ACALANES UNION HIGH SCHOOL DISTRICT

Adopted: 05/18/05

Career/Tech Education

Subject Area

COURSE TITLE: Design and Fabrication Technology

COURSE CODE: T0849e

GRADE LEVEL: Grades 9 – 12

COURSE LENGTH: One Year

PREREQUISITE: None

CREDIT: 10 Units

UC/CSU CREDIT: None

GRADUATION REQUIREMENT: Fulfills 10 units of Foreign Language/Visual and Performing Arts/Career Technology graduation requirement

STANDARDS and BENCHMARKS: Standard 1-Benchmarks: 1.1, 1.2, 1.3, 1.4; Standard 2-Benchmarks 2.1, 2.2, 2.3; Standard 3-Benchmarks: 3.1, 3.2, 3.5, 3.6; Standard 4-Benchmarks: 4.1, 4.3, 4.4, 4.6, 4.7; Standard 5-Benchmarks: 5.1, 5.2, 5.3, 5.4, 5.6, 5.7; Standard 6-Benchmarks 6.1, 6.2, 6.3; Standard 8-Benchmarks 8.1, 8.2, 8.3; Standard 9-Benchmarks 9.1, 9.2, 9.3, 9.4; Standard 25- Benchmarks 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7; Standard 37-Benchmarks: 37.1, 37.2, 37.3; Standard 38-Benchmarks 38.1, 38.2; Standard 39-Benchmarks 39.1, 39.2; Standard 40-Benchmarks 40.1, 40.2, 40.3; Standard 41-Benchmarks 41.1, 41.2; Standard 42-Benchmarks 42.1, 42.2; Standard 43-Benchmarks 43.1, 43.2; Standard 44-Benchmarks 44.1, 44.2; Standard 45-Benchmarks 45.1, 45.2

COURSE DESCRIPTION: Design and Fabrication Technology provides students with knowledge to safely operate and maintain hand and power tools as well as woodworking, plastic and metal machines as an introduction into the processes necessary to manufacture a product, this course is designed to show the inter-relationships between design, machinery, and fabrication. The course provides a broad range of applied basic skills and specific technical skills necessary to function in a highly technological society and work place. The student will improve skills in the drafting, machining and fabrication. The design process is examined as it relates to manufactured products. Topics also included are how to write specifications, how to control quality, understanding tests and analysis, and working with prototypes. The student is given lab assignments to be completed on CAD software.

COURSE GOALS: The goal of the course is to have students use the design process to create a product. This will be accomplished by identifying and defining the problem, gathering information through brainstorming, research, selecting and refining the best solution, testing and evaluating the solution.

TEXTBOOK MATERIALS: *Fundamentals of Modern Manufacturing: Materials, Processes and Systems* by Groover , Mikell Technology design and application by R. Thomas Wright

TEACHER RESOURCES: Periodicals, Internet, Specialty Books, Videos

	HSEE	Standards & Benchmarks	Assessment	Timeline
Safety				
1.0 **STUDENTS WILL BE MADE AWARE OF SAFETY PROCEDURES AND ACQUIRE THE KNOWLEDGE TO SAFELY WORK IN THE DESIGN & FABRICATION LAB.**	N/A	Standard 6.0		10% (1st Quarter emphasis)
1.1 Students will work safely at all times in the lab area and follow lab skills\classroom rules 1.2 Understand and follow General Safety Rules 1.3 Understand and heed Behavior Policies 1.4 Understand and follow Emergency Procedures (Fire, Earthquake)		Benchmarks: 6.1, 6.2, 6.3	Selected Response Performance /Product Written Exam	
Career Orientation				
2.0 **STUDENTS WILL BE MADE AWARE OF THE MANY SPECIALIZED TYPES OF CAREERS ASSOCIATED WITH THE DESIGN & FABRICATION TECHNOLOGY FIELD AND ACQUIRE THE KNOWLEDGE ABOUT FABRICATION CAREERS NECESSARY TO MAKE INFORMED AND POSITIVE CHOICES FOR THEIR FUTURE.**	N/A	Standard 3.0		10% (1st Quarter emphasis)
2.1 Make more definite choices during their high school years 2.2 Set more selective goals in their post high school education 2.3 Set better goals for their future beyond their formal education		Benchmarks 3.1, 3.3, 3.5, 3.6	Selected Response Orientation Paper	
The Design Process				
3.0 **STUDENTS WILL KNOW AND USE THE DESIGN PROCESS IN THEIR PROJECTS**	N/A	Standards 25.0 & 41.0		15%
3.1 Identify and define the problem (identify needs) 3.2 Gather information (brainstorm) 3.3 Research		Benchmarks 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7	Constructed Response Selected Response	

	HSEE	Standards & Benchmarks	Assessment	Timeline
3.4 Select and refine the best solution 3.5 Test and evaluate the solution (improve) • Communicate and present the solution		41.0, 41.1, 41.2		
Design Skills				
4.0 **STUDENTS WILL UTILIZE THE ENGINEERING DESIGN CONSIDERATIONS IN THEIR PROJECTS:** • Practicality • Affordability • Environmental implications • Manufacturability • Ethics and professional practice • Visual representation (sketching, 2-D CAD, 3-D CAD) • Modeling (sculpted models, prototype model, process model)	N/A	Standards 38.0 , 39.0 42. 0 Benchmark 38.1, 38.2, 39.1, 39.2 42.1, 42..2	Constructed Response Selected Response	15%
Measuring and Layout				
5.0 **STUDENTS UNDERSTAND AND APPLY THE PRINCIPLES OF PLANNING, LAYOUT, MATERIALS, ASSEMBLY, AND FINISHING PROCESSES IN THE FABRICATION LAB.**	N/A	Standards 37.0, 45. 0		15%
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: • layout tools • edging tools • hand saws • drilling and boring tools • miscellaneous hand tools • files and rasp, • abrasives • clamps and vices		Benchmarks 37.1, 37.2, 37.3, 45.1, 45.2	Selected Response Constructed Response	

	HSEE	Standards & Benchmarks	Assessment	Timeline
Product Design for Assembly 6.0 **STUDENTS WILL PRODUCE A PRODUCT OUT OF A VARIETY OF MATERIAL (WOOD, PLASTIC, METAL)** • Assembly • Joinery • Molding • Casting • Jigs and fixtures • Basic elements of machining system • Cutting tool section • Computer integrated manufacturing (CAD, CNC, Robotics) • Concurrent engineering	N/A	Standards 42, 43, 45. Benchmarks: 42.1, 42.2, 43.1, 43.2, 45.1, 45.2	Constructed Response Product	15%
Product specification, standardization and tolerance analysis. 7.0 **STUDENTS WILL IMPLEMENT QUALITY AND STATISTICAL CONTROL PROCEDURES TO ENSURE AND IMPROVE QUALITY IN MANUFACTURING PROCESSES.** 7.1 Analyze the contributing factors to industrial processes 7.2 Use statistic processes control concepts to evaluate and modify manufacturing process. 7.3 Clean technology and green design	N/A	Standard 41.0 Benchmarks 41.1, 41.2	Product Evaluation	10%
The Nature of Engineering 8.0 **STUDENTS WILL USE COMMUNICATION SKILLS IN SHARING OF IDEAS, DESIGN, TEST RESULTS, AND STANDARDS AND SPECIFICATIONS.** 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)	N/A	Standards 2.0 37.0, 25.0 Benchmarks 37.1, 37.2 37.3, 2.1, 2.2, 2.3, 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7	Written Reports Check off list Rubric	10%

	HSEE	Standards & Benchmarks	Assessment	Timeline
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)				

TEACHING STRATEGIES AND PROCEDURES

- Lecture
- Demonstrations
- Videos
- Peer tutoring
- Guest lectures/ Demonstrations

GRADING GUIDELINES

Problem assignments, exams, team rubrics, and class discussions.

Process

Workmanship Safety in Lab	25%
Team Design	

Assessments

Work Reports (written)	25%
Progress or projects	

Products

Product (craftsmanship)	40%

Quality Control

Does the product meet the specifications	10%