

# **ME 323 - MECHANICS OF MATERIALS**

Purdue University  
Syllabus for Summer 2024

- INSTRUCTOR:** Chuck Krousgrill  
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Office Hours: TBD, MTWTh on Zoom
- TA:** Sophie Kwon  
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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.
- 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 are the following:
- Quizzes: 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 36 hours to complete the quiz. *No makeup quizzes will be given.*
- Homework: 30%**  
Typically, there will be a homework set due at 11:59 PM each day of class. Completed homework assignments are to be submitted online through Gradescope. *Late homework will not be accepted.* 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, two homework scores will be dropped when calculating your course average. That is, you are able to miss

submissions for 2 homework problems without penalty to your grade.

**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.

**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 36 hours of its posting. Attendance will be recorded through the use of embedded quiz questions and/or your video viewing record on the Kaltura lecture videos.

**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](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](mailto: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.

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

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**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

## ME 323 - MECHANICS OF MATERIALS

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Schedule for Summer 2024

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