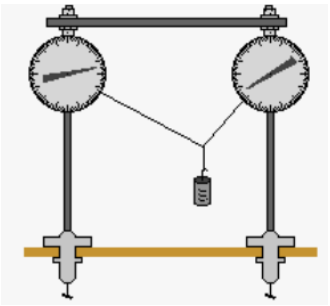
Statics
Spring 2022
Engineering 8
Section #51772



Instructor: Dr. John Heathcote
Class Times: TTh 12:00-1:15pm, **PHY-70** **(Note room change)**
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Office Hours:

MW	12:00-12:50 pm
TTh	11:00-11:50 am
F	10:00-10:50 am

If you cannot make regular office hours, feel free to make an appointment.

Prerequisite: PHYS 4A
Corequisite: MATH 6

Welcome to Statics, your first course in Engineering Mechanics!

I would like to welcome you to ENGR 8! In this course, you will take the topic of static equilibrium which you started in your first semester of physics and develop that topic in an engineering mindset! You will gain skills in vector mathematics, balancing forces and moments (torques), analyzing structures, and building several skills that will be useful in future mechanics courses, such as dynamics and mechanics of materials!

I look forward to working with you in this class! This is a challenging topic, but we can work together so that you can be successful!

Catalog Description: The study of rigid bodies in static equilibrium when acted upon by forces and couples in two- and three-dimensional space. Includes equilibrium of rigid bodies, trusses, frames and machines, as well as the calculation of centers of mass, centroids, friction, moments of inertia, and shear and bending moment diagrams.

Textbook: Engineering Mechanics: Statics, R.C. Hibbeler, 14th Edition, Pearson

You do not need to purchase this textbook yourself. It is available for check-out from the library.

Outcome Assessment Grading:

Your grade for this course will be based on you meeting the outcomes of the course. The following outcomes will be assessed by either quiz, test, or take-home project.

Graded Course Outcomes:

1. Adding coplanar vectors
2. Adding vectors in three-dimensions
3. Solving basic 2D equilibrium problems at a point*
4. Solving advanced 2D equilibrium problems at a point*
5. Solving 3D equilibrium problems at a point*
6. Calculate the moment of a force or force couple in 2D and 3D
7. Solve basic rigid body equilibrium problems in 2D*
8. Solve advanced rigid body equilibrium problems in 2D*
9. Solve rigid body equilibrium problems in 3D
10. Basic friction problems
11. Advanced friction problems*
12. Solving truss problems*
13. Solving frame problems*
14. Solving pulley problems
15. Solving machine problems
16. Constructing shear and moment diagrams for individual loads*
17. Constructing shear and moment diagrams for distributed loads*
18. Calculating centroid / center of mass
19. Calculating moment of inertia of an area
20. Combined application of centroid/moment of inertia/moment diagrams
21. Calculating mass moment of inertia

In addition, four of the above outcomes (chosen from those marked with a *) will be assessed a second time during the final exam.

Grading and Retakes:

Each of the above outcomes (including the four outcomes assessed in the final exam) will be scored out of 10 points. The overall grade will be based on a percentage score from these assessments.

For each outcome, you have the opportunity to retake an assessment to improve your score. (You may need to take these opportunities outside of our regular class time.)

Grading Scale:

90-100%	A
80-89.9%	B
70-79.9%	C
60-69.9%	D
<60%	F

Homework and In-Class Problems: This course is centered on problem-solving. It is very important for you to practice these techniques. During class, we will often work through some in-class problems together. In addition, homework will be assigned from the textbook. Although these will not be included in your grade, they will be very useful practice for the problem-solving techniques taught in this class. A successful student will use these opportunities to practice problem-solving techniques and prepare for the assessments.

Accommodations for Students with Disabilities:
If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

Add Date:	Friday, January 28	Last day to add a course
Drop Date:	Friday, March 11	Last day to drop this course
Holidays:	Monday, January 17	Martin Luther King Jr. Day
	Friday-Monday, Feb. 18-21	Presidents' Day Holidays
	Monday-Friday, April 11-15	Spring Recess Holidays
Final:	Tuesday, May 17, 12:00-1:50 pm	

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

A. Solve mechanical equilibrium problems involving the equilibrium of particles and rigid bodies using both graphical and vector calculus techniques.
B. Solve mechanical equilibrium application problems for trusses, frames, and machines.
C. Calculate shear, normal forces, and bending moment for loaded beam problems and produce shear and bending moment diagrams.
D. Solve friction application problems.
E. Determine centroid, center of mass, and center of gravity for various objects and geometric shapes.
F. Determine moment of inertia and mass moment of inertia for various objects and geometric shapes.

COURSE OBJECTIVES:

In the process of completing this course, students will:

A. Perform the vector operations of addition, subtraction, dot product, and cross product and use them in applications.
B. Draw the free body diagram of an object subjected to external forces and couples.
C. Apply the principles of mechanical equilibrium to solve problems involving a force system acting on a point mass.
D. Define and use the concepts of moment, couple, and resultant as they apply to static equilibrium problems.
E. Apply the principles of mechanical equilibrium to solve problems involving forces and couples acting on a theoretical rigid body.
F. Learn the analytical techniques appropriate for objects subjected to distributed forces.

G. Solve truss, frame, and machine application problems, using the principles of mechanical equilibrium.
H. Define and use the concepts of shear force, normal force, and bending moment in the solution of internal force problems.
I. Generate shear and bending moment equations and draw shear and bending moment diagrams for a loaded beam.
J. Solve different classes of dry friction problems.
K. Apply the theory of dry friction to application problems.
L. Define and calculate centroid, center of mass, and center of gravity for various 1-D, 2-D, 3-D, and composite bodies.
M. Define and calculate moment of inertia and mass moment of inertia for various 1-D, 2-D, 3-D, and composite bodies