Effective: Spring 2020
Last Reviewed: 04/19/2019

Course Outline

BASIC COURSE INFORMATION

Course Number: ENGR 250

Course Title: ENGINEERING STATICS

Total Student Hours and Credit			
		Hours/Week	Hours/Term
Lecture Hours	in-class	3.00	54.00
	out-of-class	6.00	108
Lab Hours	in-class	0	0
	out-of-class	0	0
Activity Hours	in-class	0	0
	out-of-class	0	0
TBA Hours Per Term			0
Total Student Hours Per Term:			162.00
Hours-per-unit Divisor			54.00
Units of Credit:			3.00

Fall semester term is 18 weeks. Spring semester term is 17 weeks. The term length multiplier is 17.5 weeks. Curriculum is calculated based on 18 weeks.

Catalog Description:
Analyzes forces on structures in equilibrium, properties of forces, moments, couples and resultant, conditions for equilibrium, friction, centroids, and area moments of inertia. Introduces mathematical modeling and problem-solving utilizing vector mathematics.

Schedule Description:
Analyzes forces on structures in equilibrium, properties of forces, moments, couples and resultant, conditions for equilibrium, friction, centroids, and area moments of inertia. Prerequisite: MATH 265B and PHYS 208A. Transfer: CSU; UC.

Prerequisites:

- PHYS 208A: PRINCIPLES OF PHYSICS 1
  and
- MATH 265B: CALCULUS II

Division:	Engineering & Technology
Department:	Engineering
Minimal Qualification Discipline Designation (MQDD):	Engineering OR Engineering Technology
Degree Applicability:	Credit - Degree Applicable

Methods of Instruction:

- Lecture and/or discussion
- Distance Education

Grading Method:

- Letter Grade Only

Repeatability:	
Course Cap:	30
Face-to-Face Modality Limit:	30
DE Modality Limit:	30

STUDENT LEARNING OUTCOMES

1. Perform equilibrium calculations of particles and calculate moments.
2. Perform equilibrium calculations for rigid bodies, analyze the effect of distributive-force systems, and analyze trusses and frames.
3. Calculate internal forces and moments, the effects of dry friction, and determine moments of inertias.
4. Effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.

COURSE CONTENT

Objectives:
Upon completion of this course the student will be able to:

1. Solve problems in a professional manner.
    - Quizzes/Exams
    - Written/Typed Homework
2. Analyze statics of particles.
    - Quizzes/Exams
    - Written/Typed Homework
3. Analyze rigid bodies.
    - Quizzes/Exams
    - Written/Typed Homework
4. Solve problems with distributed forces.

- Quizzes/Exams
- Written/Typed Homework

5. Analyze structures.
    - Quizzes/Exams
    - Written/Typed Homework
6. Calculate forces in beams.
    - Quizzes/Exams
    - Written/Typed Homework
7. Calculate problems with friction.
    - Quizzes/Exams
    - Written/Typed Homework
8. Calculate moments of inertia
    - Quizzes/Exams
    - Written/Typed Homework

Topics & Scope:

1. Statics of particles:
    - Parallelgram law
    - Triangle rule
    - Vectors
    - Breaking forces into components, 2D and 3D.
    - Equilibrium, 2D and 3D.

   (Obj 1, 2)
2. Moments:
    - 2D and 3D
    - Transmissibility
    - Force times perpendicular distance
    - Equivalent systems
    - Cross product
    - Dot product

   (Obj 1, 3)
3. Rigid bodies:
    - 2D equilibrium
    - 2-force members
    - 3-Force members
    - Indeterminancy
    - 3D equilibrium

   (Obj 3, 4)
4. Distributed Forces:
    - Areas and lines (composite and integration methods)
        - Center of mass
        - Centroid of plates
        - Wires
        - Pappus-Guldinus

      Distributed loads

        - Distributed loads
        - Submerged surfaces
    - Volumes
        - Centroids using composite bodies

(Obj 3, 4)

5. Structures:
    - Two and Three-force members.
    - Trusses
    - Frames
    - Method of joints
    - Method of sections

(Obj 1, 5)

6. Forces in beams:
    - Internal forces in members
    - Shear and bending moment diagrams
    - Relationships between the diagrams

(Obj 4, 6)

7. Friction:
    - Laws of friction
    - Angles of friction
    - Wedges
    - Square-threaded screws

(Obj 1, 7)

8. Moment of inertia:
    - Moment of inertia of an area using composite areas
    - Parallel-axis theorem
    - Radius of gyration
    - Moment of inertia of an area by integration

(Obj 1, 8)

Assignments:
Examples of independent assignments to fulfill 108 total hours of required out-of-class work:

1. Students will be assigned homework that requires them to analyze various types of structures. (Obj 2, 3, 4, 5, 6, 7)
2. Students will be assigned homework that requires them to find various properties of shapes. (Obj 4, 8)

Class participation and assignments require and develop critical thinking.

1. Students will be given a word problem that required them to calculate the axial force in a truss member. They will need to calculate this force using either the method of joints or sections. They will need to decide and state which method is the best to calculate the force. (Obj 5)
2. Students will be given a word problem that has a shape of a cross-section and they are to calculate the centroid of the shape. There are two methods to do this: Integration or the superposition method. Before calculating they will need to state which method they selected and why. (Obj 4, 8)

selected and why. (Obj 4, 8)

Methods of Evaluation:

- Written/Typed Homework
- Quizzes/Exams

Texts, Readings, and Materials:

- **Textbooks**
  Beer, F, R. Johnston *Vector Mechanics: Statics* McGraw-Hill, (2018).
- **Software**
  Statics 2019 YourOtherTeacher, Inc,

UC Transfer Course

University of California, Santa Barbara

CSU Transfer Course

California Polytechnic State University