



El Camino College
COURSE OUTLINE OF RECORD – Official

Course Acronym:	ETEC
Course Number:	12
Descriptive Title:	Introduction to Engineering Design
Division:	Industry and Technology
Department:	Engineering Technology
Course Disciplines:	Electronic Technology
Catalog Description:	In this course, 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, technical sketching, modeling, model documentation, assemblies and production processes.
Prerequisite:	
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	2
Hours Laboratory (per week):	4
Outside Study Hours:	4
Total Course Hours:	108
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	12/23/2006
Transfer UC:	propose
Effective Date:	pending
General Education: ECC	
Term:	
Other:	
CSU GE:	
Term:	
Other:	

	IGETC:
	Term:
	Other:
Student Learning Outcomes:	<p>SLO #1 Missing Orthographic Views</p> <p>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.</p> <p>SLO #2 Two and Three-Dimensional Models</p> <p>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.</p> <p>SLO #3 Design Project</p> <p>Upon completion of the course, the student shall be able to take a design project from problem statement to final production drawings.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. Compare and contrast the various steps required in the design process. 2. Produce two-dimensional drawings and three-dimensional models using Computer Aided Design (CAD) software. 3. Identify geometric constraints in three-dimensional models. 4. Apply dimensions and tolerances in accordance with industry standards. 5. Integrate proper sketching techniques and styles in the creation of engineering drawings. 6. Modify features on engineering drawings and models. 7. Extract mass properties from solid models. 8. Compare and contrast manufacturing materials and production processes.
Major Topics:	<p>I. ENGINEERING DESIGN OVERVIEW (2 hours, lecture)</p> <ol style="list-style-type: none"> A. Design process overview B. CAD software orientation <p>II. ENGINEERING DESIGN OVERVIEW (4 hours, lab)</p> <ol style="list-style-type: none"> A. Computer use exercise B. CAD software orientation exercise <p>III. INTRODUCTION TO DESIGN (6 hours, lecture)</p> <ol style="list-style-type: none"> A. Design process B. Visualization and design analysis C. Orthographic construction D. Presentation principles E. Principles and elements of design <p>IV. INTRODUCTION TO DESIGN (12 hours, lab)</p> <ol style="list-style-type: none"> A. Visualization exercise

- B. Orthographic projection exercise

V. GEOMETRIC RELATIONSHIPS (4 hours, lecture)

- A. Forms, shapes, geometric constraints
- B. Cartesian coordinate system

VI. GEOMETRIC RELATIONSHIPS (8 hours, lab)

- A. Forms and shapes exercise
- B. Cartesian coordinate system exercise

VII. MODELING AND MODEL ASSEMBLY (6 hours, lecture)

- A. Conceptual, graphical and mathematical
- B. Computer modeling, adding components
- C. Assembly modeling, assembly constraints
- D. Parts libraries
- E. Model analysis

VIII. MODELING AND MODEL ASSEMBLY (12 hours, lab)

- A. Computer modeling exercise
- B. Model assembly exercise

IX. MODEL DOCUMENTATION (8 hours, lecture)

- A. Working drawings
- B. Dimensioning
- C. Annotation

X. MODEL DOCUMENTATION (16 hours, lab)

- A. Drawing generation exercise
- B. Drawing annotation exercise

XI. PRODUCTION (8 hours, lecture)

- A. Design manufacturability
- B. Process planning
- C. Material procurement
- D. Cost analysis, quality control
- E. Packaging

XII. PRODUCTION (16 hours, lab)

- A. Manufacturability exercise
- B. Production processes exercise

XIII. MARKETING (2 hours, lecture)

- A. Product cost, overhead and quality

	<p>B. Market analysis</p> <p>XIV. MARKETING (4 hours, lab)</p> <p>A. Product cost exercise</p> <p>B. Marketing presentation exercise</p>
Total Lecture Hours:	36
Total Laboratory Hours:	72
Total Hours:	108
Primary Method of Evaluation:	3) Skills demonstration
Typical Assignment Using Primary Method of Evaluation:	Utilizing two isometric views and two orthographic views of four three-dimensional objects, sketch the missing third orthographic view for each model in the space provided. Submit sketches to the instructor.
Critical Thinking Assignment 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. Submit the drawing to the instructor.
Critical Thinking Assignment 2:	Using CAD software, create an orthographic sketch of the idler arm and measure the features with digital calipers. Create a three-dimensional solid model based on the sketch and recorded dimensions. Save the model to a flash drive and submit to the instructor.
Other Evaluation Methods:	<p>Performance Exams</p> <p>Other Exams</p> <p>Quizzes</p> <p>Written Homework</p> <p>Class Performance</p> <p>Multiple Choice</p> <p>Completion</p> <p>Matching Items</p> <p>True/False</p>
Instructional Methods:	<p>Demonstration</p> <p>Lecture</p> <p>Multimedia presentations</p>
If other:	Computer simulations
Work Outside of Class:	<p>Study</p> <p>Answer questions</p> <p>Required reading</p> <p>Problem solving activities</p>
If Other:	
Up-To-Date Representative Texts:	Randy Shih. <u>Parametric Modeling with Autodesk inventor 2022</u> . 21 st edition. SDC Publishers. 2021.
Alternative Texts:	

Required Supplementary Readings:	Project Lead the Way (PLTW) handouts
Other Required Materials:	Flash Drive (1 GB minimum) 3 Ring-Binder
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Steve Cocca/Eric Carlson
Date:	09/01/2005
Original Board Approval Date:	01/23/2006

Last Reviewed and/or Revised by:	Daniel Valladares
Date:	09/19/2023
Last Board Approval Date:	04/15/2024
Effective Term:	FALL 2025