ENGR 135: ENGINEERING MECHANICS: STATICS

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2025
Credits:	3
Total Contact Hours:	54
Lecture Hours :	54
Lab Hours:	0
Hours Arranged:	0
Outside of Class Hours:	108
Total Student Learning Hours:	162
Prerequisite:	MATH 191; PHYS 201 or PHYS 201H.
Strongly Recommended:	ENGL C1000.
Transferable to CSU:	Yes
Transferable to UC:	Yes - Approved
Grading Method:	Standard Letter

Catalog Course Description

A vectorial treatment of the principles of statics with application to engineering problems. Composition and resolution of co-plannar force systems; equilibrium of rigid bodies; distributed forces in trusses; frames and cables; shear and bending moments in beams; moments of inertia of areas and bodies and graphical methods are used to model force systems and equilibrium conditions as applied to engineering statics problems. 54 lecture hours.

Course Objectives

- Determine the components of 2D and 3D force vectors using both computational and graphical approaches.
- Analyze trusses by the method of joints and the method of sections; analyze frames and machines.
- Find internal forces in structural members.
- Draw shear and bending moment diagrams.
- Solve problems involving dry friction.
- Find the resultant of concurrent 2D and 3D forces.
- Understand 2D and 3D equilibrium of a particle and solve related problems.
- Calculate moments for rigid bodies about a point and about an axis.
- Calculate the moment of a couple, equivalent couples and equivalent systems.
- Understand 2D and 3D equilibrium of a rigid body and solve related problems; recognize statically indeterminate problems.
- Determine the centroid and the center of mass for 2D objects; calculate the centroids of 3D composite objects.
- Solve problems with distributed loads and hydrostatic loads.
- Calculate the moments of inertia for distributed forces.

Major Course Content

1) General Principles
    a) Mechanics
    b) Historical
    c) Quantities
    d) Units
    e) Problem Solving
2) Concurrent Force Systems
    a) Resolution and addition of forces Moment
    b) Resolution of a force into a force and a couple
    c) Resolution of coplanar force systems Funicular polygon
    d) Resultants of three-dimensional force systems
3) Statics of Particles
    a) Free-body diagrams
    b) Equilibrium of a particle
4) Rigid Bodies: Equivalent Force/Moment Systems
    a) Moments
    b) Vector Representation of a Moment
5) Distributed Forces:
    a) Center of gravity and Centroids.
    b) Composite bodies and figures
    c) Theorems of Pappus
    d) Flexible cables
    e) Moment and shear diagrams
    f) distributed loadsg) Fluid statics
6) Equilibrium of Rigid Bodies
    a) Free-body diagrams
    b) Equilibrium in two dimensions
    c) Equilibrium by funicular polygon
    d) Equilibrium in three dimensions
7) Trusses, Frames, and Machines
    a) Methods of joints
    b) Maxwell diagram
    c) Method of sections
    d) Frames and machines
8) Internal Forces in Structural Members
    a) Moment and shear diagrams
    b) concentrated loads
9) Friction
    a) Dry friction
    b) Wedges
    c) Screws
    d) Journal bearings
    e) Disk and pivot friction
    f) Belt friction
10) Second Moments of Area and Moments of Inertia
    a) Moments of inertia, radius of gyration and transfer of axes
    b) Composite areas
    c) Product of inertia and inclined axes
    d) Mass moment of inertia
    e) Composite bodies
11) Method of Virtual Work
    a) Definition
    b) Principles

Examples of Required Writing Assignments

Short answers describing the significance of problem solutions.

Examples of Outside Assignments

Solve statics problems such as: Cables AB and AC can sustain a maximum tension of 500N, and the pole can support a maximum

compression of 300N. Determine the maximum weight of the lamp that can be supported in the position shown. The force in the pole acts along the axis of the pole.

Instruction Type(s)

Lecture, Online Education Lecture