

ME 323 - MECHANICS OF MATERIALS

Syllabus for Spring 2024, Purdue University

LECTURE TIME AND LOCATION

Section	Time (EST)	Instructor	Classroom	Email
001	MWF 8:30-9:20 AM	Prof. Alex Chortos	WALC 3121	achortos@purdue.edu
002	MWF 10:30-11:20 AM	Prof. Klod Kokini	HAMP 2108	kokini@purdue.edu
003	MWF 1:30-2:20 PM	Prof. Kejie Zhao	PHYS 111	kjzhao@purdue.edu
004	MWF 3:30-4:20 PM	Prof. Klod Kokini	PHYS 111	kokini@purdue.edu

OFFICE HOURS

Section	Time (EST)	Instructor	Room
001	TBD	Prof. Chortos	TBD
002	11:20am-12:15pm	Prof. Kokini	HAMP 1266
003	MWF 12:30-1:20pm	Prof. Zhao	ME 3166
004	11:20am- 12:15pm	Prof. Kokini	HAMP 1266

TEACHING ASSISTANTS:

Benjamin Obsitnik
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Aishwary Shristava
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T.A. office hours: ME2142

Tuesdays: 3:00-4:30pm (Ben); 4:30-6:00pm (Aishwary)

Wednesday: 10:30am-12:00pm (Aishwary); 3:00-5:30pm (Ben)

Thursday: 3:00-4:30pm (Ben); 4:30-6:00pm (Aishwary)

Friday: 10:30am-12:00pm (Aishwary); 3:00-5:00pm (Ben)

TEXTBOOK

Required: Course lecture book (*Mechanics of Materials: A Lecturebook*, by Krousgrill, Zhao, and Raman) to be purchased at University Bookstore. You may also find it through [Amazon](#) or other online vendors.

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 starting during the second week of classes.

COURSE WEBSITE <https://www.purdue.edu/freeform/me323/>

A course website 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 website in either YouTube or PDF format. The website also contains a number of examples (with solution videos) not included in the lecture book. You can also find a large number of conceptual questions on the website that you can use in preparation for the midterm and final exams in the course. You are asked to work out these conceptual problems on your own; in general, solutions will not be provided.

The course website also accommodates blog discussion threads for us to use during the course. Please take advantage of these discussion threads to ask and/or answer questions of your colleagues as you work through the homework assignments and exam preparation in the course. A one-page set of instructions for the course blog is attached at the end of this course syllabus document.

COPYRIGHT MATERIALS

Please note that the ME 323 lecture book, assignments, exams, quizzes, etc. are copyrighted materials and should not be sold, bartered to others, or posted on-line without the expressed written consent of the authors. Similarly, notes taken in class are considered to be “derivative works” of the instructor’s presentations and materials and likewise should not be sold or bartered or posted on the internet without consent. Students are permitted to use their notes, assignments, exams and quizzes etc. for individual and/or group study or other non-commercial purposes reasonably rising up from enrollment in the course or the University generally.

PRE-WEEK VIDEO AND QUIZZES

Each week, the students must view ~ 20-minute pre-week videos posted on Brightspace. The pre-week videos cover the theory and concepts of the material to be covered in the following week. After viewing the videos, the students are required to take a simple pre-week quiz on Brightspace at any time **before noon of the following Monday**. You will have 30 minutes in one sitting to take the quiz and are allowed two attempts at the quiz if you need it. The pre-week quiz is a conceptual quiz designed to see how well you followed the video.

EXAMINATIONS

	<u>Date</u>	<u>Time (EST)</u>	<u>Location</u>
Exam 1	Wed., Feb 28	8-10 PM	PHYS 114
Exam 2	Wed., April 3	8-10 PM	PHYS 114
Final Exam	TBD		

SCHEDULE

A topical schedule for the course is attached at the end of this syllabus. This schedule includes the daily reading assignment for the course lecture book. The material 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 intent of satisfying particular preset grade distribution goals. The percentage breakdowns for the components of your course grade are the following:

Grades

Homework + Quiz	30%	If you score better on the average of Exams 1 and 2 than you do on the Final, the average of these two midterm exams will count as 45% and the Final will count as 25% of your final grade, vice versa.
Exam 1 and 2	25% or 45%	
Final Exam	45% or 25%	

Homework and quizzes: 30% (total)

- Typically, one homework set will be due every week, except for weeks during which exams are given. Homework must be submitted by 11:59pm (EST) on Friday unless otherwise posted. Please post your HW on Gradescope on the appropriate HW link using a **single PDF** file (you will be asked to prescribe which page(s) each problem is on in Gradescope). Late HW will not be accepted without a personalized excuse (i.e., a generic PUSH note is not sufficient). Please review your homework submission after it has been uploaded onto

Gradescope to ensure that all work has been properly submitted. If for some reason you have problems posting your HW on Gradescope, please email the instructor the PDF of your HW before the 11:59pm (EST) deadline with an explanation. 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.

- In-class quizzes will be given regularly (typically in every Friday's class) throughout the semester. *Make-up quizzes will not be given.*

Midterm and final exams: 70% (total)

All exams will be given closed book, closed notes. A list of relevant equations will be provided with the exam. There will be a 30-minute grace period to submit your solution on Gradescope using a single PDF file for each problem. If an exam solution is not submitted and you do not inform your instructor of technical difficulties before the end of the grace period, 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.
- 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.

Regrade Requests: Regrade requests *may* be considered for graded exams or homework but only in cases where (a) points were incorrectly added, or (b) the grader clearly did not read or did misread part of the solution. If you have a genuine regrade request, please submit a regrade request on Gradescope with a clear explanation on why your exam/homework/project should be regraded. *Regrade requests will be considered only if submitted within a week of when you first receive your graded work.*

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, the following calculators are allowed: all TI-30X and TI-36X models (Any Texas Instruments calculator must have "TI-30X" or "TI-36X" in its model name), and all fx-115 and fx-991 models (Any Casio calculator must have "fx-115" or "fx-991" in its model name).

ACADEMIC DISHONESTY POLICY

Faculty and students working together can promote a fair and positive academic environment. All students are expected to conduct themselves in an ethical manner. Students are permitted to discuss homework assignments together, but should do their own work when preparing a problem solution (i.e., copying of a solution manual, an on-line resource such as **Chegg**, or another student's work, as well as posting problems to an on-line service such as **Chegg**, is explicitly prohibited). Exams are to be completed without unauthorized assistance. Any student caught cheating on an assignment or exam will receive disciplinary action, up to and including receiving a grade of "F" for the course. In addition, documentation of the infraction will be forwarded to the Office of the Dean of Students (ODOS), which may result in additional disciplinary sanctions, up to and including expulsion from the University. All of us are equally responsible for ensuring a fair and positive environment. If you become aware of any dishonest activities, please report the infractions to the instructors (anonymously if you prefer) and we will investigate the concerns. If there is sufficient evidence of academic dishonesty, we will take disciplinary action. Finally, remember if you are complicit in assisting a peer to cheat, you are equally guilty. Please take to heart Purdue's Honor Pledge:



"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

ATTENDANCE

Every student should make every effort to attend class regularly. Only the instructor can excuse a student from a course requirement or responsibility. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via email or phone at 765-494-1747. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.

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.

CLASSROOM GUIDANCE REGARDING PROTECT PURDUE

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#) and the Violent Behavior Policy under University Resources in Brightspace.

MENTAL HEALTH/WELLNESS

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. The [CAPS website](#) also offers resources specific to situations such as COVID-19.

CAMPUS EMERGENCIES

In the event of a major campus emergency (e.g., severe weather, active shooter, etc.), course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. The School of Mechanical Engineering will provide details regarding access to information online and any additional procedures that may be needed as

soon as they are available or can be obtained by contacting the instructors or TAs via mail or phone. You are expected to read your @purdue.edu email on a frequent basis.

STUDENTS WITH DISABILITIES

If you have a disability that requires special academic accommodation, please make an appointment to speak with your instructor within the first week of the semester in order to discuss any adjustments and bring your accommodation letter from the Disability Resource Center. *It is important that we are informed about this at the beginning of the semester.* It is the student's responsibility to notify the Disability Resource Center (<http://www.purdue.edu/drc>) of an impairment/condition that may require accommodations and/or classroom modifications. If a student does not notify their instructor well in advance about the need for accommodations, there may not be time to arrange some accommodations.

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Schedule for Spring 2024

PER	DATE	TOPIC	READING*	HWK DUE
1 M	08-Jan	Introduction; Static equilibrium	Chap. 1	
2 W	10-Jan	Normal stress and strain; Mechanical properties	Chap. 2	
3 F	12-Jan	Shear stress and strain – direct shear	Chap. 3	
M	15-Jan	MLK Birthday: no class		
4 W	17-Jan	Stress – introduction to design of deformable bodies	Chap. 4	
5 F	19-Jan	Stress and strain – general definitions	Chap. 5	HW. 1
6 M	22-Jan	Axial members – determinate structures	Chap. 6	
7 W	24-Jan	Axial members – indeterminate structures	Chap. 6	
8 F	26-Jan	Axial members – planar trusses	Chap. 6	HW. 2
9 M	29-Jan	Axial members – thermal effects	Chap. 7	
10 W	31-Jan	Torsion members – stresses in circular bars	Chap. 8	
11 F	2-Feb	Torsion members – statically determinate structures	Chap. 8	HW. 3
12 M	5-Feb	Torsion members – statically indeterminate structures	Chap. 8	
13 W	7-Feb	Beam stresses – equilibrium and flexural stresses	Chap. 10	
14 F	9-Feb	Beam stresses – flexural and shear stresses	Chap. 10	HW. 4
15 M	12-Feb	Beam stresses – shear stresses	Chap. 10	
16 W	14-Feb	Shear force/bending moment diagrams – determinate structures	Chap. 9	
17 F	16-Feb	Beams deflections– statically determinate structures	Chap. 11	HW 5
18 M	19-Feb	Beam deflections - indeterminate structures	Chap. 11	
19 W	21-Feb	Beam deflections – superposition methods	Chap. 11	
20 F	23-Feb	Energy methods – Castiglano’s theorems	Chap. 16	HW. 6
21 M	26-Feb	Review		
W	28-Feb	Examination 1, 8-10pm: no lecture on Wednesday		
22 F	1-Mar	Energy methods – Castiglano’s theorems	Chap. 16	
23 M	4-Mar	Energy methods – Castiglano’s theorems	Chap. 16	
24 W	6-Mar	Energy methods – Castiglano’s theorems	Chap. 16	
25 F	8-Mar	Shear force/bending moment diagrams – indeterminate structures	Chap. 9	HW 7
		Spring Break, March 11-15: no class		
26 M	18-Mar	Shear force/bending moment diagrams – indeterminate structures	Chap. 9	
27 W	20-Mar	Energy methods – introduction to finite element methods	Chap. 17	
28 F	22-Mar	Energy methods – introduction to finite element methods	Chap. 17	HW 8
29 M	25-Mar	Thin-walled pressure vessels – axial and hoop stresses	Chap. 12	
30 W	27-Mar	Stress transformation – principal /maximum shear stresses	Chap. 13	
32 F	29-Mar	Stress transformation – Mohr’s circle	Chap. 13	HW 9
33 M	1-Apr	Review		
W	3-Apr	Examination 2, 8-10pm: no lecture on Wednesday		
33 F	5-Apr	Stress transformation – absolute maximum shear stress	Chap. 13	
34 M	8-Apr	Stresses – combined loading	Chap. 14	
35 W	10-Apr	Stresses – combined loading	Chap. 14	
36 F	12-Apr	Stresses – combined loading	Chap. 14	HW 10
37 M	15-Apr	Failure analysis – stress theories	Chap. 15	
38 W	17-Apr	Failure analysis – stress theories	Chap. 15	
39 F	19-Apr	Failure analysis – buckling of columns	Chap. 18	HW 11
40 M	22-Apr	Practice with combined loadings and failure analysis		
41 W	24-Apr	Practice with combined loadings and failure analysis		
42 F	26-Apr	Review		
	TBA	Final Examination		

* Reading assignments from lecture book