the health and safety regulations required for working with woodworking stains and finishes.
16.2	Finish Material Selection.
16.3	Application Methods.
16.4	Clean up and Product Care.
16.5	Review MSDS information provided for finishing materials applied.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary 3.3 Develops personal aesthetic criteria to communicate artistic choices.
Educational Technology	2.2.1 Develop skills to use technology effectively
Health and Fitness	2.1.1 Practice personal safety 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12 INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12 APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.

Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
<i>Standards and Competencies</i>	
Content Standard B: Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry.	
Competencies	Total Learning Hours for Unit: 12
Competency Unit 17.0: Floor, Exterior Wall Framing and Concrete Work	
17.1	Construction Tools Identification and Terminology.
17.2	Floor Joist Systems.
17.3	Western Platform Framing Systems.
17.4	Roof Framing Systems.
17.5	Concrete Form Building.
17.6	Estimating Materials.
<i>Aligned Washington State Standards</i>	
Educational Technology	1.3.4 Use multiple processes and diverse perspectives to explore alternative solutions.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. <u>Quantities</u> Reason quantitatively and use units to solve problems. N -Q 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable
Reading	RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics

Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
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COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will construct projects applying the standards taught through the competencies taught: safety, applied math, plan reading, machine and tool use, material selection, joinery, assembly systems, and finishing techniques.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard C, D: (1) Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery. (2) Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies

Total Learning Hours for Unit: 65

Competency Unit 18.0:

Application of Acquired Skills

18.1	Complete required safety assessments.
18.2	Accurately complete a bill of materials. (cutting list, board footage calculations)
18.3	Select appropriate materials.
18.4	Demonstrate ability to accurately set-up and safely operate machinery required for the project.
18.5	Explain the proper sequence of machining steps to accurately square lumber. Demonstrate this process.
18.6	Demonstrate knowledge of suitable joinery. Layout and machine joints as needed.
18.7	Demonstrate proper gluing techniques.
18.8	Demonstrate selection and proper use of mechanical fasteners.
18.9	Demonstrate knowledge of suitable construction techniques or assembly processes.
18.10	Demonstrate proper pre-finishing techniques.
18.11	Demonstrate knowledge and application of suitable finishing processes.
18.12	Complete a project evaluation sheet.

Aligned Washington State Standards

Arts	1.1 Understand arts concepts and vocabulary 3.3 Develops personal aesthetic criteria to communicate artistic choices.
Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 2.1.1 Practice personal safety 2.2.1 Develop skills to use technology effectively 2.2.2 Use a variety of hardware to support learning
Health and Fitness	2.4.2 Evaluates emergency situations, ways to prevent injuries, and demonstrates skills to respond appropriately and safely. 3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.

Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Reading	RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Science	9-12.INQC Conclusions must be logical, based on evidence, and consistent with prior established knowledge. 9-12.APPD The ability to solve problems is greatly enhanced by use of mathematics and information technologies.
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

COMPONENTS AND ASSESSMENTS

Performance Assessments: Students will participate in various classroom leadership roles and activities. Students will be encouraged to join and participate in a CTSO: SkillsUSA or the Technology Student Association.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard E: The student will identify, understand, and perform the proper use of group dynamics, diversity training, problem solving techniques, and employee / employer relationships.

Competencies	Total Learning Hours for Unit: 6
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Competency Unit 19.0:	Leadership
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19.1	Participates as a Member of a Team—Contribute to group effort
19.2	Teach Others New Skills—Help others to apply concepts, theories, recognizing training needs and conveying job information.
19.3	Work with Diversity—Work well with people from diverse backgrounds
19.4	Apply leadership skills learned through SkillsUSA / TSA in the classroom setting.
19.5	Participate in Leadership Team and Individual Competitions.

Aligned Washington State Standards

Educational Technology	1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools. 1.2.1 Communicate and collaborate to learn with others. 2.2.2 Use a variety of hardware to support learning
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Math	6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.



Woodworking and Design

To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LEARNING AND INNOVATION SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

Woodworking and Design

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

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6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	
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<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LIFE AND CAREER SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards

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	Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to:	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests



COURSE OUTLINE

Course Name **Woodworking and Design 5 & 6** Grade Level(s) **11-12**

This course provides students with an in-depth woodworking experience. Students will refine their skills learned in previous woodworking classes. They will also learn advanced skill sets that will allow each student to excel in safe machine operation and CNC applications. Woodworking and Design 5-6 requires that each student has good self-motivation, organizational skills, and is able to work well in a team. Students will create projects that allow for individual creativity and extensive problem solving, in order to show mastery of the state standards. Students may have an opportunity to earn Visual Art credit with prior instructor approval. Visual Art students will design and present a portfolio documenting their understanding of the Elements of Art and the Principles of Design. In addition, students will create an individual woodworking project that expresses this understanding.

1. Woodworking and Design 5 & 6 Core Concepts

- A. Course Goals and Expectations
- B. In depth Personal and Industrial Safety
- C. MSDS / Hazardous Materials
- D. Design Process
- E. Visual Arts Fundamentals
- F. Billing and Efficient usage of Materials
- G. Project Scheduling and Mass Production
- H. Quality Control
- I. Applied Trade Mathematics
- J. Identification and Application of Natural Wood Products
- K. Identification and Application of Manufactured Wood Products.
- L. Proper Woodworking Tool and Machine Usage.
- M. CAD, CAM, CNC Woodworking Applications.
- N. Woodworking Laser Applications.
- O. Advanced Woodworking Joinery Characteristics – strength, artistic expression, etc.
- P. Visual Art incorporated in Woodworking Overview.
- Q. Integration of Visual Art concepts through individual student projects.
- R. Individual and Facility Leadership Roles.

2. Individual Leadership and Development

- A. Project Selection
- B. Problem Solving Procedures
- C. Project Materials Characteristics and Applications.
- D. Business / Industry Documentation, Deadlines, Work Flow
- E. Work Ethic

- F. Presentation Skills
- G. Employability Skills: Abilities, Expectations, Attitudes, Portfolio
- H. Industry Certification; WCA or NCCER

3. Group and Community Leadership

- A. Active Membership in a CTSO (SkillsUSA, TSA)
- B. Involvement in a group or community based project.
- C. Understanding of Group Dynamics.
- D. Implementation of a mass production project / activity.
- E. Recognizing Diversity in school and the workplace.
- F. Knowledge or Participation of Work Based Learning Opportunities.



Woodworking Foundations

Course: Woodworking and Design 5 and 6		Total Framework Hours up to: 180
CIP Code: 480701	<input checked="" type="checkbox"/> Exploratory <input type="checkbox"/> Preparatory	Date Last Modified: 12/3/2015
Career Cluster: Manufacturing		Cluster Pathway: Production

COMPONENTS AND ASSESSMENTS

Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies

Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry. **Content Standard B:** Perform trade specific mathematical calculations for the purpose of designing, material selection, material costs, scheduling, and construction from plans. As well as identification, understanding, and use of measurement tools associated within this industry. **Content Standard C:** Identify, understand and perform acceptable safety practices and policies pertaining to work areas and the proper use of hand tools, portable power tools, stationary equipment, and CNC machinery. **Content Standard D:** Identify, perform, and understand tasks demonstrating proper applications that; hold, join, and fasten materials. As well as preparation for and application of finish products.

Competencies	Total Learning Hours for Unit: 120
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Core Concepts: Woodworking and Design 5-6

1.1	Course goals and expectations.
1.2	In depth personal and industrial safety.
1.3	MSDS / Hazardous materials.
1.4	Design process.
1.5	Visual Art Fundamentals
1.6	Billing and Efficient Usage of Materials
1.7	Project Scheduling and Mass Production
1.8	Quality Control
1.9	Identification and application of natural wood products.

1.10	Identification and application of manufactured wood products.
1.11	Proper woodworking tool and machinery usage.
1.12	CAD, CAM, CNC Woodworking Applications.
1.13	Woodworking Laser Applications.
1.14	Advanced woodworking joinery characteristics -- strength, artistic expression, etc.
1.15	Advanced Finishing Applications.
1.16	Visual Art incorporated in Woodworking overview.
1.17	Integration of Visual Art concepts through individual student projects.
Aligned Washington State Standards	
Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.1.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.
Math	6&7.RP Understand ratio concepts and use ratio reasoning to solve problems 6&7.NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. A-CED Create equations that describe numbers or relationships A-REI Understand solving equations as a process of reasoning and explain the reasoning Solve equations and inequalities in one variable 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Arts	1.1 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.

Arts	<p>1.2.1 Remembers and applies the skills and techniques of visual arts to create original works of art in two and/or three dimensions.</p> <p>2.1 Applies a creative process to visual arts. (Identifies, explores, gathers, interprets, uses, implements, reflects, refines, and presents)</p> <p>3.1.1 Remembers that visual arts are used to express feelings and present ideas and applies this understanding when creating and considering artworks.</p> <p>3.3 Develops personal aesthetic criteria to communicate artistic choices in visual arts.</p> <p>4.1.1 Remembers skills, concepts, and vocabulary that the discipline of visual arts has in common with other arts disciplines.</p> <p>4.5 Understands how arts knowledge and skills are used in the world of work, including careers in the arts.</p>
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COMPONENTS AND ASSESSMENTS	
Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.	
Leadership Alignment: State of Washington 21 st Century Leadership & Employability Skills Standards, as developed from <i>Partnership for 21st Century Skills</i> organization, within the Career and Technical courses. (See addendum at the end of this document.)	
Standards and Competencies	
Content Standard A: The student will demonstrate an understanding of core concepts of: course expectations, career fields, time management, planning, material uses and scheduling as they pertain to the woodworking industry. Standard E: Identify, understanding and perform the proper use of group dynamics, diversity training, problem solving, and employer / employee relations.	
Competencies	Total Learning Hours for Unit: 40
Core Concepts:	Individual Leadership and Development
2.1	Project Selection.
2.2	Problem Solving Procedures.
2.3	Project materials characteristics and applications.
2.4	Business Industry processes; documentation, deadlines, workflow
2.5	Work Ethic
2.6	Presentation Skills
2.7	Employability Skills; Abilities, Expectations, Attitudes, Portfolio.
2.8	Industry Certification; Woodworker Career Alliance (WCA), National Construction Career Educational Resource. (NCCER)
Health and Fitness	3.1.3 Evaluates environmental risks associated with certain occupational, residential, and recreational choices.
Educational Technology	1.3.2 Locate and organize information from a variety of sources and media.
Language	L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.
Reading	RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text. RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics
Social Studies	2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
Speaking and Listening	1.1.1 Applies a variety of listening strategies to accommodate the listening situation. 1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information. 2.2.2 Applies skills and strategies to contribute responsibly in a group setting.
Writing	3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples. 3.3.6 Uses complete sentences in writing.

Math	<p>6&7.RP Understand ratio concepts and use ratio reasoning to solve problems</p> <p>6&7 NS Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p> <ol style="list-style-type: none"> 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 2. Define appropriate quantities for the purpose of descriptive modeling. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Arts	<p>1.2 The student understands and applies arts knowledge and skills in dance, music, theatre, and visual arts.</p> <p>1.2.1 Remembers and applies the skills and techniques of visual arts to create original works of art in two and/or three dimensions.</p> <p>2.1 Applies a creative process to visual arts. (Identifies, explores, gathers, interprets, uses, implements, reflects, refines, and presents)</p> <p>3.1.1 Remembers that visual arts are used to express feelings and present ideas and applies this understanding when creating and considering artworks.</p> <p>3.3 Develops personal aesthetic criteria to communicate artistic choices in visual arts.</p> <p>4.1.1 Remembers skills, concepts, and vocabulary that the discipline of visual arts has in common with other arts disciplines.</p> <p>4.5 Understands how arts knowledge and skills are used in the world of work, including careers in the arts.</p>

COMPONENTS AND ASSESSMENTS

Performance Assessments: 1. Structured observation of the individuals or groups focusing on the prominent skills or concepts being observed. 2. Multiple choice, essay, true / false questions that exhibit a student's understanding of the knowledge being assessed. 3. Graphic representations that reveal a student's understanding of connections among ideas.

Leadership Alignment: State of Washington 21st Century Leadership & Employability Skills Standards, as developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. (See addendum at the end of this document.)

Standards and Competencies	
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Content Standard E: The student will identify, understand, and perform the proper use of group dynamics, diversity training, problem solving techniques, and employee / employer relationships.

Competencies

Total Learning Hours for Unit: 20
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Core Concepts	
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Group and Community Leadership

3.1	Active membership in a CTSO (SkillsUSA, TSA).
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3.2	Involvement in a group or community based project.
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3.3	Understanding of group dynamics.
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3.4	Implementation of a mass production project / activity.
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3.5	Recognizing Diversity in school and the workplace.
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3.6	Knowledge or participation of Work Based Learning opportunities.
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Educational Technology

1.3.3 Analyze, synthesize and ethically use information to develop a solution, make informed decisions and report results.
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Health and Fitness

2.4: Acquires skills to live safely and reduce health risks.

Language

L 1.8 Determine the meaning of words and phrases in oral presentations and literary and informational text.

Reading

<p>RST 9-10 -3 Follow precisely a complex multistep procedure when carrying out experiments, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST 9-10 -4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 text and topics</p>
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Social Studies

2.1 Understands that people have to make choices between wants and needs and evaluate the outcomes of those choices.
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Speaking and Listening

1.1.1 Applies a variety of listening strategies to accommodate the listening situation.
1.1.2 Applies a variety of listening and observation skills/strategies to recall and interpret information.
2.2.2 Applies skills and strategies to contribute responsibly in a group setting.

Writing

3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.
3.3.6 Uses complete sentences in writing.



Woodworking and Design

To be college and career ready, students need to be able to integrate and apply 21st century skills, as well as core academic and technical knowledge. Career and Technical Education programs are aligned with rigorous industry and academic standards. The State of Washington has incorporated the 21st Century Leadership & Employability Skills Standards, developed from *Partnership for 21st Century Skills* organization, within the Career and Technical courses. The 21st Century Skills Standards adopted by the State, focus on creativity, critical thinking, communication and collaboration. These standards are essential to preparing students for complex lives and work environments in our global economy.

In the Trades Pathway, this is accomplished through assessments recommended by the Office of Superintendent of Public Instruction (OSPI). OSPI has cross-walked resources provided by the student organization, Skills USA, and other recommended assessments. In addition to these resources, students will be assessed using classroom assessments.

The 21st Century Skills Standards students will be assessed on, are assembled into eleven categories. The categories include:

Creativity and Innovation	Flexibility and Adaptability
Critical Thinking and Problem Solving	Initiative and Self-direction
Communication and Collaboration	Social and Cross-Cultural Skills
Information Literacy	Productivity and Accountability
Media Literacy	Leadership and Responsibility
Information, Communication and Technology Literacy (ICT)	

The grading scale used for assessing students is as follows:

- 4 = Exceeds Standard
- 3 = Meets Standard
- 2 = Worked toward meeting standard, but did not complete
- 1 = Made an attempt to meet standard, but did minimal work
- 0 = Did not attempt to meet Standard

Each student is responsible for tracking and maintaining their score for the 21st Century Skills Standards for the course. Below is a listing of the Standards for the course and what assessments are available for demonstration of meeting or exceeding the standard throughout the semester. There are multiple opportunities for students to demonstrate their skills. It is up to the student to choose the activities that best fit **their** schedule/needs/interest and to collect the signatures DURING or IMMEDIATELY following the assessment.

<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LEARNING AND INNOVATION SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Think Creatively 1.A.1 Use a wide range of idea creation techniques (such as brainstorming) 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts) 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Work Creatively with Others 1.B.1 Develop, implement and communicate new ideas to others effectively 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work 1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Implement Innovations 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Community Service Projects
Reason Effectively 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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Use Systems Thinking 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state office Total Quality Curriculum Chapter, Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Make Judgments and Decisions 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs 2.C.2 Analyze and evaluate major alternative points of view 2.C.3 Synthesize and make connections between information and arguments 2.C.4 Interpret information and draw conclusions based on the best analysis 2.C.5 Reflect critically on learning experiences and processes	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Solve Problems 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests
Communicate Clearly 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) 3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact 3.A.5 Communicate effectively in diverse environments (including multi-lingual)	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

Woodworking and Design

** INFORMATION, MEDIA AND TECHNOLOGY SKILLS **

21 st Century Skills Standards	OSPI Suggested Resources/Activities
Access and Evaluate Information 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Use and Manage Information 4.B.1 Use information accurately and creatively for the issue or problem at hand 4.B.2 Manage the flow of information from a wide variety of sources 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information	Local Program Resource Guide (Current Edition) Connecting Career Development Event (Local, State, and National Level) Attendance at leadership specific conferences: Made for Excellence Advanced Leadership Development
Analyze Media 5.A.1 Understand both how and why media messages are constructed, and for what purposes 5.A.2 Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors 5.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media	
Create Media Products 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions 5.B.2 Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments	
Apply Technology Effectively 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 6.A.2 Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy	Professional Development Program (PDP) SkillsUSA Championships Technical Standards—Leadership Contests Leadership Handbook Regional, State, & National Conferences & Contests

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6.A.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies	
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<p style="text-align: center;">Woodworking and Design</p> <p style="text-align: center;">** LIFE AND CAREER SKILLS **</p>	
21st Century Skills Standards	OSPI Suggested Resources/Activities
Adapt to Change 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts 7.A.2 Work effectively in a climate of ambiguity and changing priorities	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a chapter officer or state officer
Be Flexible 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Manage Goals and Time 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals 8.A.3 Utilize time and manage workload efficiently	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Works Independently 8.B.1 Monitor, define, prioritize and complete tasks without direct oversight	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards

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	Leadership Handbook Regional, State, & National Conferences & Contests
Be Self-Directed Learners 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress	
Interact Effectively with Others 9.A.1 Know when it is appropriate to listen and when to speak 9.A.2 Conduct themselves in a respectable, professional manner	Professional Development Program (PDP) SkillsUSA Championships Technical Standards— Chapter Business Procedure Contest Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences
Work Effectively in Diverse Teams 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds 9.B.2 Respond open-mindedly to different ideas and values 9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work	Professional Development Program (PDP) Leadership Handbook Chapter, Regional, State, & National Meetings & Conferences Serve as a committee member, chapter officer, or state officer Community Service Project
Manage Projects 10.A.1 Set and meet goals, even in the face of obstacles and competing pressures 10.A.2 Prioritize, plan and manage work to achieve the intended result	Professional Development Program (PDP) Total Quality Curriculum SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests
Produce Results 10.B.1 Demonstrate additional attributes associated with producing high quality products including the abilities to:	Professional Development Program (PDP) SkillsUSA Championships Technical Standards Leadership Handbook Regional, State, & National Conferences & Contests

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10.B.1.a Work positively and ethically 10.B.1.b Manage time and projects effectively 10.B.1.c Multi-task 10.B.1.d Participate actively, as well as be reliable and punctual 10.B.1.e Present oneself professionally and with proper etiquette 10.B.1.f Collaborate and cooperate effectively with teams 10.B.1.g Respect and appreciate team diversity 10.B.1.h Be accountable for results	Serve as a chapter officer or state officer
Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal 11.A.2 Leverage strengths of others to accomplish a common goal 11.A.3 Inspire others to reach their very best via example and selflessness 11.A.4 Demonstrate integrity and ethical behavior in using influence and power	Professional Development Program (PDP) Leadership Handbook Serve as a chapter officer or state officer Regional, State, & National Meetings & Conferences SkillsUSA Championships Technical Standards
Be Responsible to Others 11.B.1 Act responsibly with the interests of the larger community in mind	Professional Development Program (PDP) Shadowing & Mentoring Regional, State, & National Conferences & Contests

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STEM Construction Foundations

(CIP #460100)



INTRODUCTION

Course Name	STEM Construction Foundations 1&2	Grade Level(s)	7 th and 8 th
	90 -180 hours		460100
Course Length		Course Code (s)	CTE 105
			CTE 106

Course Description

Students will, on an introductory level, learn about engineering, manufacturing, principles of basic woodworking and workplace readiness skills while incorporating STEM concepts and problem-solving strategies. Instruction includes technical design, measurement, workplace safety, hand and power tool use, and construction techniques. Students will also investigate career opportunities and skill requirements within STEM related fields.

Pathway Connections

Primary Connection: Mathematics, STEM Problem-Solving, Written and Verbal Communication

Secondary Connection: Woodworking, Construction, Manufacturing, Cabinetry, Architecture, Engineering and Design

Sample Sequence of Courses

STEM Construction Foundations 1, STEM Construction Foundations 2

Cross Credit and/or College Credit

None at the middle school level.

Basic Textbook

None.

Equipment

Industrial Woodworking Machinery, Portable Power Tools, Hand Tools, Computer Integrated Machines, Personal Computers, Chromebooks.

Software

Shop Bot Programming Software

Supplemental Materials

Power and hand tool safety DVDs.



Skills Gap Data (CTE Courses only)

Employment in the construction sector is projected to grow 2.6 percent annually. This equates to 1.6 million new jobs over the 2012-22 decade, the most among goods-producing sectors and third most among all major industry sectors. Despite expected fast growth, construction sector employment in 2022 is projected to be below the peak level (7.7 million; 2006). Of the 30 occupations

projected to have the largest percentage increase between 2012 and 2022, five are related to construction. (www.bls.gov.)

STEM Construction Foundations

Middle School Course Outline

CIP #460100

1. General workplace safety

- A.) Workplace behavior
- B.) Appropriate safety gear, footwear, and attire
- C.) Safe lifting practices
- D.) Equipment management and cleaning practices

2. Construction Measurement

- A.) Reading a ruler
- B.) Simplifying, adding, subtracting, multiplying and dividing fractions
- C.) Using measurement to calculate board feet and create a cut list

3. Engineering design and technical drawing

- A.) Basic drafting skills
- B.) Isometric drawings
- C.) Drawing to scale

4. Hand and power tool safety training

- A.) Hand tool instruction including demonstration and hands on practice
- B.) Power tool instruction and demonstrations on a variety of shop equipment
- C.) Power tool written and verbal safety exams
- D.) Students demonstrate proficiency with power tool before final approval for use

5. STEM Related Mathematics

- A.) Solve real-life mathematical and STEM related problems.

6. STEM Construction Career Exploration

- A.) Research careers in the construction field and present findings

7. Construction and Manufacturing Practices

- A.) STEM projects that develop and showcase skills associated with quality of craftsmanship, time management, proper equipment use, and math/engineering applications

STEM Construction Foundations

Middle School Power Standards

CIP #460100

1. Demonstrate employability, safety, collaboration, and leadership skills.
2. Utilize proper techniques when using hand and power tools.
3. Incorporate quality craftsmanship and manufacturing practices.
4. Know and apply engineering, drafting, and design skills.
5. Effectively manage class time to complete projects.
6. Solve real-life mathematical and STEM related problems.





SKILLS GAP/LABOR MARKET DATA
STEM Construction Foundations

STEM Construction Foundations	Employment in the construction sector is projected to grow 2.6 percent annually. This equates to 1.6 million new jobs over the 2012-22 decade, the most among goods-producing sectors and third most among all major industry sectors. Despite expected fast growth, construction sector employment in 2022 is projected to be below the peak level (7.7 million; 2006). Of the 30 occupations projected to have the largest percentage increase between 2012 and 2022, five are related to construction. www.bls.gov
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Construction and Extraction Occupations



Employment of construction and extraction occupations is projected to grow 10 percent from 2014 to 2024, faster than the average for all occupations, increasing from 6.5 million jobs to 7.2 million jobs. Overall growth in the economy and population will increase demand for new buildings, roads, and other structures, which will create new job openings for construction and extraction occupations.

The median annual wage for all construction and extraction occupations was \$41,380 in May 2014, which was higher than the median annual wage for all occupations of \$35,540.

	OCCUPATION	JOB SUMMARY	ENTRY-LEVEL EDUCATION 	2014 MEDIAN PAY 
	<u>Boilermakers</u>	Boilermakers assemble, install, and repair boilers, closed vats, and other large vessels or containers that hold liquids and gases.	High school diploma or equivalent	\$59,860
	<u>Carpenters</u>	Carpenters construct and repair building frameworks and structures—such as stairways, doorframes, partitions, rafters,	High school diploma or equivalent	\$40,820

		and bridge supports—made from wood and other materials. They also may install kitchen cabinets, siding, and drywall.		
	<u>Construction and Building Inspectors</u>	Construction and building inspectors ensure that construction meets local and national building codes and ordinances, zoning regulations, and contract specifications.	High school diploma or equivalent	\$56,040
	<u>Construction Equipment Operators</u>	Construction equipment operators drive, maneuver, or control the heavy machinery used to construct roads, bridges, buildings, and other structures.	High school diploma or equivalent	\$42,900
	<u>Construction Laborers and Helpers</u>	Construction laborers and helpers perform many tasks that require physical labor on construction sites.	<u>See How to Become One</u>	\$30,190
	<u>Drywall and Ceiling Tile Installers, and Tapers</u>	Drywall and ceiling tile installers hang wallboard and install ceiling tile inside buildings. Tapers prepare the wallboard for painting, using tape and other materials. Many workers both install and tape wallboard.	No formal educational credential	\$38,970
	<u>Electricians</u>	Electricians install, maintain, and repair electrical power, communications, lighting, and control systems in homes, businesses, and factories.	High school diploma or equivalent	\$51,110
	<u>Elevator Installers and Repairers</u>	Elevator installers and repairers install, fix, and maintain elevators, escalators, moving walkways, and other lifts.	High school diploma or equivalent	\$78,620
	<u>Flooring Installers and Tile and Marble Setters</u>	Flooring installers and tile and marble setters lay and finish carpet, wood, vinyl, and tile.	No formal educational credential	\$37,380

	<u>Glaziers</u>	Glaziers install glass in windows, skylights, and other fixtures in storefronts and buildings.	High school diploma or equivalent	\$38,410
	<u>Hazardous Materials Removal Workers</u>	Hazardous materials (hazmat) removal workers identify and dispose of asbestos, lead, radioactive waste, and other hazardous materials. They also neutralize and clean up materials that are flammable, corrosive, or toxic.	High school diploma or equivalent	\$38,520
	<u>Insulation Workers</u>	Insulation workers install and replace the materials used to insulate buildings to help control and maintain the temperatures in buildings.	<u>See How to Become One</u>	\$37,790
	<u>Ironworkers</u>	Ironworkers install structural and reinforcing iron and steel to form and support buildings, bridges, and roads.	High school diploma or equivalent	\$48,520
	<u>Masonry Workers</u>	Masonry workers, also known as <i>masons</i> , use bricks, concrete blocks, concrete, and natural and manmade stones to build walls, walkways, fences, and other masonry structures.	<u>See How to Become One</u>	\$38,720
	<u>Painters, Construction and Maintenance</u>	Painters apply paint, stain, and coatings to walls and ceilings, buildings, bridges, and other structures.	No formal educational credential	\$35,950
	<u>Plumbers, Pipefitters, and Steamfitters</u>	Plumbers, pipefitters, and steamfitters install and repair pipes that carry liquids or gases to, from, and within businesses, homes, and factories.	High school diploma or equivalent	\$50,660
	<u>Roofers</u>	Roofers replace, repair, and install the roofs of buildings using a variety of materials, including shingles, bitumen, and metal.	No formal educational credential	\$35,760

	<u>Sheet Metal Workers</u>	Sheet metal workers fabricate or install products that are made from thin metal sheets, such as ducts used in heating and air conditioning systems.	High school diploma or equivalent	\$45,070
	<u>Solar Photovoltaic Installers</u>	Solar photovoltaic (PV) installers, often called <i>PV installers</i> , assemble, install, or maintain solar panel systems on roofs or other structures.	High school diploma or equivalent	\$40,020

Publish Date: Thursday, December 17, 2015



OSPI Model Framework – Middle School STEM

Course: STEM Construction Foundations	Total Framework Hours up to: 90 - 180
CIP Code: 460100 <input checked="" type="checkbox"/> Exploratory <input type="checkbox"/> Preparatory	Date Last Modified: 5/16/16
Career Cluster: Architecture and Construction	Cluster Pathway: Construction

COMPONENTS AND ASSESSMENTS

Performance Assessments:

- Safety tests
- Formative safety evaluations
- Use of classroom and lab safety practices

Leadership Alignment:

Student application of safety practices, assisting in presentations and explanations.

Reason Effectively

2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

8.C.4 Reflect critically on past experiences in order to inform future progress

Standards and Competencies

Standard/Unit: GENERAL WORKPLACE SAFETY

Competencies

Total Learning Hours for Unit: 6/12

- Explain the role that safety plays in the construction crafts.
- Describe the meaning of job-site safety.
- Describe the characteristics of a competent person and a qualified person.
- Demonstrate the use and care of appropriate personal protective equipment (PPE).
- Properly don and remove personal protective equipment (safety goggles, hard hat, and personal fall protection).
- Follow the safety procedures required for lifting heavy objects.

Aligned Washington State Standards

Arts	
Educational Technology	
Health and Fitness	
Math-Common Core State Standards	1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.* 3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*
Reading-Common Core State	RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Standards	<p>RI.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.</p> <p>RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.</p> <p>RI.8.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.</p>
Science	
Social Studies	
Speaking and Listening-Common Core State Standards	<p>SL.6-8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6-8 topics, texts, and issues, building on others' ideas and expressing their own clearly.</p> <p>SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p>
Writing-Common Core State Standards	<p>W.8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p>

COMPONENTS AND ASSESSMENTS	
<p>Performance Assessments:</p> <ul style="list-style-type: none"> -Measurements: fractions, scale -Demonstrate proper measurement technique -Accuracy in measuring and math problems -Use triangulation to create a square box <p>Reason Effectively</p> <p>2A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation. Test taking and essay answers used weekly as part of data collection on instruction.</p> <p>Make Judgements and Decisions</p> <p>2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs</p>	
<p>Leadership Alignment:</p> <p>Develop a plan and timeline for competition of safety demonstrations and tests.</p> <p>Learn plan layouts as used in industry.</p> <p>Reason Effectively</p> <p>2.A1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation</p> <p>Make Judgments and Decisions</p> <p>2.C.3 Synthesize and make connections between information and arguments</p>	
Standards and Competencies	

Standard/Unit: CONSTRUCTION MEASUREMENT		
Competencies		Total Learning Hours for Unit: 8/16
C-7.1 Add, subtract, multiply, and divide whole numbers, with and without a calculator C-7.2 Use a standard ruler and a metric ruler to measure. C-7.3 Add, subtract, multiply, and divide fractions. C-7.4 Convert decimals to percentages and percentages to decimals. C-7.5 Recognize and use metric units of length, weight, volume, and temperature. C-7.6 Recognize some of the basic shapes used in the construction industry, and apply basic geometry to measure them		
<i>Aligned Washington State Standards</i>		
Arts		
Educational Technology		
Health and Fitness		
Math-Common Core State Standards	CC: Expressions and Equations (EE) Reason about and solve one-variable equations and inequalities 6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use 6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational CC: Geometry (G) Solve real-world and mathematical problems involving area, surface area, and volume 6.G.1 Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these Draw, construct, and describe geometrical figures and describe the relationships between them 7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, Solve real-life and mathematical problems involving angle measure, area, surface area, and volume 7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and 7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, Understand and apply the Pythagorean Theorem 8.G.6 Explain a proof of the Pythagorean Theorem and its converse. 8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. CC: Number System (NS) 6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating CC: Ratios and Proportions (RP) Understand ratio concepts and use ratio reasoning to solve problems	

	<p>6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at</p> <p>6.RP.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."</p> <p>6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams,</p> <p>6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>CC: Mathematical Practices (MP)</p> <p>MP.1 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry</p> <p>MP.2 Reason abstractly and quantitatively. Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two</p> <p>MP.3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously</p> <p>MP.4 Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early</p> <p>MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and</p> <p>MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own</p> <p>MP.7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and</p> <p>MP.8 Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.</p>
Reading-Common Core State Standards	
Science	<p>Engineering, Technology, and Applications of Science</p> <p>MS-ETS1 Engineering Design</p> <p>MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and</p> <p>MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>Science and Engineering Practices</p> <ol style="list-style-type: none"> 1. Asking questions and defining problems 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information
Social Studies	

Speaking and Listening- Common Core State Standards	
Writing-Common Core State Standards	

COMPONENTS AND ASSESSMENTS	
Performance Assessments: -Introduction to mechanical drawing/drafting -Project design sketches -In class assignments and quizzes -Describe the design process and how it is used to aid in problem solving. -Use the design process to solve a technical problem. -Recognize design criteria and constraints. -Describe the purpose and importance of working in a team. -Explain a design brief and apply the concept when using the design process. -Describe the elements of design and apply this concept to the design process. -Use a decision matrix to select the best solution to a design problem.	
Leadership Alignment: - Develop a plan and timeline for completing a project 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation	
<i>Standards and Competencies</i>	
Standard/Unit: ENGINEERING DESIGN AND TECHNICAL DRAWING	
Competencies C-3.1 Identify drafting systems. C-3.2 Understand and use drafting techniques, e.g., lines, letters, symbols C-3.3 Understand and use different types of drawings, e.g., isometric, geometric communications, orthographic, schematic C-3.4 Sketch a part or idea. C-3.1 Students will show their understanding of the design process by performing the steps involved: defining the problem, brainstorming and researching to come up with ideas, identifying criteria and specifying constraints, exploring ideas, selecting an approach, coming up with a design and making a proto-type model, testing and evaluating the design and refining if necessary, and communicating processes and results. C-3.2 Students will demonstrate their skills in board drafting and CAD to produce sketches and an orthographic drawing of their product. C-3.3 Students will demonstrate, through the proper construction of a product, their ability to interpret drawings, use a materials list, and follow a steps-of-procedures document. C-3.5 Product designer and builder will meet to discuss and fill out an evaluation sheet summarizing how well they feel they did on their part of the product development. C-3.6 Students will participate in a discussion about all the types of design careers there are and the job titles and functions of those who may be involved in design.	Total Learning Hours for Unit: 10/20

C-3.7 Applying organizational skills and time management will be required to finish the unit work in a timely manner.	
Aligned Washington State Standards	
Arts	<p>1.2: The student develops arts skills and techniques.</p> <p>Arts 3.0 The student communicates through the arts</p> <p>Arts 3.0 The student communicates through the arts</p> <p>3.3: The student develops personal aesthetic criteria to communicate artistic choices.</p> <p>4.5: The student understands how arts knowledge and skills are used in the world of work, including careers in the arts.</p>
Educational Technology	
Health and Fitness	
Math-Common Core State Standards	<p>CC: Geometry (G)</p> <p>Solve real-world and mathematical problems involving area, surface area, and volume</p> <p>6.G.1 Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these</p> <p>6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge</p> <p>6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same</p> <p>6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the</p> <p>Draw, construct, and describe geometrical figures and describe the relationships between them</p> <p>7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different</p> <p>7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides,</p> <p>7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p> <p>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume</p> <p>7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and</p> <p>7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons,</p> <p>Understand and apply the Pythagorean Theorem</p> <p>8.G.6 Explain a proof of the Pythagorean Theorem and its converse.</p> <p>8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p> <p>Solve real-world and mathematical problems involving volume of cylinders, cones and spheres</p> <p>8.G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>CC: Ratios and Proportions (RP)</p> <p>Understand ratio concepts and use ratio reasoning to solve problems</p> <p>6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams,</p>

	<p>6.RP.3c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole given a part and the</p> <p>6.RP.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>Analyze proportional relationships and use them to solve real-world and mathematical problems</p> <p>7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks</p> <p>7.RP.2 Recognize and represent proportional relationships between quantities.</p> <p>7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether</p> <p>7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>CC: Mathematical Practices (MP)</p> <p>MP.1 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry</p> <p>MP.2 Reason abstractly and quantitatively. Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two</p> <p>MP.3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously</p> <p>MP.4 Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early</p> <p>MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and</p> <p>MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own</p> <p>MP.7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and</p> <p>MP.8 Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.</p>
<p>Reading-Common Core State Standards</p>	<p>CC: Reading for Literacy in Science and Technical Subjects</p> <p>Key Ideas and Details:</p> <p>RST.6-8.1 Key Ideas and Details: Cite specific textual evidence to support analysis of science and technical texts.</p> <p>RST.6-8.2 Key Ideas and Details: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p> <p>RST.6-8.3 Key Ideas and Details: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>Craft and Structure:</p> <p>RST.6-8.4 Craft and Structure: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical</p> <p>RST.6-8.5 Craft and Structure: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.</p> <p>RST.6-8.6 Craft and Structure: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.</p> <p>Integration of Knowledge and Ideas:</p> <p>RST.6-8.7 Integration of Knowledge and Ideas: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g.,</p>

	<p>RST.6-8.8 Integration of Knowledge and Ideas: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p> <p>RST.6-8.9 Integration of Knowledge and Ideas: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from</p> <p>Range of Reading and Level of Text Complexity:</p> <p>RST.6-8.10 Range of Reading and Level of Text Complexity: By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band</p>
Science	<p>Science and Engineering Practices</p> <ol style="list-style-type: none"> 1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information <p>Physical Sciences</p> <p>MS-PS2 Motion and Stability: Forces and Interactions</p> <p>MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.</p> <p>MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the</p> <p>MS-PS3 Energy</p> <p>MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.</p> <p>MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.</p> <p>MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the</p> <p>MS-PS3-5. Construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object</p> <p>MS-PS4 Waves and Their Applications in Technologies for Information Transfer</p> <p>MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p> <p>MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.</p> <p>MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals (sent as wave pulses) are a more reliable way to encode and transmit</p>
Social Studies	
Speaking and Listening-Common Core State Standards	
Writing-Common Core State Standards	

COMPONENTS AND ASSESSMENTS

Performance Assessments: Skill and safety tests or quizzes Students utilize proper techniques when using hand and power tools to complete a project. Quality of craftsmanship with completed projects	
Leadership Alignment: Demonstrate correct use of hand and power tools	
<i>Standards and Competencies</i>	
Standard/Unit: HAND AND POWER TOOL TRAINING AND SAFETY	
Competencies	Total Learning Hours for Unit: 10/20
<ul style="list-style-type: none"> Recognize and identify some of the basic hand tools used in the construction trade Use hand tools safely. Describe the basic procedures for taking care of hand tools Identify power tools commonly used in the construction trades Use power tools safely. Explain how to maintain power tools properly. Use and maintain appropriate tools, machines and equipment to accomplish project goals. 	
<i>Aligned Washington State Standards</i>	
Arts	4.5: The student understands how arts knowledge and skills are used in the world of work, including careers in the arts.
Educational Technology	
Health and Fitness	1.2.1: Understands safety rules and procedures in a variety of physical activities: Individual, dual, team, and lifetime activities.
Math-Common Core State Standards	MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.
Reading-Common Core State Standards	RST.6-8.3 Key Ideas and Details: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.7 Integration of Knowledge and Ideas: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
Science	MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Social Studies	2.1.1 Analyzes the importance of financial literacy in making economic choices related to spending, saving, and investing. 2.1.1 Analyzes examples of how groups and individuals have considered profit and personal values in making economic choices in the past or present. 2.2.2 Understands and analyzes how the forces of supply and demand have affected international trade in Washington State in the past or present.
Speaking and Listening-Common Core State Standards	SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation. SL.6.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

	<p>SL.7.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.</p> <p>SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>SL.8.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.</p>
Writing-Common Core State Standards	<p>W.6.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>W.7.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>W.8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p>

COMPONENTS AND ASSESSMENTS	
<p>Performance Assessments:</p> <ul style="list-style-type: none"> • Read blueprints and be able to calculate board feet required to complete a project • Utilize mathematics in measurement • Perform calculations necessary to convert scale when drafting • Develop a cut list that maximizes use of material available and limits waste • Perform calculations associated with understanding the factors influencing the speed of a student-built CO₂ dragster 	
<p>Leadership Alignment:</p> <ul style="list-style-type: none"> • Designing, building, and racing CO₂ dragsters is part of a CTSO activity through TSA. 	
<p>Use Systems Thinking</p> <p>2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems</p>	
Standards and Competencies	
Standard/Unit: STEM RELATED MATHEMATICS	
Competencies	Total Learning Hours for Unit: 8/16
<ul style="list-style-type: none"> • Solve real-life mathematical and STEM related problems. 	
Aligned Washington State Standards	
Arts	4.5: The student understands how arts knowledge and skills are used in the world of work, including careers in the arts.
Educational Technology	<p>MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles.</p> <p>MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</p> <p>MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>
Health and Fitness	<p>1.2.1: Understands safety rules and procedures in a variety of physical activities: Individual, dual, team, and lifetime activities.</p> <p>1.2.2: Applies skills and strategies necessary for effective participation in physical activities.</p>
Math-Common Core State Standards	MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet

	MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.
Reading-Common Core State Standards	RST.6-8.3 Key Ideas and Details: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.7 Integration of Knowledge and Ideas: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
Science	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles. MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
Social Studies	2.1.1 Analyzes the importance of financial literacy in making economic choices related to spending, saving, and investing. 2.1.1 Analyzes examples of how groups and individuals have considered profit and personal values in making economic choices in the past or present. 2.2.2 Understands and analyzes how the forces of supply and demand have affected international trade in Washington State in the past or present.
Speaking and Listening-Common Core State Standards	SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation. SL.6.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. SL.7.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation. SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. SL.8.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
Writing-Common Core State Standards	W.6.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. W.7.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. W.8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

COMPONENTS AND ASSESSMENTS	
Performance Assessments:	Research and prepare a presentation/report on a STEM construction related career.
Leadership Alignment:	Students utilize researching skills. Students learn and practice verbal presentation skills.
Solve Problems	2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

Standards and Competencies	
Standard/Unit: STEM CONSTRUCTION CAREER EXPLORATION	
Competencies	Total Learning Hours for Unit: 5/10
<ul style="list-style-type: none"> Identify occupations related to the construction industry State the differences between past and present methods of construction. Identify a variety of systems, methods, and materials used for building construction technology. Use safe work habits and techniques 	
Aligned Washington State Standards	
Arts	4.2: The student demonstrates and analyzes the connections among the arts and between the arts and other content areas
Educational Technology	
Health and Fitness	
Math-Common Core State Standards	
Reading-Common Core State Standards	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. RST.6-8.7 Integration of Knowledge and Ideas: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
Science	
Social Studies	Analyzes the importance of financial literacy in making economic choices related to spending, saving, and investing.
Speaking and Listening-Common Core State Standards	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
Writing-Common Core State Standards	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
COMPONENTS AND ASSESSMENTS	
Performance Assessments: Produce and evaluate a product/project	
Leadership Alignment: Demonstrate and present completed projects/presentations as assigned for the successful completion of semester length course. Collaborate with Others 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams	
Standards and Competencies	

Standard/Unit: CONSTRUCTION AND MANUFACTURING PRACTICES	
Competencies	Total Learning Hours for Unit: 38/76
<ul style="list-style-type: none"> • Manage time effectively to meet a deadline • Use a standard rubric to evaluate quality of craftsmanship • Utilize design specifications to emphasize focus on detail throughout the build process. 	
<i>Aligned Washington State Standards</i>	
Arts	2.1: The student applies a creative process in the arts. 4.2: The student demonstrates and analyzes the connections among the arts and between the arts and other content areas. 4.3: The student understands how the arts impact and reflect personal choices throughout life.
Educational Technology	
Health and Fitness	
Math-Common Core State Standards	6.G.1 Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. 7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. 7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. 8.G.1 Verify experimentally the properties of rotations, reflections, and translations: -- a. Lines are taken to lines, and line segments to line segments of the same length. -- b. Angles are taken to angles of the same measure. -- c. Parallel lines are taken to parallel lines. MP.1 Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet
Reading-Common Core State Standards	
Science	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment. MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Social Studies	
Speaking and Listening-Common Core State Standards	SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study. SL.6-8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6-8 topics, texts, and issues, building on others' ideas and expressing their own clearly. SL.7.2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
Writing-Common Core State Standards	10 - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

COMPONENTS AND ASSESSMENTS	
Performance Assessments: Formative evaluations including in class assignments/projects, safety procedures and practices Mechanical drawings/blueprint interpretation, assignments /quizzes Layout drawings for 3-D modeling and identification of geometric shapes and sizes Safety tests and evaluation of safety practices Proper use of related math skills and tools to include basic math to trigonometry for proper problem solving Demonstrate correct use and care of hand and power tools Evaluate common manufacturing practices and design products and systems related to new concepts Both group designed and individually completed projects and problem solving Effects of skills required to obtain employment	
Leadership Alignment: - Demonstrates teamwork, problem solving, and understanding of higher level communication skills - Develop a plan and timeline for completing a project 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member 8.A.3 Utilize time and manage workload efficiently	
Standards and Competencies	
Standard/Unit: Unit 7 LEADERSHIP AND COMMUNICATION SKILLS	
Competencies Through oral presentations and group PowerPoints, show learning over the time in the program. Guide and Lead Others 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal	Total Learning Hours for Unit: 5/10
<ul style="list-style-type: none"> • C-10.1 Demonstrate the ability to interpret information and instructions presented in both written and verbal form • C-10.2 Demonstrate the ability to communicate effectively using written and verbal skills. 	
Aligned Washington State Standards	
Arts	
Educational Technology	
Health and Fitness	
Math-Common Core State Standards	

<p>Reading-Common Core State Standards</p>	<p>CC: Reading Informational Text Key Ideas and Details: RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. Integration of Knowledge and Ideas: RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue. CC: Reading for Literacy in Science and Technical Subjects Key Ideas and Details: RST.6-8.1 Key Ideas and Details: Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.2 Key Ideas and Details: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. RST.6-8.3 Key Ideas and Details: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. Craft and Structure: RST.6-8.4 Craft and Structure: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical RST.6-8.6 Craft and Structure: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas: RST.6-8.7 Integration of Knowledge and Ideas: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., RST.6-8.8 Integration of Knowledge and Ideas: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9 Integration of Knowledge and Ideas: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from</p>
<p>Science</p>	<p>Science and Engineering Practices 1. Asking questions and defining problems 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information Social Studies Skills SS Skills 5.1 Uses critical reasoning to analyze and evaluate positions</p>
<p>Social Studies</p>	<p>Social Studies Skills SS Skills 5.1 Uses critical reasoning to analyze and evaluate positions 5.1.1 Understands positions on an issue or event. 5.1.1 Understands evidence supporting a position on an issue or event. 5.1.1 Understands reasons based on evidence for a position on an issue or event. 5.1.2 Evaluates the significance of information used to support positions on an issue or event. 5.1.2 Evaluates the breadth of evidence supporting positions on an issue or event. 5.1.2 Evaluates the logic of reasons for a position on an issue or event. 5.2.2 Analyzes the validity, reliability, and credibility of information from a variety of primary and secondary sources while researching an issue or event. SS Skills 5.3 Deliberate public issues. 5.3.1 Engages in discussions that clarify and address multiple viewpoints on public issues. 5.3.1 Analyzes and responds to multiple viewpoints on public issues brought forth in the context of a discussion.</p>

	5.3.1 Applies key ideals outline in fundamental documents to clarify and address public issues in the context of a discussion.
Speaking and Listening- Common Core State Standards	<p>Comprehension and Collaboration:</p> <p>SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on</p> <p>SL.6.1b Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.</p> <p>SL.6.1c Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</p> <p>SL.6.1d Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.</p> <p>SL.7.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on</p> <p>SL.7.1a Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to</p> <p>SL.7.1b Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>SL.7.1c Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as</p> <p>SL.7.1d Acknowledge new information expressed by others and, when warranted, modify their own views.</p> <p>SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on</p> <p>SL.8.1a Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to</p> <p>SL.8.1b Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>SL.8.1c Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.</p> <p>SL.8.1d Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.</p> <p>SL.8.2 Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political)</p> <p>SL.8.3 Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant</p> <p>Presentation of Knowledge and Ideas:</p> <p>SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact,</p> <p>SL.6.5 Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.</p> <p>SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p> <p>SL.7.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 on page</p> <p>SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</p> <p>CC: College and Career Readiness Anchor Standards for Speaking and Listening</p> <p>Comprehension and Collaboration</p> <p>1 - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others'</p>

	<p>ideas and expressing their own clearly and</p> <p>2 - Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.</p> <p>3 - Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.</p> <p>Presentation of Knowledge and Ideas</p> <p>4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task,</p> <p>5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.</p> <p>6 - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.</p>
Writing-Common Core State Standards	<p>CC: Writing (7)</p> <p>Text Types and Purposes:</p> <p>W.7.1 Write arguments to support claims with clear reasons and relevant evidence.</p> <p>W.7.1d Establish and maintain a formal style.</p> <p>W.7.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p> <p>W.7.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.</p> <p>Production and Distribution of Writing:</p> <p>W.7.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing</p> <p>W.7.6 Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and</p> <p>Research to Build and Present Knowledge:</p> <p>CC: Writing for Literacy in History/Social Studies, Science, and Technical Subjects</p> <p>Text Types and Purposes:</p> <p>WHST.6-8.1 Write arguments focused on discipline-specific content.</p> <p>WHST.6-8.1a Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence</p> <p>WHST.6-8.1b Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p> <p>WHST.6-8.1c Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</p> <p>WHST.6-8.1e Provide a concluding statement or section that follows from and supports the argument presented.</p> <p>WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>WHST.6-8.2a Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include</p> <p>WHST.6-8.2b Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.</p> <p>WHST.6-8.2c Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.</p> <p>WHST.6-8.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.</p> <p>WHST.6-8.2e Establish and maintain a formal style and objective tone.</p> <p>Production and Distribution of Writing:</p> <p>WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>WHST.6-8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.</p>

	<p>Research to Build and Present Knowledge:</p> <p>WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused</p> <p>WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or</p> <p>WHST.6-8.9 Draw evidence from informational texts to support analysis reflection, and research.</p>
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21st Century Skills		
Check those that students will demonstrate in this course:		
<p>LEARNING & INNOVATION</p> <p>Creativity and Innovation</p> <p><input checked="" type="checkbox"/> Think Creatively</p> <p><input checked="" type="checkbox"/> Work Creatively with Others</p> <p><input checked="" type="checkbox"/> Implement Innovations</p> <p>Critical Thinking and Problem Solving</p> <p><input checked="" type="checkbox"/> Reason Effectively</p> <p><input type="checkbox"/> Use Systems Thinking</p> <p><input checked="" type="checkbox"/> Make Judgments and Decisions</p> <p><input checked="" type="checkbox"/> Solve Problems</p> <p>Communication and Collaboration</p> <p><input checked="" type="checkbox"/> Communicate Clearly</p> <p><input checked="" type="checkbox"/> Collaborate with Others</p>	<p>INFORMATION, MEDIA & TECHNOLOGY SKILLS</p> <p>Information Literacy</p> <p><input checked="" type="checkbox"/> Access and /evaluate Information</p> <p><input checked="" type="checkbox"/> Use and Manage Information</p> <p>Media Literacy</p> <p><input type="checkbox"/> Analyze Media</p> <p><input checked="" type="checkbox"/> Create Media Products</p> <p>Information, Communications and Technology (ICT Literacy)</p> <p><input checked="" type="checkbox"/> Apply Technology Effectively</p>	<p>LIFE & CAREER SKILLS</p> <p>Flexibility and Adaptability</p> <p><input checked="" type="checkbox"/> Adapt to Change</p> <p><input checked="" type="checkbox"/> Be Flexible</p> <p>Initiative and Self-Direction</p> <p><input checked="" type="checkbox"/> Manage Goals and Time</p> <p><input checked="" type="checkbox"/> Work Independently</p> <p><input checked="" type="checkbox"/> Be Self-Directed Learners</p> <p>Social and Cross-Cultural</p> <p><input checked="" type="checkbox"/> Interact Effectively with Others</p> <p><input checked="" type="checkbox"/> Work Effectively in Diverse Teams</p> <p>Productivity and Accountability</p> <p><input checked="" type="checkbox"/> Manage Projects</p> <p><input checked="" type="checkbox"/> Produce Results</p> <p>Leadership and Responsibility</p> <p><input checked="" type="checkbox"/> Guide and Lead Others</p> <p><input checked="" type="checkbox"/> Be Responsible to Others</p>