GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: ENGR 1 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2021 CURRICULUM APPROVAL DATE: 11/10/2020

SHORT TITLE: GRAPHICAL COMM AND DESIGN

LONG TITLE: Graphical Communication and Design

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
3	18	Lecture:	2	36
		Lab:	3	54
		Other:	0	0
		Total:	5	90

COURSE DESCRIPTION:

This course covers the principles of engineering drawings in visually communicating engineering designs and an introduction to computer-aided design (CAD). Topics include the development of visualization skills; orthographic projections; mechanical dimensioning and tolerancing practices; and the engineering design process. Assignments develop sketching and 2-D and 3-D CAD skills. The use of CAD software is an integral part of the course. Prerequisite: Math 8B or Math 11 (basic algebra, basic geometry and basic trigonometry). C-ID (ENGR 150).

PREREQUISITES:
MATH 8B or MATH 11

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES
L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
04B - Laboratory - LEH 0.75
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB
73B - Dist. Ed Internet LAB-LEH 0.75

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Apply rules of orthographic projection to create multiview drawings

2. Create pictorials from orthographic views.

3. Use CAD software to create: (a) 2D engineering drawings, including working drawings and assembly drawings. (b) 3D models and assemblies

4. Create auxiliary and section views of an object following correct conventions.

5. Apply standards of dimensioning and tolerancing to engineering drawings.

6. Apply the engineering design process to a design project.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 11/10/2020

Lecture and Lab complement each other.

LECTURE CONTENT:

This course uses mainly AutoCAD and some SolidWorks.

Topic: Introduction to Graphics, Sketching and Drawing

Hours: 16

Lecture Content:

1. Engineering Design Process
2. Engineering Sketching
3. Geometric Construction and use of engineering/architect scales
4. Multiview Projections
5. 3D sketching: isometric, oblique and perspective sketches
6. Auxiliary views
7. Sectional Views

Student Performance Objectives:

1. Demonstrate use of basic drawing instruments to create 2- and 3-D sketches and/or drawings of common items including 3-D spatial visualization.
2. Identify, compare, contrast, and demonstrate various line types, scales and sizes.
3. Identify, compare, contrast, and demonstrate orthographic projection and descriptive geometry including isometric, oblique, sectional, and auxiliary views.

Topic: Dimensioning and Tolerancing

Hours: 6

Lecture Content:

1. Measure, Dimension, Tolerance

2. Dimensioning Standard practices: Placement, Spacing, Grouping, Staggering, Extension Lines, Areas, Reading Direction, View Dimensioning, Scale Dimensions, Repetitive Features,

3 . Detail Dimensions: Holes, Chamfers, Slotted Holes, Keyseat, Keyway.

4. Additional dimensioning topics: Screw Threads, Arcs, concentric circles, Grooves.

5. Tolerancing: Maximum Material Condition (MMC) and Least Material Condition LMC.

6. Tolerancing: clearance fit, interference fit, transition fit.

7. Geometric Dimensioning and Tolerancing (GDT)

8. GDT symbols ASME/ANSI

Student Performance Objectives:

1. Identify, compare, contrast, and describe dimensions and tolerances.

2. Identify, compare, contrast, and describe types of tolerances with their geometric characteristic.

3. Identify, set-up, and solve for tolerances on dimensions in the engineering design process.

Topic: Computer Aided Drafting

Hours: 12

Lecture Content:

1. Wireframe and Solid Modeling

2. Feature-Based Solid Modeling

3. Working Drawings and Assemblies.

4. Descriptive Geometry.

Student Performance Objectives:

1. Demonstrate use of basic drawing instruments to create 2- and 3-D

sketches and/or drawings of common items including 3-D spatial visualization.

2. Identify, compare, contrast, and demonstrate various line types, scales and sizes.

3. Identify, compare, contrast, and demonstrate orthographic projection and descriptive geometry including isometric, oblique, sectional, and auxiliary views.

Topic: Final Exam

Hours: 2

LAB CONTENT:

Topic: Introduction to Graphics, Sketching and Drawing

Hours: 24

Student Lab Activities (each 3 hours):

1. Introduction to Graphics

2. Sketching and Basic 2D Construction

3. Engineering Geometry

4. Construction and Editing Tools

5. Design Visualization

6. Orthographic Views

7. Pictorial Projections: Isometric, Oblique, and Perspective Sketches

8. Sectional Views and Auxiliary views

Topic: Dimensioning and Tolerancing

Hours: 9

Student Lab Activities (each 3 hours):

1. Templates; Basic Dimensioning and Notes

2. Geometric Dimensioning and Tolerancing

3. Applications of tolerances and dimensioning on the Engineering Design Process

Topic: Computer Aided Drafting

Hours: 21

Student Lab Activities (each 3 hours):

1. 3-D Basics: Wireframe Modeling using AutoCAD

2. Solid Modeling using AutoCAD

3. Descriptive Geometry

4. Advanced Solid Features

5. Working Drawings and Assemblies

6. Feature-based Solid Modeling using SolidWorks Part I: parts, assemblies, drawings, 3D sketching, animation, e-drawings

7. Feature-based Solid Modeling using SolidWorks Part II: parts, assemblies, drawings, 3D sketching, animation, e-drawings

METHODS OF INSTRUCTION:

Instruction will follow a standard lecture/discussion format with an additional laboratory period. Homework will be assigned in order to assure mastery of the concepts covered in class. During the laboratory periods students will also be required to utilize computer with CAD programming software. Onshape is a free environment that extends professional-grade modern CAD tools to nonprofessional designers, hobbyists, makers, and open-source projects at no cost. It is similar to commercial systems such as AUTOCAD and SolidWorks. Throughout the course, students will be given opportunities to work together on problems given in class and group projects.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 72

Assignment Description:

1. Analyze and study pertinent text material, solved examples and lecture notes.

2. Apply principles and skills covered in class by solving regularly-assigned homework problems.

3. Regularly synthesize course materials in preparation for exams.

4. Projects to apply concepts learned in class

METHODS OF EVALUATION:

Writing assignments

Percent of total grade: 10.00 %

If this is a degree applicable course, but substantial writing assignments are not appropriate, indicate reason: Course primarily involves skill demonstration or problem solving.

Skill demonstrations

Percent of total grade: 60.00 %

Homework Problems; Lab Reports; Exams

Problem-solving assignments

Percent of total grade: 30.00 %

Homework Problems, Labs and Exams.

REPRESENTATIVE TEXTBOOKS:

Gary Bertoline and Eric Wiebe and William Ross and Nathan Hartman. Fundamentals of Graphics Communication for Engineers. McGraw Hill,2019.

Updating textbook: "A thoroughly contemporary approach to teaching essential engineering graphics skills has made Fundamentals of Solid Modeling and Graphics Communication the leading textbook in introductory engineering graphics courses. The seventh edition continues to integrate design concepts and the use of 3D CAD modeling into its outstanding coverage of the basic visualization and sketching techniques that enable students to create and communicate graphic ideas effectively."

ISBN: ISBN10: 007337539X

Reading Level of Text, Grade: Reading level of text, Grade: 13 Verified by: Verified by: David Argudo using MS Word

Required Other Texts and Materials

Lab Manual Exercises developed by Nick Langhoff (langhoffn@smccd.edu) as part of the Creating Alternative Learning Strategies for Transfer Engineering Programs (CALSTEP) project. Course materials located: https://canadacollege.edu/nsf-iuse/curriculum.php

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 200470

UC TRANSFER:

Transferable UC, effective 200470

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN: ENGR2

CAN Sequence: XXXXXXXX

CSU Crosswalk Course Department: ENGR

CSU Crosswalk Course Number: 150

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: E

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000117011

Sports/Physical Education Course: N

Taxonomy of Program: 090100