

## NUCL 27300: MECHANICS OF MATERIALS SYLLABUS and POLICIES

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**Resources:** **BrightSpace** BoilerCast lectures, etc.  
**Text and HW:** Beer and Johnston, Mechanics of Materials **8e** with **McGraw-Hill Connect key** (not International ed.)

**Grading:** Exams: 70%  
Homework: 25%  
Attendance: 5%  
A+: 95-100, A: 90-94.9, A-: 85-89.9, B: 70-84.9, C: 55-69.9, D: 40-54.9, F: 0-39.9  
B, C, D, F are broken in plus-minus ranges of 5 points like A.

**Exams:** Two 1-1/2 hour evening in person exams and one 2 hour final (with bonus problem). Closed book.

**Homework:** Homework assignments are listed in the schedule at the end of this document. They MUST be completed in **McGraw-Hill Connect** (best grade from several trials chosen). Due dates are given, accepted late with 10% daily penalty; lateness may be excused for acceptable reasons. No homework are dropped in the final grade. **Hw 14 is worth double.**  
Be extremely critical of your own work!! You are responsible for making certain that your results are correct. You can achieve this by using the tests of “reasonableness”, checking by another method or against previous results, and/or consulting with other students, the grader, or the instructor.  
When a homework dispute arises please discuss it with the grader first.

**Attendance:** Once a week.

**Emergencies:** In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

**Ethics:** The Brightspace template includes a link to Purdue’s Student Guide for Academic Integrity under University Policies including the Pledge:  
“As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

*Exams:* Exams will be open book, open notes, but needed equations will be furnished. Completely independent work is required; copying is unacceptable and copied work will warrant an F for the course.

*Homework:* getting help from the instructor, grader or other students is encouraged BUT be careful not to lean heavily on others... make sure you understand concepts.

**Course Description:** Analysis of stress and strain; equations of equilibrium and compatibility, stress-strain laws, extension, torsion and bending of bars, membrane theory of pressure vessels, elastic stability, elected topics. 3 Credit Hours.

**Prerequisite:** ME 27000      **Classification:** Required

**Learning Outcomes:**

1. To develop an understanding of simple structures subject to axial, bending, shearing, torsion or pressure loading.
2. To learn a systematic approach to engineering problem solving.
3. To introduce students to simple design problems.

**List of Topics:** Material properties; loads, reactions, axial load: stress and deformation, including statically indeterminate systems, axial force, shear force, bending moments, flexural stresses in beams, shear stresses in beams, beam deflections, torsion: stress and deformation, including statically indeterminate systems, combined loadings; elastic stress analysis and design, elastic buckling.

**Quarantine:** If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at [acmq@purdue.edu](mailto:acmq@purdue.edu) and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students ([odos@purdue.edu](mailto:odos@purdue.edu)) is also available to support you should this situation occur.

**Protect Purdue:** The [Protect Purdue Plan](#), which includes the [Protect Purdue Pledge](#), is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, wearing a mask [in classrooms and campus building](#), at all times (e.g., no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining proper social distancing with peers and instructors (including

when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss 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](#).

**Accessability:** 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. More details are available on our course Brightspace under Accessibility Information.

**Nondiscrimination Statement:**

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. More details are available on our course Brightspace table of contents, under University Policies.

**Mental Health:** 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 completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at [evans240@purdue.edu](mailto:evans240@purdue.edu). **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 of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

**Schedule:** see next page

DAY	DATE	TOPIC	B & J READING	HW	HW Due Date
Mon	23-Aug	Introduction; normal and shear stresses	1.1		
Wed	25-Aug	Stress components; axial loading	1.2-1.3	1	30-Aug
Fri	27-Aug	Stress components; general loading	1.4	2	1-Sep
Mon	30-Aug	Ultimate & allowable stresses; F.S.	1.5		
Wed	1-Sep	Concept of strain; stress-strain relationships	2.1	3	8-Sep
Fri	3-Sep	Deformation of axially loaded member	2.1		
Wed	8-Sep	Statically Indeterminate Structures	2.2	4	13-Sep
Fri	10-Sep	Thermal stresses	2.3		
Mon	13-Sep	Poisson's Ratio; Hooke's Law; Shear Strain	2.4	5	17-Sep
Wed	15-Sep	Relationship among E, G, and $\nu$	2.5		
Fri	17-Sep	Torsion Theory	3.1	6	22-Sep
Mon	20-Sep	Gears	3.2		
Wed	22-Sep	Pure Bending; Stresses and deformations	4.1-4.2	7	27-Sep
Fri	24-Sep	Eccentric Axial Loading (Symmetric)	4.7		
Mon	27-Sep	Review			
We	29-Sep	EXAM 1, RHPH 172, 8-9:30p			
Fri	1-Oct	Unsymmetrical Bending	4.8	8	6-Oct
Mon	4-Oct	General Eccentric Axial Loading	4.9		
Wed	6-Oct	V & M Equations	5.1, 5.2	9	13-Oct
Fri	8-Oct	Examples			
Wed	13-Oct	Beam Deflections	9.1	10	18-Oct
Fri	15-Oct	Statically indeterminate beams	9.2		
Mon	18-Oct	Examples			
Wed	20-Oct	Method of Superposition	9.4	11	25-Oct
Fri	22-Oct	Statically Indeterminate Beams	9.4		
Mon	25-Oct	Review			
Wed	27-Oct	Review, EXAM 2, LILY 1105, 8-9:30 pm			
Fri	29-Oct	Transverse Loading on Beams; shear stress	6.1		
Mon	1-Nov	Shear stress; shear flow		12	5-Nov
Wed	3-Nov	Examples			
Fri	5-Nov	Transformation of stress	7.1		
Mon	8-Nov	Examples		13	12-Nov
Wed	10-Nov	Mohr's Circle	7.2		
Fri	12-Nov	Pressure Vessels	7.6		
Mon	15-Nov	Yield criteria	7.3-7.5	14 (Double Points)	19-Nov
Wed	17-Nov	Design of beams	8.1		
Fri	19-Nov	Stability of Beams and Columns	10.1		
Mon	22-Nov	No class (Thanksgiving)	10.1		
Mon	29-Nov	Euler's Formula	10.1		
Wed	1-Dec	Centric Loads	10.2	15	6-Dec
Fri	3-Dec	Eccentric Loads	10.3		
Mon	6-Dec	Design of Columns			
Wed	8-Dec	Energy Methods: Crack Propagation			
Fri	10-Dec	Review			
		FINAL			

Revised 10/25/2021