5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: ENGR 2 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Fall 2022 CURRICULUM APPROVAL DATE: 04/12/2022

SHORT TITLE: STATICS

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
047 - Laboratory - LEH 0.7
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB
737 - Dist. Ed Internet LAB-LEH 0.7

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Effectively communicate problem statements and solutions in a manner easily deciphered by engineers in and out of one's specific discipline.
2. Determine the forces that act on rigid bodies including external forces, weight, normal, distributed loads, friction and reactions at supports.
3. Calculate internal forces in members and create shear and bending moment diagrams for beams.
4. Perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
5. Analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Identify and apply the principles of Minimal Potential Energy and Virtual Work to the solution of quantitative problems.
2. Identify and apply the principles of frictional forces to the solution of quantitative problems.
3. Identify and apply the principles of beam theory to the solution of quantitative problems.
4. Identify the differences between trusses and frames/machines.
5. Apply the method of sections and the method of joints to solve for the equilibrium state of a truss.
6. Identify and apply the principles of centroids and moment of inertia to the solution of quantitative problems.
7. Identify and apply the principles of forces, moments and couples to the solution of quantitative problems.
8. Formulate and solve engineering problems.
9. Communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
10. Determine the forces that act on rigid bodies including external forces, weight, normal, distributed loads, friction and reactions at supports.
11. Calculate internal forces in members and create shear and bending moment diagrams for beams
12. Analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.
13. Perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
14. Determine the force reactions at the supports of trusses and compute the forces in truss-members;

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

Curriculum Approval Date: 04/12/2022

LECTURE CONTENT:

2 HOURS

1. Vector mathematical operations

addition, subtraction, negation

dot-product, cross-product

mixed triple product

2 HOURS

2. The Principle of static equilibrium: ?F = 0

Newton’s Law's of Motion

decomposition of force vectors into Cartesian components

unit vectors

4 HOURS

3. Statics of particles in two or three dimensions

2 HOURS
7. Forces on Submerged Surfaces
hydrodstatic-pressure versus fluid-depth
free body diagrams for submerged bodies
center of pressure location using the first moment of areas
resultant of hydrostatic forces
4 HOURS
8. Analysis of structures
trusses: forces in members
method of joints;
method of sections
frames and machines: transmission and transformation of forces
2 HOURS
9. Forces in beams and cables
shear and bending-moment diagrams for point-loaded and distributed-loaded beams
cables with concentrated and distributed force-loads
2 HOURS
10. Friction

LAB CONTENT:

During Lab hours we will follow the same topics covered in lecture but with the objective of combining problem-solving activities with programming activities. We will use as a lab manual the book: Solving Statics Problems in MATLAB to accompany Engineering Mechanics Statics by Meriam, Kraige and Halper.

3 HOURS

1. LAB: Using programming tools for vector mathematical operations.

addition, subtraction, negation

dot-product, cross-product

mixed triple product

3 HOURS

2. LAB: Using programming tools to solve problems involving the principle of static equilibrium: ?F = 0

Newton?s Law's of Motion

decomposition of force vectors into Cartesian components

3 HOURS

7. LAB: Using programming tools to solve problems involving forces on Submerged Surfaces

hydrodstatic-pressure versus fluid-depth

free body diagrams for submerged bodies

center of pressure location using the first moment of areas

resultant of hydrostatic forces

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours 8

Assignment Description

A one time project that requires students to analyze and study pertinent text material, solved examples and lecture notes. In addition students will have to use computer software to build a truss.

Project: Truss Analysis using Matlab/Octave

Required Outside Hours 64

Assignment Description

Regularly assigned homework that requires students to apply the principles and skills covered in class by solving related problems.

METHODS OF EVALUATION:

Skill demonstrations

Evaluation Percent 20

Evaluation Description

Students will demonstrate the ability to use scientific computing and programming skills to solve static problems during lab/discussion hours.

Problem-solving assignments

Evaluation Percent 30

Evaluation Description

Homework Problems

Objective examinations

Evaluation Percent 50

Evaluation Description

Performance Exams

REPRESENTATIVE TEXTBOOKS:

Engineering Mechanics: Statics (15th Edition), Russell C. Hibbeler, Prentice Hall (Pearson), 2022.

ISBN: ISBN 13: 9780134798585

Rationale: The 14th Editions is the latest version of the book.

Reading level of text, Grade: 13 Grade Verified by: Verified by: DA using MS Word

Textbook to Supplement Lab Activities: Venkataraman, Panchapakesan, "Essential Mechanics - Statics and Strength of Materials with MATLAB and Octave" (2020). Open Access Books by RIT Staff and Faculty. 3. https://scholarworks.rit.edu/ritbooks/3

RECOMMENDED MATERIALS:

Lab Manual: Solving Statics Problems in MATLAB to accompany Engineering Mechanics Statics 6e (Wiley, 2006) by James L. Meriam, L. G. Kraige, Brian D. Harper

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
CSU GE:
IGETC:
CSU TRANSFER:
Transferable CSU, effective 198670
UC TRANSFER:
Transferable UC, effective 198670

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: ENGR8
CAN Sequence: XXXXXXXX
CSU Crosswalk Course Department:
CSU Crosswalk Course Number:
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: CCC000180918
Sports/Physical Education Course: N
Taxonomy of Program: 090100