Escondido Union High School District

Agricultural Engineering 2
(Revision to Agriculture Mechanics 2)

EUHSD Board Approval Date: 8/8/17
The EUHSD Agricultural Engineering 2 curriculum document identifies what students should be able to know by grade level in a comprehensive standards-based course of study. The curriculum document is updated annually based on student academic achievement data, research and best practices, and input from stakeholders. The EUHSD curriculum document contains the following documents and/or information:

A. Course Description
B. Course Guidelines/Requirements - graduation credit information, transcript information, adopted materials, adopted technology, assessment outline
C. Instructional Materials References
D. Scope and Sequence Map with Essential Standards outlined by Unit
E. References to key essential design and implementation documents

A comprehensive course of study and/or program is designed so that all students have access to the rigorous curriculum necessary to graduate high school demonstrating college and career readiness skills. Student-Centered learning provides opportunity for collaboration, communication, and a robust learning environment and provides opportunities for all students to meet the goals of the district’s Instructional Focus at the time of this writing: “All students communicate their thinking, ideas and understanding by effectively using oral, written and/or non-verbal expression.”

A key design consideration in the transition to the new California State Standards is a focus on changes to pedagogy. The English Language Arts instructional shifts guide classroom teaching and learning and the foundation of curriculum and instructional design. Key considerations of the ELA Instructional shifts can be found by visiting the following URL: http://www.corestandards.org/other-resources/key-shifts-in-english-language-arts/

The curriculum document is aligned to the California Model Career Technical Education Standards and reflects learning outcomes from both the anchor and pathway standards. http://www.cde.ca.gov/ct/ct/f/ctemcstandards.asp - CTE Model Curriculum Standards

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Dr. Courtney Goode, Assistant Superintendent of Human Resources, Equity and Title IX Compliance Officer
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Agricultural Engineering 2 Course Description

Agricultural Engineering 2 is the second class offered in the Mechanized Agriculture Pathway. In this course students will build on the knowledge and skills gained in the Agriculture Engineering 1 course. They will also study more advanced fundamentals of mechanical and structural systems and facilities. Students will explore professional opportunities in the field of agricultural engineering. Integral to this will also be the opportunity to participate in activities developed through a student leadership organization. By participating in this program, students will meet College and Career Readiness outcomes. Units covered in this course will build upon existing knowledge where applicable. End of unit projects will incorporate, at minimum, the knowledge acquired from at least one other previously covered unit. The EUHSD agricultural education program is made up of three integrated parts: classroom instruction, FFA and a supervised agricultural experience (SAE). In this course students are provided opportunities for leadership development, personal growth and career success. Agricultural education instruction is delivered through three major components: Classroom/Laboratory instruction (contextual learning), Supervised Agricultural Experience programs (work-based learning), and student leadership organizations. The SAE is a required component of our agricultural education program and intended for every student. Through their involvement in the SAE program, students consider multiple careers and occupations, learn expected workplace behavior, develop specific skills within an industry, and are given opportunities to apply academic and occupational skills in the workplace or a simulated workplace environment. As part of students' agricultural coursework, they build and maintain a Record Book and Coursework Portfolio in which they will store artifacts and industry-related certificates, awards, etc. related to FFA leadership and Supervised Agricultural Experiences.

<table>
<thead>
<tr>
<th>Course Requirements</th>
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<tbody>
<tr>
<td><strong>Course Length:</strong> Year Long</td>
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<tr>
<td><strong>UC/CSU Requirement:</strong> Meets UC/CSU “D” requirements Approved 6/9/22</td>
</tr>
<tr>
<td><strong>Course Number (Semester A):</strong> 5713 5709 effective 6/9/22</td>
</tr>
<tr>
<td><strong>Course Number (Semester B):</strong> 5714 5710 effective 6/9/22</td>
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<tr>
<td><strong>Credits (Semester A):</strong> 5 CTE or Elective</td>
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<tr>
<td><strong>Required Prerequisite/s:</strong> Completion or Concurrent Enrollment in Algebra 1 or Math 1 (Integrated) and enrolled in FFA</td>
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<tr>
<td>*Agriculture Engineering 1</td>
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<tr>
<td><strong>Board Approval Date (Curriculum):</strong> 8/8/17</td>
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<tr>
<td><strong>Core Instructional Material/s:</strong> This course uses Open Educational Resources (OERs) in order to access current digital libraries that are pivoting rapidly to industry needs.</td>
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<tr>
<td><strong>Industry Sector:</strong> Agriculture and Natural Resources</td>
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</table>
| **Assessment/s:** The course is designed as a project-based curriculum. Each unit outlines specific skills and/or long-term projects which serve as unit and course assessments.
Meeting the Needs of ELs:

Instructional leaders and teachers utilize the student information system to acquire the language levels of EUHSD English Learners. In 2012, the CA Department of Education adopted new language level proficiency descriptors and new EL state standards. Visit the following website to learn more about those new descriptors and corresponding standards: [http://www.cde.ca.gov/sp/el/er/documents/eldstndspublication14.pdf](http://www.cde.ca.gov/sp/el/er/documents/eldstndspublication14.pdf); please see our EL Plan for additional information regarding the ways we strive to meet our students’ diverse language needs.

In 2014, the CA Department of Education adopted new ELA-ELD Framework, with specific strategies designed to meet the needs of EL students. Visit the following URL to learn more about the new frameworks which we have adopted and to which we have aligned our curricula and practices: [http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf](http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf)

Scope and Sequence Guide

The Scope and Sequence Guide is a California standards-based document that delineates the standards-based skills students are expected to know and do in order to meet College and Career Readiness expectations. Each unit of study in the Scope and Sequence document is designed to build upon the previous unit and/or prerequisite coursework in support of student mastery of specific standards-based skills. The Scope and Sequence document provides the framework of understanding for key assignments, key assessments, and instructional resources and strategies that serve to assist students in meeting unit-learning objectives. The document will be updated annually with input from all stakeholders.

In coursework requiring reading and writing, the following standards are not specifically stated in any one unit of study but are the result of implementation throughout the curriculum as students participate in reading, writing, and speaking/listening standards-based activities.

- By the end of grade 11, students will read and comprehend literary nonfiction in the grades 11-CCR text completely and proficiently, with scaffolding as needed at the high range. (Reading Informational Text Standard 10)
- Students will write routinely over extending 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 and purposes. (Writing Standard 10)
- "To be college and career ready, students must have ample opportunities to take part in a variety of rich and structured conversations – as part of a whole class, in small groups, and with a partner – build around important content in various domains. They must be able to contribute appropriately to conversations, make comparisons and contrasts, and analyze and synthesize a multitude of ideas according to the standards of evidence appropriate to a particular discipline." (Standards for ELA Anchor Standards for Speaking/Listening)
Agricultural Engineering 2 - Scope and Sequence
Unit 1 – Using the Ag Engineering Shop
Length: 1 Week

Unit Description: In Unit 1, students will participate in hands-on activities designed to build their foundational understanding of participation in a workshop classroom environment acquired in year 1. Students will examine specific safety and use policies, procedures, and practices. Students will examine workspaces for safety and/or health concerns. They will be expected to demonstrate a variety of safety practices through various classroom assignments and activities and will demonstrate their understanding through completion of a required safety test. Many of the skills and procedures acquired in Unit 1 will be built upon in subsequent units of study. Students are introduced to a list of possible Supervised Agriculture Experiences (SAE), which include activities based on student choice and focus on hands-on experiences that allow them to apply their learning and prepare them to transition into the world of college and career agricultural opportunities.

Agriculture and Natural Resources Anchor Standards:
The CTE Anchor standards reflect what students should know and do in a sequential CTE pathway course of study. The Anchor standards may be repeated throughout each unit of study and build upon one another throughout a series of courses.

Communications:
2.5 Communicate information and ideas effectively to multiple audiences using a variety of media and formats.

Technology:
4.5 Research past, present, and projected technological advances as they impact a particular pathway.

Problem Solving and Critical Thinking:
5.1 Identify and ask significant questions that clarify various points of view to solve problems.
5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.

Health and Safety:
6.2 Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities.
6.3 Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies.
6.4 Practice personal safety when lifting, bending, or moving equipment and supplies.
6.5 Demonstrate how to prevent and respond to work-related accidents or injuries; this includes demonstrating an understanding of ergonomics.
6.6 Maintain a safe and healthful working environment.

Learning Objectives:
Students will be able to...
- Communicate both orally and in writing.
- Conduct research, both small and on a larger scale, on specific assigned topics such as safety and machine tool use.
- Ask and answer questions using industry terminology.
- Participate in small and large group discussions and clarify points of view when needed.
- Interpret information from a variety of documents. (informational text, charts, graphs, etc.)
- Follow specific policies and procedures for safety and equipment use.
- Demonstrate health and safety practices when working in the shop.
- Maintain tools and equipment according to industry specifications.
- Set up and maintain shop to avoid health concerns or safety hazards.
- Practice personal safety when handling materials or machinery.
- Report hazards in the shop.
- Locate and adhere to MSDS instructions.
- Demonstrate teamwork approach to learning.

Unit Assignments:
- Throughout the course, students will be expected to properly identify, use, and maintain a variety of shop tools and equipment according to industry specifications. The teacher will demonstrate each piece of equipment and its safety features for each specific unit of study. Students will complete a series of unit quizzes and an overall safety test in order to demonstrate understanding of key rules and procedures. For all tasks involving specific equipment use, students will conduct demonstrations of the equipment, showcasing the safety features and maintenance features. This will be repeated in each unit of study or when a new piece of equipment and/or tool is introduced.
- All students will be required to keep a notebook that outlines key equipment/tools and their use, function, and maintenance requirements and any specific industry related vocabulary terminology. This includes the specific equipment term and its official definition according to industry standards. For specific equipment safety regulations: This includes identifying any safety features of the specific tool or piece of equipment. As a demonstration of safety requirements for learning, students will complete the following activities:
  - Students will work in groups of 2-3 to create a poster diagramming and outlining key components of workshop safety. Students will present their posters to two other groups and will evaluate their posters according to industry standards reviewed in class.
  - Students will take a multiple-choice safety test and will pass with at least 90% accuracy prior to
6.7 Be informed of laws/acts pertaining to the Occupational Safety and Health Administration (OSHA).

Responsibility and Flexibility:
7.2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
7.3 Understand the need to adapt to changing and varied roles and responsibilities.
7.4 Practice time management and efficiency to fulfill responsibilities.

Leadership and Teamwork:
9.1 Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
9.2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills as applied in groups, teams, and career technical student organization activities.

Technical Knowledge and Skills:
10.1 Interpret and explain terminology and practices specific to the Agriculture and Natural Resources sector.
10.5 Interpret and explain the aims, purposes, history, and structure of the FFA student organization and know the opportunities it makes available.

Demonstration and Application:
11.1 Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices specific to the Building and Construction Trades sector program of study.

Agriculture Mechanics Pathway Standards:
B1.0 Implement personal and group safety practices.
B1.1 Practice the rules for personal and group safety while working in an agricultural mechanic’s environment.
B1.2 Integrate accepted shop management procedures and a safe working environment.
B1.3 Safely secure loads on a variety of vehicles.

Reading Standards for CTE Grade 9/10:
1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
   • Utilize the internet and other sources of technology to retrieve information.
   • Cite evidence from text using appropriate citation manual.
   • Follow complex multi-step instructions.
   • Determine meaning of words and symbols as they pertain to industry standards.
   • Understand and describe the SAE opportunities available to them.
   • Utilizing equipment and/or working in the shop area. Students who do not get 100% accuracy will write out the incorrect questions, research the correct answer, respond with the correct answer, and will note the specific rationale for why they may have selected the incorrect answer.
   o Students will develop a housekeeping or clean-up plan for each shop based on photographs and videos of the workshops as they appear during actual work. The plan will be in a spreadsheet format, identifying potential hazards and ways to mitigate those hazards so they do not result in injuries.
   • As a continuation of the career exploration task in year 1, students will build upon their career search and resume experience as part of the year 2 requirement. Utilizing a variety of online resources, information from guest speakers, information from their FFA organization, information from regional and state-wide industries and businesses, students will enhance their resume and cover letter and educational exploration task. They will identify at least three fields of study that they would like to research with regard to the field of agricultural engineering coursework. Students will upload their resume and cover letter to the instructor at the end of the course.

Teacher Note: National FFA Association is a student professional organization. The teacher will review membership and activities to the class. FFA Professional Student Organization for Industry. Students will be introduced to the FFA organization and may participate, at their choosing. Students participate in a variety of competitions and Career Development Events. The events may be held at the local, regional or state level as conducted by the FFA organization. Students may also move on to National competitions.
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

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.

**Writing Standards for CTE grade 9/10:**

2d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

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.

8. Gather relevant information from multiple authoritative print and digital sources (primary and secondary), using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. CA

### Unit Assessments:
- Hands-on safety demonstration assessments for specific equipment and tool use
- Notebook checks
- Written safety test with 100% accuracy

### Unit Resources:
- [https://www.ffao.org/home](https://www.ffao.org/home) - (teacher and student resource for FFA)
- [https://www.bae.ncsu.edu/programs/extension/farm_safety](https://www.bae.ncsu.edu/programs/extension/farm_safety)
Agricultural Engineering 2 - Scope and Sequence
Unit 2 – Project Planning & Design Using Wood and Metal
Length: 12 Weeks

**Unit Description:** In Unit 2, students will use the materials, measurement, and project planning information acquired in year 1 in order to design a project from an original idea from start to finish. The project could be sold at a regional and/or state fair or other school event and will be displayed at a showcase and assessed according to industry standards. Students will be expected to develop their project and complete a detailed project plan utilizing all aspects of industry planning standards. They will work throughout the second semester in order to complete all phases of their project. In addition, students will complete a series of required skills/competencies according to industry standards utilizing a variety of machinery. Students also explore and choose a School-based or Ownership/Entrepreneurship SAE activity. They may build on their SAE from the first course.

<table>
<thead>
<tr>
<th>Agriculture and Natural Resources Pathway Standards:</th>
<th>Learning Objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1.0 Implement personal and group safety practices.</td>
<td>Students will be able to…</td>
</tr>
<tr>
<td>B1.1 Practice the rules for personal and group safety while working in an agricultural mechanic’s environment.</td>
<td>• Communicate both orally and in writing.</td>
</tr>
<tr>
<td>B1.2 Integrate accepted shop management procedures and a safe working environment.</td>
<td>• Conduct research, both small and on a larger scale, on specific assigned topics such as safety and machine tool use.</td>
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<tr>
<td>B2.4 Complete a woodworking project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, shaping, joining, and finishing.</td>
<td>• Ask and answer questions using industry terminology.</td>
</tr>
<tr>
<td>B5.5 Complete a cold metal project, including interpreting a plan, developing a bill of materials, selecting materials, shaping, fastening, and finishing.</td>
<td>• Participate in small and large group discussions and clarify points of view when needed.</td>
</tr>
<tr>
<td>B9.7 Construct a welding project using any electric welding process, appropriate products, joints, and positions, which will include interpreting a plan, determining proper assembly sequence, developing a bill of materials and cutting list, selecting and acquiring materials, and developing a clear and concise fabrication contract.</td>
<td>• Interpret information from a variety of documents. (informational text, charts, graphs, etc.).</td>
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<tr>
<td>B12.2 Draw and interpret architectural plans.</td>
<td>• Follow specific policies and procedures for safety and equipment use.</td>
</tr>
</tbody>
</table>

**Reading Standards for CTE Grade 9/10:**
1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
2. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
3. 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.

**Writing Standards for CTE grade 9/10:**

**Unit Assignments:**
- **Agriculture Project Performance Task 1** – Students will develop a project from original idea and will complete all phases of an industry project plan for submission to their teacher. The plan will include a list of all materials and a cost projection. (metal or wood). The plan will also include a sketch to scale drawing using a software application. Students will also use a 3D printer to develop a prototype. All plans must be approved prior to beginning the project. Students will work independently or in approved teams and will be assessed according to industry standards. Project examples include: construction of a BBQ; creation of a fire-pit; construction of a smoker; building a patio furniture set, etc. Students will assess the quality of their project and will write a 1-page reflection on areas of strength and areas that could be improved. Students will also assess the quality of at least two other class projects and provide feedback. Students will be required to take digital photographs of their project, attach their plan, attach their reflection and feedback forms, and upload to their digital portfolio (AET – Agriculture Experience Tracker).
- **Agriculture Project Performance Task 2** - Students will develop a project from original idea and will complete all phases of an industry project plan for submission to their teacher. The plan will include a list of all materials and a cost projection. (metal or wood) The plan will also include a sketch to scale drawing using a software application. Students will also use a 3D printer to develop a prototype. All plans must be approved prior to beginning the project. Students will work independently or in approved teams and will be assessed according to industry standards. Project examples include: seasonal ornamental item for donation and/or sale. Students will be working with advanced tools and machinery. (milling machine, grinders, combo lathe, plasma cutters, ironworker, metal bender, etc.) Students will assess the quality of their project and will write a 1-page reflection on areas of strength and areas that could be improved.
2d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
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.
8. Gather relevant information from multiple authoritative print and digital sources (primary and secondary), using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. CA

Students will also assess the quality of at least two other class projects and provide feedback. Students will be required to take digital photographs of their project, attach their plan, attach their reflection and feedback forms, and upload to their digital portfolio (AET – Agriculture Experience Tracker).

Note: Students will begin work on these projects in the first semester and continue throughout the year. Student projects will be assessed throughout the year during various stages of development. All students will present their project – along with their cover letter and resume at the end of the course.

- Vocabulary Activity - Students will utilize a variety of industry related terms and will demonstrate their understanding through use of the vocabulary while in the shop and will be provided unit quiz assessments on the industry vocabulary. The vocabulary section will be part of the student’s final exam.

Review End of Year Career Task - As a continuation of the career exploration task in year 1, students will build upon their career search and resume experience as part of the year 2 requirement. Utilizing a variety of online resources, information from guest speakers, information from their FFA organization, information from regional and state-wide industries and businesses, students will enhance their resume and cover letter and educational exploration task. They will identify at least three fields of study that they would like to research with regard to the field of agricultural engineering coursework. Students will upload their resume and cover letter to the instructor at the end of the course.

**Unit Assessments:**
- Measurement Skills Test
- Notebook Checks
- Scale Drawing and Reflection utilizing industry standard rubric
- Sketch designs
- Project Plan Presentation
- Unit assessment regarding wood and metal.
- School-Based Enterprise SAE activity (students choose from a list of possibilities at school) or they can explore Ownership/Entrepreneurship SAE opportunities.

**Unit Resources:**
- Various tools and equipment
- https://owl.english.purdue.edu/owl/
### Agricultural Engineering 1 Scope and Sequence

#### Unit 3 – Large Project Fabrication & Career Exploration

**Length: 16 Weeks**

**Unit Description:** In Unit 3, students will complete a large-scale metal fabrication project. They will utilize a variety of metallurgy principles and fabrication techniques, understand and apply agriculture cold metal processes, utilize industry measurement and layout techniques learned in Agriculture Engineering 1, demonstrate an understanding of electric arc welding processes, and develop and execute a comprehensive design plan based on industry standards. As a culminating activity, students will participate in a design showcase where they analyze their designs using common industry specification rubrics. Students will also present their comprehensive career exploration project.

**Agricultural and Natural Resources Pathway Standards:**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>B1.0</td>
<td>Implement personal and group safety practices.</td>
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<tr>
<td>B2.4</td>
<td>Complete a woodworking project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, shaping, joining, and finishing.</td>
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<tr>
<td>B3.0</td>
<td>Demonstrate basic electricity principles and wiring practices commonly used in agriculture.</td>
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<tr>
<td>B4.4</td>
<td>Complete a plumbing project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, joining, and testing.</td>
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<tr>
<td>B5.0</td>
<td>Understand agricultural cold metal processes.</td>
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<tr>
<td>B5.1</td>
<td>Identify common metals, sizes, and shapes.</td>
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<td>B5.2</td>
<td>Demonstrate basic tool-fitting skills.</td>
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<td>B5.3</td>
<td>Properly lay out materials for a given project.</td>
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<tr>
<td>B5.4</td>
<td>Demonstrate basic cold metal processes (e.g., shearing, cutting, drilling, threading, bending).</td>
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<tr>
<td>B5.5</td>
<td>Complete a cold metal project, including interpreting a plan, developing a bill of materials, selecting materials, shaping, fastening, and finishing.</td>
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<td>B7.0</td>
<td>Understand oxy-fuel cutting and welding.</td>
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<td>B7.1</td>
<td>Explain the role of heat and oxidation in the cutting process.</td>
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<tr>
<td>B7.2</td>
<td>Properly set up, adjust, shut down, and maintain an oxy-fuel system.</td>
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<tr>
<td>B7.3</td>
<td>Flame-cut metal with an oxy-fuel cutting torch.</td>
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<tr>
<td>B7.4</td>
<td>Fusion-weld mild steel with and without filler rod by using oxy-fuel equipment.</td>
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<tr>
<td>B7.5</td>
<td>Repair metal objects using a variety of techniques, such as brazing or hard surfacing.</td>
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<tr>
<td>B8.1</td>
<td>Select, properly adjust, safely employ, and maintain appropriate welding equipment (e.g., gas metal arc welding, shielded metal arc welding, gas tungsten arc welding).</td>
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<tr>
<td>B8.2</td>
<td>Design project plans by using mechanical drawing techniques.</td>
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<tr>
<td>B8.3</td>
<td>Finish a metal project by implementing proper sequencing.</td>
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<tr>
<td>B8.4</td>
<td>Construct a welding project using any electric welding process, appropriate products, joints, and positions, which will include interpreting a plan, determining proper assembly sequence.</td>
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**Learning Objectives:**

<table>
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<td>Interpret information from a variety of documents (informational text, charts, graphs, etc.).</td>
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<td>Follow specific policies and procedures for safety and equipment use.</td>
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<td>Demonstrate health and safety practices when working in the shop.</td>
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<td>Maintain tools and equipment according to industry specifications.</td>
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<td>Set up and maintain shop to avoid health concerns or safety hazards.</td>
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<td>Practice personal safety when handling materials or machinery.</td>
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<td>Locate and adhere to MSDS instructions.</td>
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**Unit Assignments:**

- **Performance Task:** Students will select a large-scale project for completion throughout the second semester. The project will go on display at a regional fair or other large-scale event. Students will complete all phases of project plans from original design concept through sketch plan, prototype development, materials cost analysis, and time management. Students will work independently, under the supervision of their instructor, and will utilize a variety of machine shop tools and equipment. The project will include integration of metals, wood, small or large engine design, electrical design, and may include irrigation. Students will be assessed periodically by industry experts who will visit the classroom to assist in review of project before completion. Upon completion of their large-scale project, students will showcase their project and will be assessed according to industry standards for all phases of project design. Students will write a reflection on the entire process, which will include areas of strength and areas of improvement. Students will also assess at least two other student projects using industry standard rubrics.
  - As a foundation for learning within the Performance Task, students will demonstrate the following skills and competencies:
    - Define metallurgy principles, including distortion, hardening, tempering, and annealing.
    - Operate and maintain various arc welding and cutting systems safely and appropriately.
    - Design project plans by using mechanical drawing techniques.
  - As a foundation for learning within the Performance Task, students will employ and maintain appropriate welding equipment (e.g., gas metal arc welding, shielded metal arc welding, gas tungsten arc welding).
  - Students will design and develop a comprehensive design plan based on industry standards. As a culminating activity, students will participate in a design showcase where they analyze their designs using common industry specification rubrics. Students will also present their comprehensive career exploration project.
B8.2 Read welding symbols and plans, select electrodes, fit-up joints, and control heat and distortion.
B8.3 Apply gas metal arc welding, shielded metal arc welding, or flux core arc welding processes to fusion-weld mild steel with appropriate welding electrodes and related equipment.
B8.4 Weld a variety of joints in various positions.
B9.0 Assimilate metallurgy principles and fabrication techniques.
B9.1 Define metallurgy principles, including distortion, hardening, tempering, and annealing.
B9.2 Operate and maintain various arc welding and cutting systems safely and appropriately.
B9.3 Operate and maintain fabrication tools and equipment safely and appropriately.
B9.4 Design project plans by using mechanical drawing techniques.
B9.5 Finish a metal project by implementing proper sequences.
B9.6 Manipulate and finish metal by using a variety of tools, machines, and techniques (e.g., lathe, mill, CNC plasma, shears, press break, grinders, and sanders).
B9.7 Construct a welding project using any electric welding process, appropriate products, joints, and positions, which will include interpreting a plan, determining proper assembly sequence, developing a bill of materials and cutting list, selecting and acquiring materials, and developing a clear and concise fabrication contract.
B12.2 Draw and interpret architectural plans.
B12.6 Construct agricultural structures by using wood framing and steel framing systems (e.g., barns, shops, greenhouses, animal structures).
B12.7 Develop clear and concise agricultural construction contracts.

Reading Standards for CTE Grade 9/10:
1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
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.

• Demonstrate teamwork approach to learning.
• Utilize the internet and other sources of technology to retrieve information.
• Cite evidence from text using a variety of sources.
• Demonstrate basic electricity principles.
• Complete a project according to timelines and specifications.
• Create industry standard plans.
• Identify and correctly use common metals, woods, and tools.
• Demonstrate basic cold metal processes.
• Complete a cold metal project.
• Understand and demonstrate oxy-fuel cutting and welding techniques.
• Repair basic metal objects using a variety of welding techniques.
• Maintain equipment according to industry specifications.
• Read welding symbols and plans according to industry specifications.
• Weld a variety of joints in a variety of positions.
• Utilize metallurgy principles and fabrication techniques.
• Utilize common industry vocabulary.

Students will participate in an end-of-year career showcase where they exchange their career exploration findings with at least two other student groups.

Throughout the 16-week unit, students will also complete a series of competency-based shop assessments, as outlined below. The instructor will pace the shop assessments accordingly and all students will be expected to complete each procedural demonstration assessment as outlined:

• Procedure 1: Following an instructor led demonstration, students will utilize the SMAW machines to assemble a butt joint, corner joint, tee joint, lap joint, and an edge joint. They will be asked to focus on safety and proper joining techniques. Students will be assessed using a common industry standard rubric on joining techniques. Following the creation of the joints in Procedure 1, students will be asked to utilize analytical thinking skills and grade and judge the welds they created. They will focus on weld defects discussed in
### Writing Standards for CTE grade 9/10:

2d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

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.

8. Gather relevant information from multiple authoritative print and digital sources (primary and secondary), using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. CA

### Unit Assessments:
- Unit test
- Unit quizzes
- Tool Identification assessment
- Notebook Check
- End of Course Final Exam
- End of Course Career Exploration Project
- Large Scale Project presentation.
- Procedural Skills Tests
- Culminating SAE and FFA activities as well as Record Book and Portfolio management summative activities.

### Unit Resources:
- Various tools and equipment
- [https://owl.english.purdue.edu/owl/](https://owl.english.purdue.edu/owl/)

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class (industry specifications). They will be asked to write a reflective summary of how to prevent defects from occurring in the future.

- **Procedure 2:** Following an instructor led demonstration, students will use the GMAW machines to assemble a butt joint, a corner joint, a tee joint, a lap joint, and an edge joint. They will be asked to focus on safety and proper joining techniques. Students will be assessed using a common industry standard rubric on joining techniques. Following the creation of the joints in Procedure 1, students will be asked to utilize analytical thinking skills and grade and judge the welds they created. They will focus on weld defects discussed in class (industry specifications). They will be asked to write a reflective summary of how to prevent defects from occurring in the future.

- **Procedure 3:** Following an instructor led demonstration, students will demonstrate the proper procedures for setting up and shutting down oxygen/acetylene torch. Using the torch, students will be asked to cut a straight line, a 45-degree beveled cut, and a pierce and circular hole. Students will be assessed using a common industry standard rubric on joining techniques. They will be asked to write a reflective summary of how to prevent defects from occurring in the future.