Department of Mechanical Engineering
ME EN 2010 · Statics
Spring 2018

Syllabus

Instructor: Dr. Spear, MEK 2151, *email correspondence via course website only*
TAs: Caitlin Arndt, *email correspondence via course website only*
Brian Phung, *email correspondence via course website only*
Jayden Plumb, *email correspondence via course website only*
Units: 3
Meeting times: M,W,F: 8:35am-9:25am, WEB L101
Recitation times:

Monday	Tuesday	Wednesday	Thursday	Friday
	3:05 PM – 3:55 PM FASB 295 (Arndt)		10:45 AM – 11:35 AM WEB 1250 (Plumb)	11:40 AM – 12:30 PM MEK 3550 (Phung)

Office hours: Office hours are listed below, or by appointment.

Monday	Tuesday	Wednesday	Thursday	Friday
9:35 AM – 10:30 AM MEK 2151 (Spear)	11:00 AM – 12:00 PM MEK 0545 (Plumb)	9:35 AM – 10:30 AM MEK 2151 (Spear)		9:35 AM – 10:30 AM MEK 2151 (Spear)
3:00 PM – 4:00 PM MEK 0545 (Arndt)				2:30 PM – 3:30 PM MEK 0545 (Phung)

Required textbook: *Engineering Mechanics: Statics*, 14th edition, Hibbeler.
ISBN-10:0133918920

Also required: A scientific calculator with trigonometric functions built in (you may not use other devices, including phones, as calculators)
Engineering computation paper – available in bookstore

Prerequisites: A working knowledge of vector algebra, solving multiple systems of equations, trigonometry, analytic geometry, and calculus

Course website:
Outside of lecture, I will communicate with you via Canvas. This is where I will post the course syllabus, homework assignments, lecture slides, announcements, and other administrative information. While the lecture slides contain important concepts that we will cover in class, I

will go into more depth during lecture, which includes working through example problems on the blackboard. The worked-out example problems from lecture and recitation will not be posted on Canvas. Therefore, it is imperative that you attend both lecture and recitation.

Course summary:
This course covers the subject of Statics. Statics involves the evaluation of external and internal forces on right-body systems. Topics that will be covered include: vector operations; forces, moments, couples, and resultants; static equilibrium in two and three dimensions; free body method of analysis; statically equivalent force systems; trusses, frames, and machines; centroids, distributed loads, and moment of inertia; friction; internal forces and bending moments in structural members; and a brief introduction to stress and strain.

Course objectives:
By the end of this course, you should be able to:

- Solve problems in structural mechanics involving concentrated and distributed forces and couples, knowing how and when to replace them with equivalent resultant forces and moments.
- Identify conditions of static equilibrium.
- Compute center of gravity.
- Draw and analyze free body diagrams to find reaction forces or moments and to find internal forces in members.
- Identify and enforce boundary conditions (e.g., pinned, roller, friction, traction free, etc).
- Understand basic concepts of stress, strain, and material properties.

Deliverables and grading:

Homework	15%
In-class homework assessments	15%
Partial-term exams (3)	50%
Final exam	20%

≥93.0	<93.0 ≥90.0	<90.0 ≥87.0	<87.0 ≥83.0	<83.0 ≥80.0	<80.0 ≥77.0	<77.0 ≥73.0	<73.0 ≥70.0	<70.0 ≥67.0	<67.0 ≥63.0	<63.0 ≥60.0	<60.0
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E

The total score is the weighted average of the homework, in-class homework assessments, partial-term exams, and final exam, as described in the table above. A curve (upward) will be applied only if the scores on exams are lower than expected; otherwise, no curve will be applied. To account for absences due to unforeseen circumstances (alarm didn't go off, got in a car accident, car wouldn't start, had an illness/emergency, had to go to the hospital, etc.), the two lowest homework scores and two lowest homework assessments will be dropped.

Ground rules for office hours:
Office hours help tremendously to improve student understanding. Because this class is so large, office hours provide an extra opportunity for one-on-one engagement. To make office hours more efficient for everyone, you must do the following before coming to office hours:

1) **Attend lecture and take notes**. If you cannot attend lecture for some reason, you must obtain the lecture slides from Canvas and the lecture notes from a fellow student.
2) **Read the corresponding sections in the textbook**.
3) **Formulate a well-posed and specific question**. Here is an example of a poorly formulated question: "I don't know how to start this homework problem".

Office hours are not meant to be a substitute for attending lecture and reading the textbook. ***You must put in your best effort in order for me to help you in the most efficient way possible.***

Homework and homework formatting policies:
Statics is a core area for almost any engineering discipline. The primary way to learn and become proficient in this area is by practice. Therefore, one homework assignment will be due each week. Homework assignments will be posted on Canvas, and an announcement will be made through Canvas and in class when an assignment has been posted. Homework must be submitted to the homework box outside of the main office in MEK by the deadline indicated on the assignment. No late homework will be accepted. Answers (not solutions) to most homework problems will be provided with the assignment so that you have the opportunity to self-correct. Try to work through the homework problems until you understand them well enough that you can teach someone else. This will require discipline and effort on your part, but will help you to succeed in this course. Know that it is normal—and, in fact, beneficial—to "struggle" through the problems the first time you are attempting them.

We only have three TAs for the entire class, and they are limited in the amount of time that they can spend on the course each week. Because of the number of students, assignments, recitations, and limited work hours for TAs, one problem from each assignment (selected at random) will be graded in detail and the remaining problems will be graded based on completion and formatting. Complete solutions to all problems will be posted after the assignment is due. It is your responsibility to compare the solutions to your own and to follow up in a timely manner if you have questions.

1. **Format and engineering paper**. It is *critical* that you not only learn the course material and general approach to solving engineering problems, but that you also adopt a specific format when writing your homework solutions. The same (or similar) format will be expected in nearly every engineering course to follow and is often used in engineering practice. Engineering paper must be used and is available for purchase at the campus bookstore and online. In the header portion of the paper, include the following information:

	Name	Homework # - Problem #	Due Date	Page #

The main body of the homework should include the following sections:
Given:
Find:
Assumptions: (if any)
Solution:

There should be no more than one problem solution on any page, and you should only use the front side of the paper. The final answer should be clearly demarcated (e.g. boxed or circled). An example solution format is available on Canvas.

2. **Neat, legible, and stapled.** Homework assignments that are not readable or are otherwise difficult to decipher will be returned with a zero or reduced score. All pages of an assignment must be stapled together before submission; students are fully responsible for any lost pages if the pages are not stapled together before submission.

3. **Show all work.** Clearly show all steps of the problem solution. Partial credit can only be given if a sufficient amount of detail is shown. If you only provide the final answer with no work to communicate how you obtained that answer, no points will be given. Using a computer to bypass solution steps is not allowed, though you are welcome to use one to check your final answers.

4. **Working with others is encouraged.** Part of the learning process comes from communicating with others. However, you will learn nothing from simply copying others' work. If you simply copy homework solutions from others, you are likely to fail the course.

5. **Submission deadline.** Homework must be turned in to the appropriate homework submission box located outside of the main office on the first floor of MEK by the date and time specified at the top of the assignment. Late homework will NOT be accepted for any reason. Remember, your two lowest homework scores will be dropped, which should cover things like misbehaving alarm clocks, car accidents, hospital visits, family emergencies, etc. If you are participating in a university-sanctioned event or have something more long-term going on in your life that will prevent you from submitting homework on time, please see me ahead of time.

In-class homework assessments:
The purpose of in-class homework assessments is for me to check that you understand the previous week's assignment and to provide you with an opportunity to earn points for doing so. In order to assess whether you understand the material covered on homework problems, there will be weekly or biweekly in-class homework assessments. In-class homework assessments will include problems that are (nearly) identical to the previous week's homework problems and can be solved in less than 20 minutes. In-class homework assessments cannot be made up. Any form of cheating on an in-class assessment will result in a zero score for the entire in-class assessment portion of your grade (15%), making it difficult to be able to pass the course.

Partial-term exams:
There will be three non-cumulative, partial-term exams. All exams are closed-book and closed-notes. Exams cannot be taken at different times/dates, except as documented in accordance with university policy.

Final exam: Tuesday, May 1, 8:00-10:00am
The final will be comprehensive and is closed-book and closed-notes.

Instructor and student responsibilities:
As your professor, I am responsible for providing you with the instruction and resources necessary to build a strong foundation in the course topic areas. I am also responsible for assessing whether you are competent in these areas. As the student, you are responsible for making sure that you understand the concepts, which will require you to attend lecture and recitation, read the course textbook, complete the assigned homework problems, compare your solutions to the posted solutions, and seek help early if you do not understand something. If you fail to do these things, you will not be successful in this class.

Conduct, academic misconduct, and dishonesty:
The Student Handbook is available online (http://registrar.utah.edu/handbook/index.php). All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies condemned conduct that involves cheating on tests, misrepresenting one's work, **plagiarism**, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. **Academic misconduct and dishonesty will not be tolerated.** If you suspect that there is academic misconduct taking place in the class, please notify me.

COLLEGE OF ENGINEERING GUIDELINES

https://www.coe.utah.edu/wp-content/uploads/pdf/faculty/semester_guidelines.pdf **Spring Semester 2018**

Appeals Procedures

See the Code of Student Rights and Responsibilities, located in the Class Schedule or on the UofU Web site for more details

Appeals of Grades and other Academic Actions
If a student believes that an academic action is arbitrary or capricious he/she should discuss the action with the involved faculty member and attempt to resolve. If unable to resolve, the student may appeal the action in accordance with the following procedure:

1. Appeal to Department Chair (in writing) within 40 business days; chair must notify student of a decision within 15 days. If faculty member or student disagrees with decision, then,
2. Appeal to Academic Appeals Committee (see http://www.coe.utah.edu/current-undergrad/appeal.php for members of committee). See II Section D, Code of Student Rights and Responsibilities for details on Academic Appeals Committee hearings.

Americans with Disabilities Act (ADA)

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in a class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union, 581-5020 (V/TDD) to make arrangements for accommodations. All written information in a course can be made available in alternative format with prior notification to the Center for Disability Services.

Adding Classes

Please read carefully: All classes must be added within the FIRST TEN academic days of the term (deadline: Friday, January 19). Late adds will be allowed January 20-29, requiring only the instructor's signature. Any request to add a class after January 29 will require signatures from the instructor, department, and Dean, and need to be accompanied by a petition letter to the Dean's office.
A $50 FEE WILL BE ASSESSED BY THE REGISTRAR'S OFFICE FOR ADDING CLASSES AFTER January 29. ***

Withdrawal Procedures

See the Class Schedule or web for more details ** Please note the difference between the terms "drop" and "withdraw". Drop implies that the student will not be held financially responsible and a "W" will not be listed on the transcript. Withdraw means that a "W" will appear on the student's transcript and tuition will be charged. **

Drop Period – No Penalty
Students may DROP any class without penalty or permission during the FIRST TEN academic days of the term (Friday, January 19).

Withdrawal from Full Term Length Classes
Students may WITHDRAW from classes without professor's permission until **Friday, March 2, 2018.** Between January 20 and March 2, a "W" will appear on the transcript AND tuition will be charged. Refer to Class Schedule, Tuition and Fees for tuition information.

Withdrawal from Session I & Session II
See the web page for details:
http://registrar.utah.edu/academic-calendars/spring2018.php

Withdrawals **after March 2** will only be granted due to **compelling, nonacademic emergencies**. A petition and supporting documentation must be submitted to the Dean's Office, 1602 Warnock Engineering Building. Petitions must be received before the last day of classes (Tuesday, April 24, 2018).

Repeating Courses

When a College of Engineering class is taken more than once, only the grade for the second attempt is counted. Grades of **W, I, or V** on the student's record count as having taken the class. Departments enforce these guidelines for other courses as well (e.g., math, physics biology, chemistry). Attempts of courses taken at transfer institutions count as one attempt. This means a student may take the course only one time at the University of Utah. Courses taken at the University of Utah may not be taken a second time at another institution. If a second attempt is needed, it must be at the University of Utah. Please work with your department advisor to determine the value of repeating courses. Students should note that anyone who takes a required class twice and does not have a satisfactory grade the second time may not be able to graduate. It is the responsibility of the student to work with the department of their major to determine how this policy applies in extenuating circumstances.

WEEK-BY-WEEK SCHEDULE

Lecture	Date	Topic	Reading	HW Due	
	WEEK 1				Hibbeler, Chapters 1-3
1	M: Jan. 8	Introduction, units, numerical accuracy, force vectors	Chapter 1.1-1.6		
2	W: Jan. 10	Vectors, graphical representation, resultants, components	2.1-2.3		
3	F: Jan. 12	Cartesian (rectangular) vectors, direction angles	2.4-2.6	HW 1	
	WEEK 2				
	M: Jan. 15	**NO CLASS (MLK Jr. Day)**			
4	W: Jan. 17	Position vectors, unit vectors	2.7-2.8		
5	F: Jan. 19	Force directed along a line	2.8	HW 2	
	WEEK 3				
6	M: Jan. 22	Dot (scalar) product	2.9		
7	W: Jan. 24	Particle equilibrium, FBDs	3.1-3.2		
8	F: Jan. 26	Particle equilibrium, FBDs, coplanar equilibrium	3.3	HW 3	
	WEEK 4				
9	M: Jan. 29	3D particle equilibrium	3.4		
10	W: Jan. 31	3D particle equilibrium	3.4		
11	F: Feb. 2	Moment of forces (scalar), cross product	4.1-4.2	HW 4	Hibbeler, Chapters 4-5
	WEEK 5				
12	M: Feb. 5	Moment of force (vector), Principal of moments	4.3-4.4		
13	W: Feb. 7	**Exam 1 review**			
	F: Feb. 9	**EXAM 1 (covers topics from HW 1-4, chapters 1-3)**			
	WEEK 6				
14	M: Feb. 12	Moment of force about an axis, moment of a couple	4.5-4.6	HW 5	
15	W: Feb. 14	Equivalent force-couple systems	4.7-4.9		
16	F: Feb. 16	Equivalent systems	4.8-4.9	HW 6	
	WEEK 7				
	M: Feb. 19	**NO CLASS (Presidents' Day)**			
17	W: Feb. 21	Equilibrium of rigid bodies, FBDs, two-force members	5.1-5.4		
18	F: Feb. 23	3D equilibrium of rigid bodies	5.5-5.6	HW 7	
	WEEK 8				
19	M: Feb. 26	3D equilibrium of rigid bodies	5.5-5.7		
20	W: Feb. 28	Constraints & statical determinacy	5.7		
21	F: Mar. 2	Trusses (method of joints)	6.1-6.3	HW 8	
	WEEK 9				
22	M: Mar. 5	Trusses (method of sections)	6.4		
23	W: Mar. 7	**Exam 2 review**			
	F: Mar. 9	**EXAM 2 (covers topics from HW 5-8, chapters 4-5)**			

	WEEK 10				Hibbeler, Chapters 6-8
24	M: Mar. 12*	Frames and machines	6.6	HW 9	
25	W: Mar. 14*	Frames and machines	6.6		
26	F: Mar. 16	Internal forces, shear and bending moment equations	7.1-7.2	HW 10	
	WEEK 11	**NO CLASS (Spring Break)**			
	Mar. 18-25				
	WEEK 12				
27	M: Mar. 26	Shear and bending moment diagrams	7.1-7.2		
28	W: Mar. 28	Relationship between dist. load, shear, and moment	7.3		
29	F: Mar. 30	Friction forces and equilibrium	8.1-8.2	HW 11	
	WEEK 13				
30	M: Apr. 2	Friction: wedges, screws, and belts	8.3-8.5		
31	W: Apr. 4	Friction: wedges, screws, and belts	8.3-8.5		
32	F: Apr. 6	Centroids, Theorem of Pappas	9.1-9.3	HW 12	Hibbeler, Chapters 9-10
	WEEK 14				
33	M: Apr. 9	Moment of inertia	10.1-10.5		
34	W: Apr. 11	**Exam 3 review**			
	F: Apr. 13	**EXAM 3 (covers topics from HW 9-12, chapter 6-8)**			
	WEEK 15				
35	M: Apr. 16	Stress and strain	Handout	HW 13	Additional Topics
36	W: Apr. 18	Stess and strain	Handout		
37	F: Apr. 20	Material properties	Handout		
	WEEK 16				
38	M: Apr. 23	Course content review and debriefing			
	T: May 1 (8-10am)	**FINAL EXAM (comprehensive)**			

* Dr. Spear will be on travel, and a guest lecturer will be available to fill in.