

SUBJECT AREA – CAREER/TECHNICAL EDUCATION

COURSE TITLE: ADVANCED DESIGN AND FABRICATION TECHNOLOGY II - IV

CBEDS ASSIGNMENT CODE: 5601

COURSE CODE: T0855e, T0856e, T0857e

GRADE LEVEL: 10-12

COURSE LENGTH: One Year

PREREQUISITE: Design and Fabrication Technology

CREDIT: 10 Units

UC/CSU CREDIT: None

GRADUATION REQUIREMENT: Fulfills 10 units of World Languages/Visual and Performing Arts/Career Technical Ed. graduation requirements

STANDARDS and BENCHMARKS: Woodworking: 1.0: A - I; 2.0: A – G; 3.0: A – F; 4.0: A –D.  
Engineering: 2.0, 2.1-2.3; 4.0, 4.1- 4.8; 5.0, 5.1 - 5.7; 10.0, 10.2, 10.3, 10.5; 13.0, 13.1, 13.2; 14.0, 14.1-14.4; 15.0, 15.1-15.3; 16.0, 16.1-16.3; 17.0, 17.1, 17.2; 19.0, 19.1-19.3; 20.0, 20.1-20.3; 21.0, 21.1-21.3; 25.0, 25.1-25.7; 28.0, 28.1-28.4; 29.0, 29.1, 29.3; 30.0, 30.5; 32.0, 32.1; 37.0, 37.2, 37.3; 38.0, 38.1,

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38.2; 39.0, 39.1, 39.2; 40.0, 40.1-40.3; 42.0, 42.2; 43.0, 43.1, 43.2; 45.0, 45.1, 45.2  
Visual Arts: 1.0, 1.4; 2.0, 2.1-2.3, 2.6, 2.7, 2.9, 2.10, 2.12; 3.0, 3.3; 5.0, 5.2, 5.4

**COURSE DESCRIPTION:**

Students will continue to build on skills and procedures learned and practiced in Design and Fabrication Technology. While the first year's course explored design, machinery, and fabrication, Advanced Design and Fabrication II-IV will integrate those aspects of technology with a student's individual expression. Employing hand tools, power tools, and Computer-Aided Manufacturing machines, students will respond to the needs of the built environment as well as society at large, through the exploration of several different arenas including, woodworking, metalworking, jewelry, casting, glass work and plastics. Throughout the year, emphasis will be placed on safety, responsibility, and cooperation.

**COURSE GOALS:**

Upon completion of the course, student will:

Understand and apply the following principles:

1. Visualization
2. Inquiry
3. Research & Specifications
4. Design
5. Integration & Prototype
6. Assessment & Quality Control
7. Implementation

**TEXTBOOK MATERIALS**

Fundamentals of Modern Manufacturing: Materials, Processes and Systems, Groover , Mikell  
Technology Design and Application, R. Thomas Wright, 2004

**TEACHER RESOURCES**

Periodicals: *Fine Woodworking*, *Wood*, *American Woodworker*, *Woodsmith*, *Art Metal & Metalworking Resource*, *Metal Web News*, *Polymer News*, and *Glass Magazine*.

Acalanes Union High School District  
 Course Content and Performance Objectives  
**ADV DESIGN AND FABRICATION TECHNOLOGY II-IV**

	CAHSEE	Standards & Benchmarks	Standards Based Test (CST)	Assessment	Timeline
<p><b>Safety</b></p> <p><b>1.0 STUDENTS WILL BE MADE AWARE OF SAFETY PROCEDURES AND ACQUIRE THE KNOWLEDGE TO SAFELY WORK IN THE DESIGN &amp; FABRICATION LAB.</b></p> <p>1.1 Students will work safely at all times in the lab area and follow lab skills\classroom rules</p> <p>1.2 Understand and follow General Safety Rules</p> <p>1.3 Understand and heed Behavior Policies</p> <p>1.4 Understand and follow Emergency Procedures (Fire, Earthquake)</p>	N/A	<p><u>Wood 3 A-F</u>  <u>Eng &amp; Design</u>            6.0, 6.1- 6.3</p>	N/A	<p>Safety Tests            In-Class Demos            Personal Communication            Performance Product</p>	<p>Ongoing            1<sup>st</sup> week            3-4 days</p>
<p><b>Career Orientation</b></p> <p><b>2.0 STUDENTS WILL BE MADE AWARE OF THE MANY SPECIALIZED TYPES OF CAREERS ASSOCIATED WITH THE DESIGN &amp; FABRICATION TECHNOLOGY FIELD AND ACQUIRE THE KNOWLEDGE ABOUT FABRICATION CAREERS NECESSARY TO MAKE INFORMED AND POSITIVE CHOICES FOR THEIR FUTURE.</b></p> <p>2.1 Make more definite choices during their high school years</p> <p>2.2 Set more selective goals in their post high school education</p> <p>2.3 Set better goals for their future beyond their formal education</p>	N/A	<p><u>Wood 4 A-D</u>  <u>Eng &amp; Design</u>            3.0, 3.1 - 3.6</p>	N/A	<p>Lecture            Quiz</p>	<p>1<sup>st</sup> Qtr            1-2 days</p>

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<b>The Design Process</b>  <b>3.0 STUDENTS WILL KNOW AND USE THE DESIGN PROCESS IN THEIR PROJECTS</b>  3.1 Identify and define the problem (identify needs) 3.2 Gather information (brainstorm) 3.3 Research 3.4 Select and refine the best solution 3.5 Test and evaluate the solution (improve) 3.6 Communicate and present the solution	N/A	<u>Wood</u> 2A-B <u>Visual Arts-</u> 1.4 <u>Eng &amp; Design</u> 5.1 - 5.7	N/A	Projects Drawings Class Critiques	Ongoing 1-2 weeks
<b>Design Skills</b>  <b>4.0 STUDENTS WILL UTILIZE THE ENGINEERING DESIGN CONSIDERATIONS IN THEIR PROJECTS:</b>	N/A	<u>Eng &amp; Design</u> 2.0, 2.1-2.3 4.1- 4.8 10.1-10.5 14.0 -17.0	N/A	Projects Mini Design Quizzes	3-4 weeks
<ul style="list-style-type: none"> <li>• Practicality</li> <li>• Affordability</li> <li>• Environmental implications</li> <li>• Manufacturability</li> <li>• Ethics and professional practice</li> <li>• Visual representation (sketching, 2-D CAD, 3-D CAD)</li> <li>• Modeling (sculpted models, prototype model, process model)</li> </ul>					

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<b>Measuring and Layout</b>  <b>5.0 STUDENTS UNDERSTAND AND APPLY THE PRINCIPLES OF PLANNING, LAYOUT, MATERIALS, ASSEMBLY, AND FINISHING PROCESSES IN THE FABRICATION LAB.</b>  5.1 Understand and use correct measuring practices using foot\inch system including fractions  5.2 Understand safety and properly use and maintain hand tools: <ul style="list-style-type: none"> <li>• layout tools</li> <li>• edging tools</li> <li>• hand saws</li> <li>• drilling and boring tools</li> <li>• miscellaneous hand tools</li> <li>• files and rasp,</li> <li>• abrasives</li> <li>• clamps and vices</li> </ul>	N/A	<u>Wood</u> 1.0, A - I <u>Eng &amp; Design</u> 40.1 - 40.3	N/A	Projects Tests Review of Drawings	2 – 2 ½ weeks

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CAHSEE Standards & Benchmarks Standards Based Test (CST) Assessment Timeline

Product Design for Assembly	CAHSEE	Standards & Benchmarks	Standards Based Test (CST)	Assessment	Timeline
<p><b>6.0 STUDENTS WILL PRODUCE A PRODUCT OUT OF A VARIETY OF MATERIAL (WOOD, PLASTIC, METAL)</b></p> <ul style="list-style-type: none"> <li>• Assembly</li> <li>• Joinery</li> <li>• Molding</li> <li>• Casting</li> <li>• Jigs and fixtures</li> <li>• Basic elements of machining system</li> <li>• Cutting tool section</li> <li>• Computer integrated manufacturing (CAD, CNC, Robotics)</li> <li>• Concurrent engineering</li> </ul>	N/A	<p><u>Wood</u> 2 A - F <u>Visual Arts</u> 2.1 - 2.6 <u>Eng &amp; Design</u> 42.1, 42.2 43.1, 43.2 45.1, 45.2</p>	N/A	Projects Rubrics Class Critiques	Several projects throughout the year
<p><b>Product specification, standardization and tolerance analysis.</b></p>					
<p><b>7.0 STUDENTS WILL IMPLEMENT QUALITY AND STATISTICAL CONTROL PROCEDURES TO ENSURE AND IMPROVE QUALITY IN MANUFACTURING PROCESSES.</b></p> <p>7.1 Analyze the contributing factors to industrial processes</p> <p>7.2 Use statistic processes control concepts to evaluate and modify manufacturing process.</p> <p>7.3 Clean technology and green design</p>	N/A	<p><u>Eng &amp; Design</u> 41.1, 41.2 43.1, 43.2 45.1, 45.2</p>	N/A	Tests Projects Group Presentations Evaluations by teacher and class w/ a rubric	2-3 weeks

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**ADV DESIGN AND FABRICATION TECHNOLOGY II-IV**

	CAHSEE	Standards & Benchmarks	Standards Based Test (CST)	Assessment	Timeline
<b>The Nature of Engineering</b>  <b>8.0 STUDENTS WILL USE COMMUNICATION SKILLS IN SHARING OF IDEAS, DESIGN, TEST RESULTS, AND STANDARDS AND SPECIFICATIONS.</b>  8.1 Written reports (technical report writing) 8.2 Technical presentation (visual displays, computer presentations oral presentations) 8.3 Electrical transmission of data (internet, LAN, WAN, wireless) 8.4 Team Approach ( Small group develops a product ) 8.5 Team Project ( The project would include product design, documentation, process planning, process routing, marketing information, product cost estimation, tool design, written and oral presentation)	N/A	<u>Eng &amp; Design</u> 2.0, 2.1- 2.3	N/A	Projects Group Presentations Evaluations by teacher and class w/ a rubric	From 2 <sup>nd</sup> Qtr on

### **TEACHING STRATEGIES AND PROCEDURES**

- Lecture
- Demonstration
- Group work
- Individual projects and group projects
- Trained students teaching their classmates-peers helping peers
- Instructional videos on system processes and manufacturing
- Guest speakers
- If possible, field trips to local manufacturing plants

### **GRADING GUIDELINES**

See AUHSD Grade Guidelines: Final Mark Rubric and Final Course Mark Determination Components