

NUCL 27300: MECHANICS OF MATERIALS SYLLABUS and POLICIES

- Instructor:** Martin Bertodano, bertodan@purdue.edu
- TA/Graders:** Andrew Mulrenin, amulreni@purdue.edu **webmaster**
Evan Frishholz, efrishho@purdue.edu **WebEx hours:** T,Th 7:30-9:00p
Mitchell Ferrel, ferrelm@purdue.edu **WebEx hours:** MWF 4:30-5:30p
Webex address: <https://purdue-student.webex.com/meet/ferrelm>
- Resources:** **BrightSpace** BoilerCast lectures, etc.
Text and HW: Beer and Johnston, **Mechanics of Materials 8e with McGraw-Hill Connect key (not International ed.)**
MecMovies <http://web.mst.edu/~mecmovie/>
- Grading:** Exams: 75%
Homework: 25%
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 online exams via **BrightSpace** and one 2 hour final (with bonus problem).
- 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 at end of day of second period after assignment date; accepted one period late with 10% penalty; not accepted otherwise; lateness may be excused for acceptable reasons. *Homework handed outside of class will not be graded.* 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:** Online course.
- 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 270 **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 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) 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](#).

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. 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. **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: Next page

Schedule (Rev 1):

DAY	DATE	TOPIC	B & J READING	HW ASSIGNMENT
Wed	20-Jan	Introduction; normal and shear stresses	1.1	1
Fri	22-Jan	Stress components; axial loading	1.2-1.3	
Mon	25-Jan	Stress components; general loading	1.4	2
Wed	27-Jan	Ultimate & allowable stresses; F.S.	1.5	
Fri	29-Jan	Concept of strain; stress-strain relationships	2.1	3
Mon	1-Feb	Deformation of axially loaded member	2.1	
Wed	3-Feb	Statically Indeterminate Structures	2.2	4
Fri	5-Feb	Thermal stresses	2.3	
Mon	8-Feb	Poisson's Ratio; Hooke's Law; Shear Strain	2.4	5
Wed	10-Feb	Relationship among E, G, and ν	2.5	
Fri	12-Feb	Torsion Theory	3.1	6
Mon	15-Feb	Gears	3.2	
Wed	17-Feb	Reading day		
Fri	19-Feb	Pure Bending; Stresses and deformations	4.1-4.2	
Mon	22-Feb	Review		
Wed	24-Feb	EXAM 1 (Brightspace, 7:30 am and 8:00 pm)		7
Fri	26-Feb	Eccentric Axial Loading (Symmetric)	4.7	
Mon	1-Mar	Unsymmetric Bending	4.8	8
Wed	3-Mar	General Eccentric Axial Loading	4.9	
Fri	5-Mar	V & M Equations	5.1, 5.2	9
Mon	8-Mar	Examples		
Wed	10-Mar	Beam Deflections	9.1	10
Fri	12-Mar	Statically indeterminate beams	9.2	
Mon	15-Mar	Examples		
Wed	17-Mar	Reading day		
Fri	19-Mar	Method of Superposition	9.4	11
Mon	22-Mar	Statically Indeterminate Beams	9.4	
Wed	24-Mar	Transverse Loading on Beams; shear stress	6.1	
Fri	26-Mar	Review		
Mon	29-Mar	EXAM 2 (Brightspace, 7:30 am and 8:00 pm)		
Wed	31-Mar	Shear stress; shear flow		12
Fri	2-Apr	Examples		
Mon	5-Apr	Transformation of stress	7.1	
Wed	7-Apr	Examples		13
Fri	9-Apr	Mohr's Circle	7.2	
Mon	12-Apr	Pressure Vessels	7.6	
Wed	14-Apr	Reading day		
Fri	16-Apr	Yield criteria	7.3-7.5	14 (Double Points)
Mon	19-Apr	Design of beams	8.1	
Wed	21-Apr	Stability of Beams and Columns	10.1	
Fri	23-Apr	Euler's Formula	10.1	15
Mon	26-Apr	Eccentric Loads	10.2	
Wed	28-Apr	Design of Columns	10.3	
Fri	30-Apr	Review		
		EXAM 3 (TBA)		