ME 323 - MECHANICS OF MATERIALS

Purdue University

Syllabus for Summer 2025

INSTRUCTOR:

Chuck Krousgrill
Email: krousgri@purdue.edu
Lecture on Zoom:
Office Hours: TBD, MTWTh on Zoom

TA:

Savani Prabhune
Email: prabhune@purdue.edu
Tutorial room: TBD hours on Zoom.

TEXTBOOK:

Required: "*Mechanics of Materials: A Lecturebook*", Krousgrill, Zhao and Raman. Purchased at the University Bookstore.

COURSE WEBSITE:

The course website for ME 323 can be found at: https://www.purdue.edu/freeform/me323/. The blog will be the point of delivery for ALL course material. ***Brightspace will NOT be used in the course this summer.***

GRADESCOPE:

We will use Gradescope this term for the submission, grading and return of homework. There is a link to the Gradescope site on the course blog.

COURSE SCHEDULE:

A topical schedule for the course is attached at the end of this syllabus.

ATTENDANCE:

Your attendance is expected for every lecture, either live on Zoom or watching the lecture video. If you watch the lectures on the recorded videos, you are expected to do so by 11:59PM on the day of the next following regular class period. Regardless of the mode of watching the lectures, you are expected to stay for the entire class. Otherwise, you will be counted as absent for that lecture.

COURSE 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.

The percentage breakdown for the components of your course grade is the following:

Quizzes and attendance: 10%
Unannounced quizzes will be given throughout the course, either: i) as part of your viewing of the lecture videos, and/or ii) as quizzes given on Gradescope for which you are given 48 hours to complete the quiz. *No makeup quizzes will be given.*

Homework: 30%

There will be a homework set assigned for each day of class. Completed homework assignments are to the submitted online through Gradescope by 11:59PM of the *third regular class period following the assignment date*. (See the homework due date schedule on the course schedule found on the last page of this document. Homework is to be turned in using the same format as was used in ME 270 and ME 274. See attached page reminding you of the format to be used. 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. At the end of the semester, three homework scores will be dropped when calculating your course average. That is, you are able to miss submissions for three homework problems without penalty to your grade. *Late homework will not be accepted.*

Midterm exam: 30%
One midterm exam will be given during the school term. See the course schedule for exam date. *Makeup midterm exams will not be given.*

Final exam: 30%
A final exam will be given during the scheduled University final exam period for the summer term. *Makeup final exams will not be given.*

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 will be considered to be a serious offense in this course. Please see your instructor if you are uncertain about the difference between collaborating and copying.

Usage of services such as Chegg, Course Hero, Quizlet, etc. for unauthorized help (including, but not limited to, accessing online cheating services) is a violation of class policy. The consequences of not following the course policy on this include a lowering of your course grade up through possible expulsion from the University. Suspect use cases will be submitted to the Office of the Dean of Students and, if copyright infringement is involved, to appropriate legal counsel.

ATTENDANCE:

"Attendance" is expected for all class meetings, where attendance is either attending the live Zoom session, or by viewing the recorded

lecture video within 48 hours of its posting. You must stay for the entire Zoom lecture or watch the entire lecture video in order to have that count as having attended class.

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

DIVERSITY & INCLUSION: Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy can be found at:

http://www.purdue.edu/purdue/ea_eou_statement.html.

CAPS INFORMATION: 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 support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

ACCESSIBILITY: Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

ME 323 – Course Blog

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The blog discussion threads for this course are intended to provide a forum for the exchange of ideas among the students in the class and between the students and the instructor. From this blog, you can get/provide assistance from/to other people in the class. We have found that you can often learn as much from helping others as from getting help for yourself.

In order to add comments on the course blog, you need to be logged in to the blog using your Career Account login (you should NOT use the Two-Factor Authentication). Let your instructor know if you have problems logging in.

ANONYMITY IN POSTING:

When you first log onto the course blog and are approved by your instructor, your default *User Name* is set to that of your Purdue Career Account. This *User Name* will appear with each comment that you post on the blog. If you would like to post anonymously, you are able to choose a new "*Nickname*" that will be displayed instead of your *User Name* on the comments. To do so:

1. Go to your "**Edit my profile**" in the upper right of the Admin Bar under "**Howdy**".
2. Add a nickname in the "**Nickname**" (*required*)" box.
3. In the "**Display name publicly as**", choose the desired nickname from the drop-down list.
4. Click "**Update Profile**" at the bottom of the page.

You may add additional *Nicknames*, and switch among these for different displays throughout the semester. If being anonymous to your colleagues is important to you for your postings, choose nicknames that will help you maintain your anonymity.

Homework guidelines

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- To make your record keeping easier, please name your homework file "*ME323_Problem Number_Your Name*".
- If you use multiple sheets of paper to solve a problem repeat the *DATE PROBLEM NUMBER PAGE* and *NAME* header on each sheet.
- Before scanning, put the pages in order and scan from the first to the last sheet of paper.
- Before uploading to Gradescope, check the quality of the scanned problem. You do not want to lose points because the grader is unable to read your solution. If it is hard to read, you need to re-scan and make sure the result is better.
- Your writing needs to be large enough so that when the problem is scanned, it does not require the grader to do high levels of magnification to be able to read your solution.
- If you are using a pencil to do your solution, you need to use a pencil that is on the soft side (HB at a minimum or 2B ideally) so that the writing is dark enough so that the scan works well. Make sure that the pencil is sharpened, too.
- You must specify co-ordinate systems, associated references points, draw the unit vectors that you are using on the diagrams, and include units in your answers. For equilibrium problems, you must include clear free-body diagrams. Failure to do any of these things will result in a loss of points. Failure to do all of these things will result in a large loss of points.
- While homework is due just before midnight, you should set yourself a goal of submitting it well before that deadline, so that internet challenges can be identified soon enough to develop other strategies for uploading on time. If you are unable for any reason to upload your homework/quizzes to Gradescope by the deadline, please send your submission to your instructor prior to the deadline. *No homework will be accepted late*.

Homework format

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Please use *white paper* for your homework problem solutions in order to produce better scans.

DUE DATE *(month, day, year)* ***PROBLEM NO.*** *(H#)* ***PAGE NO.*** *(# of #)* ***NAME*** *(last, first)*

***Given*:** A concise statement (in your own words) of the information given.

***Find*:** A concise statement (in your own words) of the information sought.

***Solution*:** **Sketch the system** to be studied. USE A STRAIGHT EDGE for drawing lines.

For general problems in load analysis, show the four-step plan:

1. *Equilibrium*: FBDs and equilibrium equations.
2. *Load/deflection*: Write down the appropriate load/deflection relations.
3. *Compatibility*: Write down the appropriate compatibility equations relating deformations.
4. *Solve*: Count the number of equations and the number of unknowns. If you have sufficient equations, solve. If not, go back to the first three steps and add in additional equations.

Work the problem symbolically.
At the end convert all quantities to a consistent set of units and substitute into the equations to obtain the answers.

Check your answers for correctness and feasibility.

Check your vector notation and units. In particular, check that you are not equating vector quantities to scalar quantities. It is important that you demonstrate that you know the difference between scalars and vectors. So pay attention to your notation.

Label the answers._____ANSWER

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PER	*DATE*	*TOPIC*	*READING**	*HWK ASSIGN***	*HWK DUE*
1 M	16-Jun	Introduction; Static equilibrium; Stress	Section 1	H01	
2 T	17-Jun	Strain; Mechanical properties	Section 2	H02	
3 W	18-Jun	Shear stress and strain – direct shear	Section 3	H03	
4 Th	19-Jun	Stress – introduction to design of deformable bodies	Section 4	H04	H01
5 F	20-Jun	Stress and strain – general definitions	Section 5	H05	H02
6 M	23-Jun	Axial members – determinate structures	Section 6	H06	H03
7 T	24-Jun	Axial members – indeterminate structures	Section 6	H07	H04
8 W	25-Jun	Axial members – planar trusses	Section 6	H08	H05
9 Th	26-Jun	Axial members – thermal effects	Section 7	H09	H06
10 F	27-Jun	Torsion members – circular shafts	Section 8	H10	H07
11 M	30-Jun	Torsion members – statically determinate structures	Section 8	H11	H08
12 T	1-Jul	Torsion members – statically indeterminate structures	Section 8	H12	H09
13 W	2-Jul	Beams – shear and moment diagrams (determinate)	Section 9	H13	H10
14 Th	3-Jul	Beams – flexural stresses	Section 10	H14	H11
15 F	4-Jul	***University holiday – no class***			
16 M	7-Jul	Beams – shear stresses	Section 10	H15	H12
17 T	8-Jul	Beams – deflections (determinate/ indeterminate)	Section 11	H16	H13
18 W	9-Jul	Beams – deflections (determinate/ indeterminate)	Section 11	H17	H14
Th	10-Jul	Beams – deflections using superposition	Section 11	H18	H15
19 F	11-Jul	***Midterm Examination***			
20 M	14-Jul	Energy methods – Castigliano's theorems	Section 16	H19	H16
21 T	15-Jul	Energy methods – Castigliano's theorems	Section 16	H20	H17
22 W	16-Jul	Energy methods – Castigliano's theorems	Section 16	H21	H18
23 Th	17-Jul	Energy methods – introduction to finite element methods	Section 17	H22	H19
24 F	18-Jul	Energy methods – introduction to finite element methods	Section 17	H23	H20
25 M	21-Jul	Thin-walled pressure vessels – axial and hoop stresses	Section 12	H24	H21
26 T	22-Jul	Stress transformation – principal /maximum shear stresses	Section 13	H25	H22
27 W	23-Jul	Stress transformation – Mohr's circle	Section 13	H26	H23
28 Th	24-Jul	Stress transformation – absolute maximum shear stress	Section 13	H27	H24
29 F	25-Jul	Stresses – combined loading	Section 14	H28	H25
30 M	28-Jul	Stresses – combined loading	Section 14	H29	H26
31 T	29-Jul	Failure analysis – stress theories	Section 15	H30	H27
32 W	30-Jul	Failure analysis – stress theories	Section 15	H31***	H28
33 Th	31-Jul	Failure analysis – buckling of columns	Section 18	H32***	H29
34 F	1-Aug	Failure analysis – buckling of columns	Section 18	H33***	H30
35 M	4-Aug	Open period – activities to be announced			
36 T	5-Aug	Open period – activities to be announced			

* Reading assignments are from the course lecture book. It is expected that you will have read this material before viewing the lecture video for the day.

** Homework is to be submitted by 11:59PM on Gradescope on the day of the ***third regular class period*** following the assigned date. No late homework can be accepted.

*** Homeworks H31/H32 due by 11:59PM on **Sunday**, August 3. Homework H33 will NOT be collected.