

MAE 130A / SE 101A (4 units)  
Mechanics I: Statics

**Class/Laboratory Schedule:** four hours of lecture, eight hours outside preparation.  
12 hours/week total

**Course Coordinator(s):** Vlado Lubarda

**Textbooks/Materials:**

1. Beer and Johnston, Vector Mechanics for Engineers - Statics, McGraw-Hill, 2012, 10<sup>th</sup> ed.
2. Hibbeler, R.C., "Engineering Mechanics: Statics", Pearson Prentice Hall, 2010, 12<sup>th</sup> ed.

**Catalog Description:** Statics of particles and rigid bodies in two and three dimensions; free body diagrams; internal forces; static analysis of trusses, frames, and machines; shear force and bending moment diagrams in beams; equilibrium problems with friction.

**Prerequisites:** Grades of C- or better in Math 20C and Phys 2A

- Required Course
- Technical Elective Course
- Other: \_\_\_\_\_

**Performance Criteria:**

Objective 1

1.1 Students will learn to formulate and solve equilibrium equations for particles and rigid bodies.

Objective 2

2.1 Students will learn to construct free-body diagrams, and to compute internal forces in statically determinate trusses, frames, and machines.

2.2 Students will learn to construct the moment-shear diagrams for beams, and to identify critical sections subjected to maximum internal forces.

Objective 3

3.1 Students will learn how to solve and analyze equilibrium problems with friction.

**Course Objectives:**

(Numbers in parenthesis refer to ME and AE Program Outcomes)

Objective 1: To teach students the formulation of equilibrium equations for planar and spatial rigid bodies (1a, 5e).

Objective 2: To teach students the process of modeling external forces, drawing free-body diagrams, and evaluating internal forces (1a, 5e).

Objective 3: To teach students how to solve equilibrium problems with friction (1a, 5e).

**Course Topics:**

- 1.) Statics of particles
- 2.) Moment of a force, couples, equivalent systems of forces
- 3.) Equilibrium of rigid bodies in 2D and 3D
- 4.) Distributed forces, centroids, and centers of gravity
- 5.) Static analysis of trusses, frames, and machines
- 6.) Internal forces in beams, shear force and bending moment diagrams
- 7.) Equilibrium problems with friction

**Syllabus Prepared By:** H. Murakami, March 2000

**Revised:** V. Lubarda, via Teaching Work Group, April 2008

**Reviewed:** TWG, June 2010

**Revised:** Lelli Van Den Einde, Anne Hoger, via TWG Meeting, June 2011

**Reviewed:** TWG, August 2012