

**FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT**

**COURSE OUTLINE  
Engineering Design**

**Date:** May 2001

**Proposed Grade Level(s):** 9 & 10

**Grading:** A-F

**Prerequisites:** None

**Subject Area:** Technology

**Course Length:** 1 Year

**Number of Credits:** 5/Semester

**COURSE DESCRIPTION:**

Engineering Design is an introductory course in which students develop problem-solving skills, with emphasis placed on three-dimensional solid models. This course is one year in length and offered to 9<sup>th</sup> and 10<sup>th</sup> grade students. Students will work from sketching simple geometric shapes to applying a solid modeling computer software package. They will learn a problem-solving design process and how it is used in industry to manufacture a product. The Computer Aided Design System (CAD) will also be used to analyze and evaluate the product design. The techniques learned and equipment used is the base for the sequence of courses in Engineering Technology in the Polytechnic Academy. Age-appropriate activities are designed for students and will be an integral part of the course. All students will benefit from this course regardless of their respective learning styles, learning rates, or gender.

**GENERAL GOALS/PURPOSES:**

Increase the number of students who pursue engineering and engineering technology programs requiring a four- or two-year college degree.

Students will develop a broad-based understanding of the underlying methodology of scientific processes, engineering problem solving and the application of technology.

Students will demonstrate an understanding of the principles of mathematics and their application to problem solving.

Students will demonstrate effective communication of information and solutions in a variety of contexts, including the preparation and presentation of information in different settings.

Students will develop interpersonal skills and work habits and acquire information that will lead to employment.

**STUDENT READING COMPONENT:**

Students will locate, understand, and interpret written information in documents such as manuals, graphs, and textbooks.

## **STUDENT WRITING COMPONENT:**

Students will communicate thoughts, ideas, information, and messages in writing through letters, directions, reports, graphs, and flowcharts.

## **STUDENT ORAL COMPONENT:**

Students will communicate orally in giving directions to a project and short presentations.

## **STUDENT MATH COMPONENT:**

Students will perform basic and algebraic computations and approaches to practical problems by choosing appropriately from a variety of mathematical techniques.

## **DETAILED UNITS OF INSTRUCTION:**

- 1. Unit 1 Introduction to Engineering Design**
  - 1.1 Syllabus scope and sequence
  - 1.2 Course expectations
- 2. Unit 2 Sketching**
  - 2.1 Measurement
  - 2.2 Elements of Sketching
  - 2.3 Orthographic/Isometric views
  - 2.4 Visualization of solid models
- 3. Unit 3 Introduction to Computer Aided Drafting**
  - 3.1 Hardware familiarization
  - 3.2 Software introduction
  - 3.3 Develop basic geometric shapes
  - 3.4 Develop Engineering Vocabulary
  - 3.5 Produce set of 3-dimensional solid models
- 4. Unit 4 Engineering Design in Manufacturing**
  - 4.1 Materials in Manufacturing
  - 4.2 Machine processes in design
  - 4.3 Adaptation of materials and manufacturing to design software
  - 4.4 Develop complex solid models
  - 4.5 Design using the U.S. standard and metric models
- 5. Unit 5 Building Assemblies and Analyzing Components**
  - 5.1 Develop assemblies
  - 5.2 Create presentation animation
  - 5.3 Determine interferences
- 6. Unit 5 Geometric Tolerance and Dimensioning**
  - 6.1 American National Standards Institute Dimensioning Standards
  - 6.2 Applying Standards to CAD models
  - 6.3 Produce printed dimensioning
  - 6.4 Section views and Dimensioning
- 7. Unit 6 Introduction to Architectural Design**
  - 7.1 Research house designs
  - 7.2 Understanding Customer needs and criteria
  - 7.3 Pre-cost analysis
  - 7.4 Sketching to scale
  - 7.5 Architectural software familiarization
  - 7.6 Develop exterior elevations

- 7.7 Develop detail floor plans
- 7.8 Architectural Dimensioning Standards
- 7.9 Develop CAD drawings with dimensions
- 7.10 Plotting and presentation of drawings
- 7.11 Final cost analysis

**THIS COURSE WILL PREPARE STUDENTS FOR THE HSEE AND/OR THE FCUSD EXIT EXAMS:**

Math, Reading, Writing

**LAB FEE, IF REQUIRED:** \$20 per year

**SUBJECT AREA CONTENT STANDARDS TO BE ADDRESSED:**

Industrial and Technology Education Content and Performance Standards 1996:

Standard 1 Drafting

Standard 2 Computer Aided Drafting

**DISTRICT ESLR'S TO BE ADDRESSED:**

When students complete an Industrial and Technology Education course, they will be:

1. **Self-directed Learners** who will be able to solve engineering problems;
2. **Effective Communicators** who can express technology concepts to others effectively;
3. **Quality Producers** who can solve technology problems in a neat and organized manner;
4. **Constructive Thinkers** who are able to approach complex technology problems in a organized, logical, and systematic fashion;
5. **Collaborative Workers** who can work in teams to accomplish a task; and
6. **Responsible Citizens** who accept responsibility for their actions.