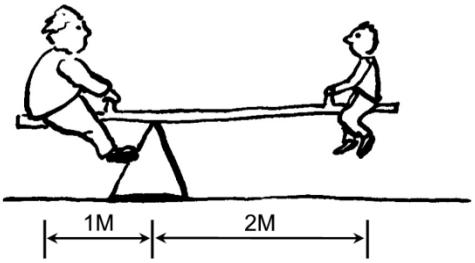
# Statics
*Spring 2016*
# Engineering 8
Section #56237




**Instructor:** Dr. John Heathcote **Class Format:** ONLINE, with on-campus tests
**Office:** FEM-1B (in the math study center)
**Phone:** (559) 638-0300 ext. 3215
**Cell Phone:** (559) 643-5469
**e-mail:** john.heathcote@reedleycollege.edu

**Office Hours:** MWTh 11:00-11:50 am
TTh 1:00-1:50pm
If you cannot make regular office hours, feel free to 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. 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.

**Optional Textbook:** Engineering Mechanics: Statics, R.C. Hibbeler, 14th Edition, Pearson
*(You will be doing homework on the online website. However, a textbook will still be very useful for reading the material and seeing the examples. I would recommend finding an older edition of this textbook. It will be much cheaper but will still cover the same material.)*

**Required Online Site:** MasteringEngineering site for Engineering Mechanics: Statics, 14th edition

Online cost is $111 (with etext) or $61 (without etext)

Register at: http://www.pearsonmylabandmastering.com/northamerica/masteringengineering/
Course ID: heathcote07404

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|---|---|---|
| **Grading:** | 70% | Tests and Final Exam |
| | 20% | Homework |
| | 10% | Design Project |

**Tests and Final Exam:** There will be four tests during the term. The first three tests will cover the chapters from that unit. The fourth test will cover the most recent unit, but will also include questions covering the cumulative content from the entire semester. Rules for what is allowed for each test will be announced before each test. Students will take these exams on the Reedley College campus. The dates for these exams are **2/18, 3/31, 4/28, and 5/19 at 7 pm in FEM-3**. Photo identification is required when you come in to take each test.

**Alternate Test Arrangements:** Students who are unable to take the tests at the times listed above will need to make special arrangements ahead of time with the instructor.

**Homework:** Homework will be assigned in order to practice the problem-solving skills taught in class. These will be accessed and submitted on the MasteringEngineering website. The homework is very important. Not only does it count for 20% of the overall grade, it will also be very useful practice for the problem solving techniques taught in this class.

**Design Project:** Students will complete a design project that will apply the topics from this course to a "real-world" application. This project will involve creative design of a structure and calculation of the structure's load. Grades will be based on the success of the design in meeting the goals, the accuracy of the calculations, and the neatness of the report.

**Homework Grading Policies:** Late homework will be reduced in credit by 2% for each day that it is late (up to a maximum of 50% off). (This applies only to the problems that are submitted late, not to the entire assignment.) Students will have unlimited attempts to get each question correct. It is important that you use the homework assignments to practice the problem-solving techniques and learn the material.

**How does this online course work?** This course will be managed through Blackboard and the "MasteringEngineering" website. Most weeks, there will be two deadlines. For each deadline, I will post a folder on Blackboard which will include study materials such as notes, links to recorded lectures, and practice problems. For each deadline, there will also be an online homework assignment on MasteringEngineering.

**Deadline Schedule:** A schedule of deadlines is posted on Blackboard and at the end of this syllabus. On most weeks, the deadlines fall on Tuesday and Friday (at 2:00 pm). On weeks when there is a test, the test will be given on a Thursday. On these weeks, there will usually be no deadline on Friday.

**Grading Scale:**

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

**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.

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|---|---|---|
| **Add Date:** | Friday, January 29th | Last day to add a course |
| **Drop Date:** | Friday, March 11th | Last day to drop this course |
| **Holidays:** | Monday, January 18th | Martin Luther King Jr. Day |
| | Friday-Monday, Feb. 12-15th | Presidents' Day Holidays |
| | Monday, March 21st - Friday, March 25th | Spring Recess Holidays |
| **Final:** | Thursday, May 19th 7:00 pm | |

## Course Outline:

| Unit | Chapters | Topics | Weeks |
|---|---|---|---|
| A | 1-3 | Introduction, Force Vectors, Equilibrium at a Point | 1-6 |
| B | 4, 5 | Force Systems, 2-D and 3-D Rigid Body Equilibrium | 5-11 |
| C | 6, 7 | Structures, Internal Forces, Shear and Moment Diagrams | 11-15 |
| D | 8-10 | Friction, Centroid, Moments of Inertia, + Semester Review | 15-18 |

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.

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

**ENGR 8 Deadlines** (Subject to Change) -- *Tuesday/Friday deadlines are at 2:00pm.*

| | | | |
|---|---|---|---|
| 0: | Tuesday | 1/12 | Blackboard introductions are due |
| 1: | Friday | 1/15 | Sign up for Mastering, Practice problems with MasteringEngineering, Chap. 1 |
| 2: | Tuesday | 1/19 | 2.1-2.3 Vector Addition of Forces, 2.4 Addition of a system of coplanar forces |
| 3: | Friday | 1/22 | 2.5-2.6 Addition of Cartesian Vectors, 2.7-2.8 Position vectors; force along a line |
| 4: | Tuesday | 1/26 | 2.9 Dot Product, plus Chap 2 review |
| 5: | Friday | 1/29 | 3.1-3.3 2-D equilibrium at a point |
| 6: | Tuesday | 2/2 | 3.4 3-D equilibrium at a point |
| 7: | Friday | 2/5 | More equilibrium at a point |
| 8: | Tuesday | 2/9 | 4.1-4.4 2-D and 3-D Moments |
| | No HW for Friday, 2/12 (Holiday) | | |
| 9: | **THURSDAY** | **2/18** | **Test #1 (Chaps. 1-3)** |
| 10: | Tuesday | 2/23 | 4.1-4.4 2-D and 3-D Moments / 4.5 Moment about a specific axis |
| 11: | Friday | 2/26 | 4.6 Moment of a couple, 4.7 Simplification of a force / couple system |
| 12: | Tuesday | 3/1 | 4.8 Further simplification of a force/couple system, 4.9 Reduction of a simple distributed load |
| 13: | Friday | 3/4 | 5.1-5.2 Rigid Body FBD's / 5.3 2-D Rigid Body equilibrium |
| 14: | Tuesday | 3/8 | 5.3-5.4 2-D Rigid Body equilibrium, 2- and 3- force members |
| 15: | Friday | 3/11 | 5.5-5.7 3-D Rigid Body equilibrium |
| 16: | Tuesday | 3/15 | 5.5-5.7 3-D Rigid Body equilibrium |
| 17: | Friday | 3/18 | 2-D and 3-D rigid body equilibrium |
| | Spring Break | | |
| 18: | Tuesday | 3/29 | 6.1-6.3 Method of Joints |
| 19: | **THURSDAY** | **3/31** | **Test #2 (Chaps. 4 and 5)** |
| 20: | Tuesday | 4/5 | 6.4 Method of Sections |
| 21: | Friday | 4/8 | 6.6 Frames and Machines |
| 22: | Tuesday | 4/12 | Trusses, Frames and Machines |
| 23: | Friday | 4/15 | 7.1 Internal Loadings |
| 24: | Tuesday | 4/19 | 7.2 Shear and Moment equations and diagrams |
| 25: | Friday | 4/22 | 7.3 Relations between dist load, shear and moment |
| 26: | Tuesday | 4/26 | 8.1-8.2 Dry Friction |
| 27: | **THURSDAY** | **4/28** | **Test #3 (Chaps. 6-7)** |
| 27b: | **FRIDAY** | **4/29** | **DESIGN PROJECT DUE** |
| 28: | Tuesday | 5/3 | Extra day on friction – Tipping vs. Slipping |
| 29: | Friday | 5/6 | 9.1 - 9.2 Centroids of Composite bodies |
| 30: | Tuesday | 5/10 | 10.1-10.4 Moment of inertia for composite areas |
| 31: | Friday | 5/13 | 10.8 Mass Moment of inertia |
| 32: | Tuesday | 5/17 | Review Assignment |
| 33: | **THURSDAY** | **5/19** | **Final Exam (Chaps. 8-10, plus cumulative)** |