ME 323 - MECHANICS OF MATERIALS

Purdue University
Syllabus for Spring 2018

INSTRUCTORS:

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Lecture: 8:30-9:20, WALC 2051
Office Hours: 9:30-11:30 M
10:30-11:30 W

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Lecture: 11:30-12:20, WALC 3090
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TEACHING ASSISTANTS:

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TEXTBOOK:

Required: Course lecture book to be purchased at Boiler CopyMaker in PMU

Optional: *Mechanics of Materials*, R.R. Craig, Wiley, 3rd edition, 2011.

Reference texts: Copies of three different mechanics of materials textbooks (by authors Craig, Hibbeler and Philpot) will be available at the reserve desk for the Engineering/Science library on the second floor of WALC. These books will be available for two-hour checkout periods.

COURSE BLOG: *https://www.purdue.edu/freeform/me323/*

A course blog will be used for the delivery for much of the course material, as well as provide a discussion forum for students interacting while learning from each other in the course. Please visit this site to see what material is available there. Note that the course lecture book contains many examples; solutions for many of these examples are made available to you through this blog in either YouTube or PDF formats.

SCHEDULE:

A topical schedule for the course is attached at the end of this syllabus. This schedule includes the daily reading assignment for both the course lecture book and the optional textbook. This material from either source should be read prior to each class meeting.

GRADING:

Your course grade will be based on a straight grading scale: 97-100% A+; 93-97% A; 90-93% A-; 87-90% B+; 83-87% B; 80-83% B-; 77-80% C+; 73-77% C; 70-73% C-; 67-70% D+; 63-67% D; 60-63% D-; <60% F. It is possible that, depending on the class averages at the end of the semester, the grade cutoffs can be adjusted *slightly downward*. However, the grades in this course are *not curved* with an intent of satisfying particular preset grade distribution goals. The percentage breakdowns for the components of your course grade are the following:

Homework and quizzes: 25% (total)

- Typically, one homework set will be due every week, except for weeks during which exams are given. Completed homework assignments are to the ***submitted online through Gradescope by 11:59PM on the due date***. Late homework will not be accepted. Homework is to be completed on engineering paper using the same format as was used in ME 270 and ME 274. Your work needs to be presented with a logical thought process

and in a neat, easy-to-read style. Failure to do so can result in a loss of points in your homework grade.

- Unannounced quizzes will be given regularly throughout the semester. *Make-up quizzes will not be given*.

Midterm and final exams: 75% (total)

All exams will be given closed book, closed notes. A list of relevant equations will be provided with the exam. If an exam is missed, the grade will be recorded as a zero. *Make-up exams will be given only in the event of documented illness or emergency.*

- Two, two-hour midterm exams will be given during the semester on dates shown on the course schedule. Each midterm term exam is worth 25% of the total course grade.
- A final exam will be given during the regular University final exam period at the end of the semester. The date of the exam will be announced later in the course. The final exam is worth 25% of the total course grade.

***COLLABORATION*:**

You are encouraged to work together in learning the course material (including homework). However, your submitted homework solutions should be YOUR work and not copied from other sources. *Copying solutions from other sources (including from your colleagues' homework or from on-line tutoring services) will be considered to be a serious academic dishonesty offense in this course*. Please see your instructor if you are uncertain about the difference between collaborating and copying.

***ACADEMIC DISHONESTY POLICY*:**

To foster a climate of trust and high standards of academic achievement, Purdue University is committed to cultivating academic integrity and expects students to exhibit the highest standards of honor in their scholastic endeavors. Academic integrity is essential to the success of Purdue University's mission. As members of the academic community, our foremost interest is toward achieving noble educational goals and our foremost responsibility is to ensure that academic honesty prevails. *Any copying or cheating will be an automatic "F" grade*. Please take some time to carefully read Purdue's 'Statement of Integrity and Code of Conduct' and talk with your instructor if you have any questions (www.purdue.edu/purdue/about/integrity_statement.html).

***ELECTRONIC DEVICES*:**

You are asked to not use electronic communication devices during class time (this includes reading/sending text messages and using a laptop computer for other than taking class notes). Please turn off cell phones before coming to class and put away your cell phone before the start of class.

***CALCULATOR POLICY*:**

This course follows the Mechanical Engineering Calculator Policy. Accordingly, only TI-30XIIS calculators are to be used for quizzes and exams.

***ATTENDANCE*:**

Attendance is expected for all class meetings. *If you are unable to attend on any day, please contact your instructor prior to the class meeting time via email*. Failure to do so will give you an *unexcused absence* for the day; an unexcused absence will result in a reduction in the points used in calculating your course grade. You are responsible for all course material on any dates that you are absent.

***LEAVING CLASS*:**

You are expected to arrive to class on time and remain in the classroom throughout the class period. If you have a medical condition that requires you to step out of the room during the class

period, please see your instructor at the start of the term. Otherwise, please plan ahead so that you do not need to take breaks in the middle of class.

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Schedule for Spring 2018

PER	DATE	TOPIC	READING*	HWK DUE
1 M	8-Jan	Introduction; Static equilibrium	Sec. 1/1.1-1.4	
2 W	10-Jan	Normal stress and strain; Mechanical properties	Sec. 2/2.1-2.3	
3 F	12-Jan	Shear stress and strain – direct shear	Sec. 3/2.7	
M	15-Jan	***University holiday – no lecture***		
4 W	17-Jan	Stress – introduction to design of deformable bodies	Sec. 4/2.4-2.6,2.8	Hwk. 1
5 F	19-Jan	Stress and strain – general definitions	Sec. 5/2.11-2.13	
6 M	22-Jan	Axial members – determinate structures	Sec. 6/3.1-3.4	
7 W	24-Jan	Axial members – indeterminate structures	Sec. 6/3.5,3.8	Hwk. 2
8 F	26-Jan	Axial members – planar trusses	Sec. 6/3.10	
9 M	29-Jan	Axial members – thermal effects	Sec. 7/3.6	
10 W	31-Jan	Torsion members – stresses in circular bars	Sec. 8/4.1-4.5	Hwk. 3
11 F	2-Feb	Torsion members – statically determinate structures	Sec. 8/4.6-4.7	
12 M	5-Feb	Torsion members – statically indeterminate structures	Sec. 8/4.6-4.7	
13 W	7-Feb	Beams – shear and moment diagrams	Sec. 9/5.3-5.4	Hwk. 4
14 F	9-Feb	Beams – shear and moment diagrams	Sec. 9/5.3-5.4	
15 M	12-Feb	Beams – flexural stresses	Sec. 10/6.1-6.2	
16 W	14-Feb	Beams – flexural and shear stresses	Sec. 10/6.1-6.2, 6.8	Hwk. 5
17 F	16-Feb	Beams – shear stresses	Sec. 10/6.8	
18 M	19-Feb	Review		
19 W	21-Feb	***Examination 1, 8:00-10:00pm (no lecture, evening exam)***		
20 F	23-Feb	Beams – deflections in determinate structures	Sec. 11/7.1-7.4	
21 M	26-Feb	Beams – deflections in determinate structures	Sec. 11/7.1-7.4	
22 W	28-Feb	Beams – deflections in indeterminate structures	Sec. 11/7.1-7.4	Hwk. 6
23 F	2-Mar	Beams – deflections using superposition methods	Sec. 11/7.6	
24 M	5-Mar	Energy methods – Castigliano's theorems	Sec. 16/11.1-11.4	
25 W	7-Mar	Energy methods – Castigliano's theorems	Sec. 16/11.1-11.4	Hwk. 7
26 F	9-Mar	Energy methods – Castigliano's theorems	Sec. 16/11.1-11.4	
		Spring Break: 12-Mar through 16-Mar (no lecture)		
27 M	19-Mar	Energy methods – introduction to finite element methods	Sec. 17	
28 W	21-Mar	Energy methods – introduction to finite element methods	Sec. 17	Hwk. 8
29 F	23-Mar	Energy methods – introduction to finite element methods	Sec. 17	
30 M	26-Mar	Thin-walled pressure vessels – axial and hoop stresses	Sec. 12/9.1-9.2	
31 W	28-Mar	Stress transformation – principal /maximum shear stresses	Sec. 13/8.1-8.4	Hwk. 9
32 F	30-Mar	Stress transformation – Mohr's circle	Sec. 13/8.5-8.6	
33 M	2-Apr	Stress transformation – Mohr's circle	Sec. 13/8.5-8.6	
34 W	4-Apr	Stress transformation – absolute maximum shear stress	Sec. 13/8.6	Hwk. 10
35 F	6-Apr	Stresses – combined loading	Sec. 14/9.4	
36 M	9-Apr	Review		
37 W	11-Apr	***Examination 2, 8:00-10:00pm (no lecture, evening exam)***		
38 F	13-Apr	Stresses – combined loading	Sec. 14/9.4	
39 M	16-Apr	Stresses – combined loading	Sec. 14/9.4	
40 W	18-Apr	Failure analysis – stress theories	Sec. 15/12.3	Hwk. 11
41 F	20-Apr	Failure analysis – stress theories	Sec. 15/12.3	
42 M	23-Apr	Failure analysis – buckling of columns	Sec. 18/10.1-10.3	
43 W	25-Apr	Failure analysis – buckling of columns	Sec. 18/10.1-10.3	
44 F	27-Apr	Review		Hwk. 12

* Reading assignments from lecture book/*optional* text book.