

Statics
Fall 2009
Engineering 8
Sections # 56506 and #56278



Instructor: Dr. John Heathcote
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Class Times: TTh 2:00-3:15 pm on ONLINE
Room: FEM-4E

Office Hours: Tuesday, 12:00-12:50 pm
Wednesday, 1:00-1:50 pm
Thursday, 1:00-1:50 pm
Or feel free to stop by or make an appointment

Prerequisite: PHYS 4A
Corequisite: MATH 6

Catalog Description: The study of rigid bodies in static equilibrium when acted upon by forces and couples in two- and three- dimensional space. Included are equilibrium of rigid bodies, trusses, frames and machines, as well as the calculation of centers of mass, centroids, friction, and moments of inertia. Additional topics, which may be covered, include distributed forces in cables, beams, and fluid statics, mass moments of inertia, and virtual work.

Important Note about this Course:

This course is being taught with both a traditional “face-to-face” section of students and an online section of students. The assignments and tests will be the same for both groups of students. Students in the “face-to-face” section will be taught in class each week, while students in the online section will receive that material online. (The online material will include videos of lectures and worked out problems and written notes.) Students in the “face-to-face” class can also access this online material to either catch up on missed work or to supplement in-class learning. Likewise, online students are welcome to come to a “face-to-face” class whenever they desire as well.

All students will submit the homework assignments online. Also, all students will take traditional written tests on campus.

Required Website Access:

In order to do the homework for this course, you will need access to the ARIS website that is set up by the textbook. You can get this access two ways. The first way is to purchase the textbook in the bookstore. This textbook will be bundled with an access code which you can use to register for the site. The second way to get access to the site is by purchasing the access online.

Optional Textbook:

The textbook is a useful resource for reading the material and seeing example problems. However, the homework will all be posted on the website, so the textbook is not specifically required.

The textbook being sold at the bookstore is:

Vector Mechanics for Engineers: Statics

Authors: Beer, Johnston, Mazurek, and Eisenberg

9th Edition

ISBN: 978-0-07-352923-3

Since the textbook will only be used as a resource, an older edition of this same text could be purchased used as a way to save money.

Grading:	70%	Four Tests
	10%	Design Project(s)
	20%	Homework

Tests and Final Exam: There will be four tests during the term. Each test may cover material from the entire semester. Rules for what is allowed for each test will be announced before each test. “Face-to-face” students will take these tests during regularly scheduled classes. Online students will come on campus at prearranged times to take these tests.

Design Project: In order to apply some of the concepts from this course, one or more design projects will be assigned. In these projects, you will use what you have learned in the course to design or analyze some sort of engineering structure. The actual construction of this structure may not be assigned. An important part of this project will be the design report that accompanies it.

Homework: Homework will be assigned in order to practice the problem-solving skills taught in class. These homework problems will be accessed via the online site that corresponds to the textbook. Homework answers will be submitted online.

Late Work and Make-up Tests: Homework should be submitted on time in order to receive full credit. If there is a valid reason that the work must be turned in late, please inform the instructor ahead of time. Make-up tests will only be arranged upon prior approval. If you will miss a test, you **MUST** let the instructor know beforehand.

Cheating and/or plagiarism: Cheating and/or plagiarism will not be tolerated. A student will receive no credit for the assignment if in the opinion of the instructor the individual has cheated.

Grading Scale:

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

Attendance: In order to successfully complete this course, you must learn the material that is presented during lecture. You should either **attend class or access the material that is posted online.**

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, September 4 th	Last day to add a course
Drop Date:	Friday, October 16 th	Last day to drop this course
Holidays:	Thursday, November 26 th	Thanksgiving Day
Final Exam:	Thursday, December 17 th	2:00-3:50 pm

(for face-to-face section)

Exam Schedule (all tests scheduled in FEM-4E during the 2pm class period, at 6pm or arranged)

Exam #1:	Thursday, September 10
Exam #2:	Thursday, October 8
Exam #3:	Thursday, November 5
Exam #4:	Thursday, December 17

Course Outline:

Unit	Chapters	Topics	Weeks
A	1, 2	Introduction, Vectors, Force Systems	1-4
B	3, 4	Moments, equilibrium in two dimensions	5-8
C	6, 8	Equilibrium in 3-D, Structures	9-12
D	5, 7, 8, 9	Centroids beams, friction, moments of inertia	13-18

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.
- G. Use the concept of virtual work to solve simple problems.

COURSE OBJECTIVES:

In the process of completing this course, students will:

- A. Understand 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.
- N. Use the concept of virtual work to solve simple problems in systems with variable equilibrium states.