El Camino College
COURSE OUTLINE OF RECORD – Approved

I. **GENERAL COURSE INFORMATION**
    Subject and Number: **Engineering Technology 12A**
    Descriptive Title: **Introduction to Engineering Design I**
    Course Disciplines: **Engineering Technology AND Drafting**
    Division: **Industry and Technology**

    Catalog Description:
    This course is the first of two courses in which students are introduced to the basics of the design process used in engineering fields and the application of computer modeling software. Emphasis is placed on the design process, geometric relationships, visualization, and technical sketching.

    Note: The two-course sequence Engineering Technology 12A and Engineering Technology 12B is the same as Engineering Technology 12.

    Conditions of Enrollment:
    You have no defined requisites.

    Course Length: X Full Term   Other (Specify number of weeks):
    Hours Lecture: 1.00 hours per week   TBA
    Hours Laboratory: 2.00 hours per week   TBA
    Course Units: 1.50

    Grading Method: Letter
    Credit Status: Associate Degree Credit

    Transfer CSU: X Effective Date: 12/15/2008
    Transfer UC: No

    General Education:
    El Camino College:

    CSU GE:
    IGETC:

II. **OUTCOMES AND OBJECTIVES**

   A. **COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)**

     1. SLO #1 Two and Three-Dimensional Models
Given a simple set of design constraints, the student shall be able utilize AutoCad Inventor software to produce a design package including two-dimensional drawings and three-dimensional models.

     2. SLO #2 Missing Orthographic Views
Given an incomplete set of orthographic views of a simple machined part, the student shall be able to complete the given views and to construct the missing views.

     3. SLO #3 Making Revisions
Given an incorrect design package and a list of needed revisions, the student shall be able to correctly and effectively incorporate the revisions into the drawings and models.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at http://www.elcamino.edu/academics/slo/

   B. **Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)**

     1. Compare and contrast the various steps required in the design process.
        Homework Problems

     2. Produce two-dimensional drawings and three-dimensional models using Computer Aided Design and Drafting (CADD) software.
        Performance exams

     3. Identify geometric constraints in three-dimensional models.
        Performance exams

     4. Integrate proper sketching techniques and styles in the creation of engineering drawings.
        Performance exams

III. **OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)**

Lecture or Lab	Approximate Hours	Topic Number	Major Topic

Lecture	1	I	Engineering Design Overview
			    A. Design process overview
			    B. CADD software orientation

Lab	2	II	Engineering Design Overview
			    A. Computer use exercise
			    B. CADD software orientation exercise

Lecture	6	III	Introduction to Design
			    A. Design process
			    B. Visualization and design analysis
			    C. Orthographic construction
			    D. Presentation principles
			    E. Principles and elements of design

Lab	12	IV	Introduction to Design
			    A. Visualization exercise
			    B. Orthographic projection exercise

Lecture	3	V	Geometric Relationships
			    A. Forms, shapes and geometric constraints
			    B. Cartesian coordinate system

Lab	6	VI	Geometric Relationships
			    A. Forms and shapes exercise
			    B. Cartesian coordinate system exercise

Lecture	4	VII	Modeling
			    A. Conceptual, graphical and mathematical
			    B. Computer modeling and adding components
			    C. Model analysis

Lab	8	VIII	Modeling
			    A. Computer modeling exercise
			    B. Model analysis exercise

Lecture	2	IX	Marketing
			    A. Product cost, overhead and quality
			    B. Market analysis

Lab	4	X	Marketing
			    A. Product cost exercise
			    B. Marketing presentation exercise

Lecture	2	XI	Model Documentation
			    A. Working drawings
			    B. Dimensioning

Lab	4	XII	Model Documentation
			    A. Drawing generation exercise
			    B. Drawing annotation exercise

Total Lecture Hours	18
Total Laboratory Hours	36
Total Hours	54

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:
Problem solving demonstrations (computational or non-computational)

B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:
Assignment 12 depicts isometric views and two orthographic views of four three dimensional objects. Sketch the missing third orthographic view for each model in the space provided and submit drawing to the instructor.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:
1. Part #26 in the student directory is a three-dimensional solid model of an assembly link. Create a two-dimensional working drawing from this model including dimensions. Plot the drawing and submit to the instructor.

2. Your team has been assigned to update the design for the "Rack Assembly." Using CADD software reverse engineering techniques and create a model of the current assembly. Save the model to a flash drive and electronically submit the model to the instructor.

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:
Performance exams
Other exams
Quizzes
Written homework
Laboratory reports
Class Performance
Homework Problems
Multiple Choice
Completion
Matching Items
True/False

V. INSTRUCTIONAL METHODS
Demonstration
Laboratory
Lecture
Multimedia presentations
Other: Computer simulations

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS
Study
Answer questions
Required reading
Problem solving activities

Estimated Independent Study Hours per Week: 2

VII. TEXTS AND MATERIALS

A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS
Michael Hacker. Engineering & Technology. 1st ed.   Delmar Cengage Learning, 2010.
Qualifier Text: INDUSTRY STANDARD

B. ALTERNATIVE TEXTBOOKS

C. REQUIRED SUPPLEMENTARY READINGS
Project Lead The Way (PTLW) material and handouts

D. OTHER REQUIRED MATERIALS
Flash Drive (1 GB minimum)
3 Ring-Binder

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification

B. Requisite Skills

Requisite Skills

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Richard Hughes on 09/01/2008.

BOARD APPROVAL DATE: 12/15/2008

LAST BOARD APPROVAL DATE: 01/21/2020

Last Reviewed and Revised by: DANIEL VALLADARES　　　　　　**Date: 10/04/2019**
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