

COURSE OUTLINE

ENES-120

Statics

3 Credits

HOWARD COMMUNITY COLLEGE

Description

Students will study the equilibrium of stationary bodies under the influence of various kinds of forces. Topics studied include: forces, moments, couples, equilibrium, frames and machines, centroids, moment of inertia, and friction. Vector and scalar methods are used to solve problems. Prerequisite: PHYS-110; Pre- or Co-requisite: MATH-150 or MATH-182. (2 hours lecture, 2 hours lab)

Overall Course Objectives

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

1. Convert engineering data between the FPS and SI system of units.
2. Express a given force in Cartesian vector form.
3. Compute the resultant of coplanar forces.
4. Determine the components of a position vector.
5. Sketch the free-body diagram of a particle in equilibrium.
6. Solve for unknown forces acting on a particle in equilibrium.
7. Determine the moment of a force.
8. Apply the principle of Moments.
9. Calculate the magnitude and direction of a moment of a couple.
10. Replace a system of forces and couples with a single force and a couple.
11. Compute the magnitude of the resultant of a distributed loading.
12. Sketch the free-body diagram of a rigid body in equilibrium.
13. Solve for unknown forces acting on a rigid body.
14. Determine the forces in members of a simple truss.
15. Determine the forces in members of frames and machines.
16. Calculate the forces acting on wedges and screws.
17. Solve for the forces acting in flat belts.
18. Locate the centroid of areas and volume.
19. Compute surface areas of revolution.
20. Compute volumes of revolution.
21. Compute moments of inertia for areas.

Major Topics

- I. Concurrent Forces
 - A. Units, Measurements and Calculations
 - B. Force Vectors
 - C. Coplanar Forces, Cartesian Vectors
 - D. Position Vectors
 - E. Equilibrium of a Particle
 - F. Three-Dimensional Force System

- II. Forces on Rigid Bodies
 - A. Moment of a Force
 - B. Principle of Moments
 - C. Moment of a Couple
 - D. System of a Force and a Couple
 - E. Distributed Loading
 - F. Equilibrium of a Rigid Body

- III. Trusses and Friction
 - A. Simple Trusses
 - B. Frames and Machines
 - C. Dry Friction
 - D. Wedges and Screws
 - E. Flat Belts

- IV. Center of Gravity, Centroid and Moment of Inertia
 - A. Center of Gravity and Centroid
 - B. Theorems of Pappus and Guldinus
 - C. Moment of Inertia for Area
 - D. Parallel Axis Theorem

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member but will be based on homework, quizzes, unit tests, writing assignments and a final exam.

Writing: Specific writing assignments will be determined by the individual faculty member but will require at least 500 words. The writing assignments will deal with procedures for solving problems in Statics.

Other Course Information

This course is an Arts and Sciences elective.