UNIVERSITY AT BUFFALO

EAS 207 Statics

Spring 2016

Lectures:	M W F 4:00 - 4:50 pm @ Knox 104
Recitations or labs:	As per the UB Schedule
Instructor:	Siamak Epackachi, 232 Ketter Hall, e-mail: siamakep@buffalo.edu
Office hours:	T/TH 1:30-3:00 pm
Teaching assistant(s):	Haifeng Wang, e-mail: hwang48@buffalo.edu
Office hours:	T/TH 11:30 – 1:30 pm
Prerequisite(s):	PHY 107 or PHY 117 and MTH 142
Corequisite:	MTH 241 (recommended)
Course web site:	Ublearns
Textbook:	1. Engineering Mechanics -Statics, By Hibbeler, 14th Edition 2. MasteringEngineering, Hibbeler 14E (Online resource and tutorials)

Course description: Application of mechanics to the study of static equilibrium of rigid and elastic bodies. Topics include composition and resolution of forces; moments and couples; equivalent force systems; free-body diagrams; equilibrium of particles and rigid bodies; forces in trusses and beams; frictional forces; first and second moments of area; moments and products of inertia; methods of virtual work and total potential energy.

Course Goals/Objectives: Mechanics, concerned with the study of static and dynamic equilibrium of particles and rigid bodies, is regarded as essential to the basic education of an engineer. Since the problems confronted by today's engineers are seldom restricted to one's own specialization, it is imperative that the engineering students become thoroughly grounded in the fundamental principles of mechanics so necessary for the solution of many problems. The major goal of this course is to present, in a coherent and systematic fashion and by emphasizing the useful application, a fundamental treatment of the principle of statics (mechanics). Problems solving in the subject area of statics familiarize the student with real-life problems and develop in them an appreciation for their own powers of analysis and the effective use of mathematical modeling.
Emphasis is on understanding concepts and applying them to solve engineering problems.

Course Learning Outcomes: Upon successful completion of the course, students will be able to:

Course Learning Outcomes	SO	Assessment Tools
1. Calculate the resultant forces and moments in 2D and 3D systems.	a,e	HW and Exams
2. Draw free-body diagrams for particles and rigid bodies.	a,e, g	HW and Exams
3. Solve particle and rigid body problems using the principle of static equilibrium.	a,e, g	HW and Exams
4. Analyze 2D and 3D trusses using methods of joints and sections.	a,e, g	HW and Exams
5. Calculate internal forces in a beam and plot shear-force and bending-moment diagrams.	a,e, g	HW and Exams
6. Solve problems related to sliding objects using Coulomb's dry friction theory.	a,e, g	HW and Exams
7. Locate the center of gravity and the centroid of a given shape/volume.	a,e	HW and Exams
8. Calculate moment of inertia for an area/volume	a,e	HW and Exams

Contribution of EAS 207 towards fulfillment of ABET Student Outcomes (SO):

(a) Apply knowledge of mathematics, science, and engineering

EAS 207 is an engineering problem solving course that builds upon the students' background in mathematics and physics to form a linkage between abstract concepts and physical problems common to engineering practice.

(e) An ability to identify, formulate, and solve engineering problems

The problems demonstrated in class and the homework assignments encourage students to consider ill-defined "real-world" problems in a disciplined and structured fashion so that they may apply their engineering knowledge and judgment to the meaningful solution of the problem. These exercises are designed to develop the students' confidence so they will be competent to make the next transition, from problem solving to design.

(g) Communicate effectively

Because engineers frequently communicate via engineering calculations, a premium is placed on the quality, order, neatness, and correctness of all solution of problems performed as part of EAS 207. The students are continually reminded that the quality of their engineering calculations is a statement of their regard for their profession.

Relationship of Course to ABET Student Outcomes (Course Assessment Matrix):

a	b	c	d	e	f	g	h	i	j	k
3				3		1				

Contribution Level: 3 = Substantial, 2 = Moderate, and 1 = Limited

Academic integrity: The University at Buffalo takes very seriously its commitment to principles of academic integrity. Please review the UB policies regarding academic integrity regularly (http://academicintegrity.buffalo.edu/policies/index.php).

As an engineer, you have special ethical obligations. As per the NSPE Code of Ethics, "engineers shall avoid deceptive acts" and "shall conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession."

UB Engineering Code of Ethic:

- Act with honesty, integrity and fairness
- Show respect for others
- Accept responsibility
- Give credit where credit is due
- Serve the larger community
- Take pride in being a part of UB Engineering

Accessibility Resources: If you require classroom or testing accommodations due to a disability, please contact Accessibility Resources, located at 25 Capen Hall. Accessibility Resources can be reached by phone at (716) 645-2608 or by email at stu-accessibility@buffalo.edu. Please inform me as soon as possible about your needs so that we can coordinate your accommodations. For additional information see http://www.buffalo.edu/accessibility/index.php

Course Requirements: There will be weekly homework assignments, two (2) midterm tests and a final. While attendance is not mandatory, students are expected to approach this course as they would any professional responsibility. Students are also expected to use professional style in all communications, including email, with the instructor and teaching assistants. Email must include the use of correct salutations and closings (including clear identification of the author) and be grammatically correct.

Homework Assignments:

1 - Homework assignments will be due every Monday and will consist of 5 problems. Homework will be due in class and will not be accepted by fax or email. No homework extensions will be given, and late HW will not be accepted.

2 - Assignments must be done neatly on ENGINEERING paper, in pencil, and written on one side of the paper. Homework submissions are expected to be thorough and logically organized. A cover sheet should accompany each assignment. Pages MUST be stapled together. When you perform engineering calculations you must explain your work such that an uninformed reader can follow how and why each step was performed. Sloppy work, even if technically correct, is unprofessional and will lose points. Figures should be drawn roughly to scale using a straight edge. Final answers must be **boxed** and must include **units** where applicable and be given using 4 **significant figures**.

3 - Homework **must** follow this format:

Given: (statement of problem)

Find: (what are you after)

Solution: (analysis leading to result)

The answer must be **boxed.**

4 - Each homework assignment is a professional, original document prepared by you; treat it as such. You should be proud of the way it looks while knowing that the calculations that you have prepared are as accurate as possible. Remember that practicing engineers must maintain very high standards in the quality of their work because all engineering calculations must be independently checked during the design review process. Students are expected to do all homework **individually** although general discussion of concepts amongst peers is encouraged. Use of on-line help sites that provide the solution is strictly forbidden. In practice, there is no solution manual; you must get used to solving the problems on your own.

5 - Homework solutions will be posted on-line to help you review and understand your mistakes.

6 - Each homework problem will be graded 2, 1.6, 1.2, 0.8, 0.4 or 0. The basis for grading will be as follows:

2 = correct format, correct solution; 1.6 = correct format, a few errors;
1.2 = correct format, some errors; 0.8 = correct format, many errors;
0.4 = incorrect format or little effort; 0 = no effort

7 - All homework grades will be posted on UBLearns. Students are responsible for checking the accuracy of their grades on UBLearns. Please notify the instructor if your grade is missing or wrong; the graded assignment must be produced to get credit for it. Graded homework will be returned during the lecture period. Homework that is not collected will be disposed of after one week. All homework assignments will be used in calculating the final grade, with the same weight assigned to each assignment. Individual

arrangements will be made with students who have documented, legitimate absences which prevent them from submitting their homework on time such as an illness requiring a doctor's visit, an automobile accident, a family emergency, jury duty, participation in a sanctioned university activity.

Recitation policy:

1 - One 50-min recitations will be offered every week.
2 - There is no recitation in the first week of the semester.
3 - Starting with the second week of the semester, the recitations will be used to reinforce the topics covered during the lectures.
4 - Every week assignment(s) will be assigned during the recitation. You must attempt to solve the problem(s). During recitation, the instructor will show in detail how to solve the problem(s), and help you reach the correct answer. The problem(s) will be collected at the end of recitation for extra credit. You will get 5 bonus points towards your HW grade for solving problems during each recitations. Attendance is not mandatory but it is strongly recommended as it will help you succeed in the course.

Exams:

1 - The dates and time of the first and second midterms are presented in the table of tentative lecture schedule. The mid-term exams will be 120 minutes long each. The final will be 3-hours long. All tests should be taken at the announced time and place. Missed exams will be assigned a grade of zero unless an acceptable excuse is provided to the instructor, prior to the exam date. In cases of emergency, the instructor should be notified as soon as possible. Students with a legitimate absence will be given a make-up exam.

ME Tutorials:

There are 2 Mastering Engineering online tutorial problems per week due on Tuesdays and Fridays.
The Course ID is: MEEPACKACHI65624

Individual and Group tutoring:

The Instructor and teaching assistants provide individual tutoring during office hours to assist students to understand the concepts involved and to apply these concepts for solving engineering problems.

Grading policy:

Students' grades will be based on her/his performance in the several parts of the course with the following weights:

Test 1 = 22.5% of total grade; Test 2 = 22.5% of total grade
Final = 37.5% of total grade; Homework = 12% of total grade
ME Tutorials = 5.5% of total grade

At the end of the semester, the total points earned (out of a maximum of 100 points) will be used to determine the grade as follows:

Points	Letter Grades	Points	Letter Grades
> 86	A	66 to 69.9	C+
82 to 85.9	A -	62 to 65.9	C
78 to 81.9	B+	58 to 61.9	C -
74 to 77.9	B	54 to 57.9	D+
70 to 73.9	B -	50 to 53.9	D
		< 50	F

Grade 'I' will be strictly limited to the circumstances for which the incomplete is intended; namely, satisfactory work to date and legitimate inability to complete the work within the semester.
http://undergrad-catalog.buffalo.edu/policies/grading/explanation.shtml#incomplete .

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Classroom "etiquette": To provide an environment that is professional and conducive to learning, it is important that all students observe the following classroom etiquette (modified from http://undergrad-catalog.buffalo.edu/policies/course/obstruction.shtml).

- Attend classes and pay attention.
- Come to class on time. If you must enter a class late, do so quietly and do not disrupt the class by walking between the class and the instructor. Do not leave class unless it is an absolute necessity.
- Do not talk with other classmates while the instructor or another student is speaking. If you have a question or a comment, please raise your hand, rather than starting a conversation about it with your neighbor.
- Turn off the electronics: cell phones, pagers, laptops, and beeper watches.
- Avoid audible and visible signs of restlessness. These are both rude and disruptive to the rest of the class.
- Focus on class material during class time. Sleeping, talking to others, doing work for another class, reading the newspaper, checking email, and exploring the internet are unacceptable and can be disruptive.
- Do not pack book bags or backpacks to leave until the instructor has dismissed class.

How to pass and do well in this course:

1. Read appropriate section from text and/or course notes BEFORE class.
2. Come regularly to class and recitations and pay attention.
3. Take good notes, and ask questions if you do not understand the material.
4. Before you attempt to solve your homework problems, reread the appropriate section from the text and your notes; try to understand the concepts and solved problems.
5. Do ALL the assigned homework.
6. Use all resources available for additional assistance if you need it (e.g. recitation, office hours).
7. Start preparing for each exam at least one week before, allowing time to work out practice exams.

Tentative Lecture Schedule:

Chapter	Topic	Date
Chapter 1	Introduction	1/25
Chapter 2	Force Vectors	1/27 - 1/29 - 2/1
Chapter 3	Equilibrium of a Particle	2/3 - 2/5 - 2/8
Chapter 4	System of Forces & Moments	2/11 - 2/13 - 2/15 - 2/17
Chapter 5	Equilibrium of a Rigid Body	2/19 - 2/22 - 2/24 - 2/26
Review for Test 1		2/29
NO CLASS TEST 1 March 4th , Friday 5:00 pm – 7:00 pm		
Chapter 6	Trusses & Frames	3/2 - 3/7 - 3/9 - 3/11
Chapter 7	Internal forces & moments, Cables	3/21 - 3/23 - 3/25 - 3/28 - 3/30
Chapter 8	Friction	4/1 – 4/4 – 4/6 – 4/8
Review for Test 2		4/11
NO CLASS TEST 2 April 15th , Friday 5:00 pm – 7:00 pm		
Chapter 9	Centroid and C.G.	4/13 - 4/18 - 4/20 - 4/22
Chapter 10	Moments of Inertia	4/25 - 4/27 - 4/29 - 5/2
Chapter 11	Virtual Work	5/4
Review		5/6
FINAL EXAM May 13rd , Friday 3:30 pm – 6:30 pm Knox 104		