



Mechanics of Materials - Syllabus

Mechanics of Materials, ENGR 232, Fall 2024

Instructor	Megan Voss-Warner
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Course Meeting Days and Time	MW 3:30-4:45PM
Office Hours	M/W 8:00-10:00, T/TH 9:00-12:00

Catalog Description:

Covers general principles of stress and strain, including elastic and inelastic behavior stress and strain transformation, stress calculations for direct shear and torsion; analysis of beam behavior, including flexural stresses and deflections, combined stresses, applications involving statically indeterminate systems, and buckling of compression members.

Credit Hour Policy Statement:

This class meets the federal credit hour policy of 1 hour of class with an expected 2 hours of additional student work outside of class each week for approximately 15 weeks for each hour of credit, or a total of 45-75 total hours for each credit.

Course Learning Objectives:

By the end of this course, students will be able to:

1. Differentiate between stress and strain and describe the relationship between the two
2. Identify important points on a stress vs. strain curve
3. Know the difference between elastic and plastic behavior
4. Calculate deformations due to axial loads, shear loads, torsional loads and temperature changes
5. Solve statically indeterminate problems
6. Calculate stress concentrations due to axial and torsional loadings
7. Calculate axial stresses due to bending of uniform and composite members
8. Calculate and draw shear and moment diagrams
9. Design members for axial, flexural, and torsional loading
10. Understand the role of safety factors in design
11. Calculate vertical and horizontal shear stresses in flexural members
12. Transform 2- and 3-dimensional stresses to find principal stresses
13. Use integrals to determine shear, moment, rotation, and deflection of statically determinate and indeterminate beams
14. Design columns to avoid buckling

Methods of Instructions:

This course will primarily be taught through in-person instruction during class times. Online videos may be used as needed and will be posted on blackboard. Students will learn theory and practice some problems in class, with the majority of practice being done outside of class through homework.

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Textbooks and Required Reading:

Mechanics of Materials, by Beer, Johnston, and DeWolf, any edition. 8th edition will be followed in class. ISBN: 1259977269

Course Schedule:

The course schedule is below with the topic to be covered each class. A homework assignment comprised of 1-4 problems will be due at the beginning of every class except for dates with exams.

Class #	Date	Day	Topic
1	9/2	M	Syllabus, Review of Statics and FBDs, deformation discussion
2	9/4	W	Types of stress and stress components
3	9/9	M	Factors of safety and design with stress
4	9/11	W	Stress/strain diagrams, hook's law, and young's modulus
5	9/16	M	Statically indeterminate problems
6	9/18	W	Temperature change, Poisson's ratio, and Hooke's law
7	9/23	M	Shear Strain and modulus
8	9/25	W	Stress concentrations and plastic deformation
9	9/30	M	Torsion and angle of twist
10	10/2	W	Transmission shafts and stress concentrations
11	10/7	M	Bending stresses
12	10/9	W	Exam 1, Chapters 1-3
13	10/14	M	Eccentric axial loading and unsymmetric loading
14	10/16	W	Shear and moment diagrams
	10/21	M	Fall Break
	10/23	W	Fall Break
15	10/28	M	Beam design with shear and moment diagrams
16	10/30	W	Beam shear
17	11/4	M	Horizontal beam shear (horizontal and vertical)
18	11/6	W	Transformation of 2D stresses with Mohr's circle
19	11/11	M	Mohr's circle applications, 3D Mohr's circle, pressure vessels
20	11/13	W	Failure theories
21	11/18	M	Beam deflections
22	11/20	W	Exam 2, Chapters 4-7
23	11/25	M	Beam deflections 2
24	11/27	W	Statically indeterminate beams
25	12/2	M	Stresses due to combined loads
26	12/4	W	Column buckling and design
27	12/9	M	Final Exam, chapters 8-10



Grading Criteria:

Quizzes = 10%

Homework & in-class exercises = 20%

Exams (3) = 70%

In-class exercises: Group activities requiring practice problems or discussion will be graded as in-class exercises. These are graded primarily on a participation basis, as it is encouraged to make mistakes in class to avoid mistakes on tests. Students will also be occasionally asked to do work outside of class that will be discussed in class instead of handed in as a graded homework.

Homework: Unless otherwise stated, homework is due in paper form at the beginning of class. Authorized aid for homework is any resource, including but not limited to: classmates, notes, textbooks, online resources, software, professors, or other humans. It is **STRONGLY RECOMMENDED** that you first attempt homework on your own until you get an answer, but it is encouraged to use any available resources to check your work. Homework is your greatest opportunity to practice the material. Don't waste this opportunity.

Exams: Exams will be given during class time. Authorized aid for exams includes a calculator, ruler, and an equation sheet. The professor will be available for clarification, if needed.

Quizzes: Quizzes will have the same authorized aid as exams, except that the equation sheet will always be provided by the instructor. At least the Quiz date or topic will be announced (but not necessarily both) at least one class period in advance. Due to the possibility of pop quizzes, students must be vigilant about informing the professor of upcoming absences. There will be no make-up quizzes for absences that were not communicated to the professor at least 1 week in advance except for excused illnesses or unforeseen excused absences.

The grading scale is below. The minimum percentage required to get each letter grade is listed below the grade.

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93.0	90.0	87.0	83.0	80.0	77.0	73.0	70.0	67.0	63.0	60.0	0

Withdrawal and Attendance policies:

Harlaxton College expects regular class attendance by all students. Students are considered sufficiently mature to appreciate the necessity of regular and punctual attendance, to accept this personal responsibility and to accept the consequences of failure to attend. When absences occur due to emergency or medical reasons, students are expected to notify their instructors of the absence prior to class or to seek the assistance of the College nurse or a member of the Student Experience Team for help in notifying instructors.

Instructors have the authority to grant excused absences for medical, psychological, or personal reasons upon review of appropriate documentation and professional recommendation supporting such a request. In the event of long-term illness, reasonable accommodations will be made to allow a student to complete a course. In these cases, the Dean will need to approve the long term nature of the accommodation.

The Dean of Harlaxton College has the authority to grant excused absences for medical, psychological, or personal reasons.

Each instructor is expected to maintain an attendance policy in keeping with the nature of the Harlaxton program and may consider it in evaluating performance in their courses.



Policy Governing Unexcused Absences:

Harlaxton College operates an attendance policy that is binding on all faculty and students. The number of unexcused absences that are allowed before incurring a penalty is related to the number of times a class meets each week. For courses which meet three times a week, students are allowed a maximum of three unexcused absences during the semester without attracting penalty points. For courses meeting twice a week two such absences are permitted, and for courses meeting once a week a single absence is allowed. Additional unexcused absences will attract a grade penalty.

Each absence beyond the two allowed will result in a third-letter grade deduction (A- to B+).

Policy Governing Excused Absences.

- Excused absences are not given to facilitate student travel independent of College-sponsored travel.
- Students may be permitted to miss class because of participation in academic field trips.
- Instructors must co-ordinate and confirm academic fieldtrips with the Dean, prior to the commencement of the Semester to ensure their inclusion in the Semester timetable.
- Where authorization for an academic fieldtrip is requested after the commencement of the semester, the request must be submitted to the Dean.

The following information is required:

- Purpose and brief description of the official Harlaxton event or academic fieldtrip.
- Dates, location, and times (as applicable).
- Alphabetical list of students involved [Last Name/First Name] along with their student identification number.

If approval is granted:

- Instructors affected will be notified at least one week prior to the class period during which absence is anticipated, or as soon as possible.
- Missed class time due to student participation is to be considered an excused absence.
- The grade of a student may not be lowered in any class due to excused absences.
- It is the student's responsibility - to take the initiative by consulting with their instructors before the absence occurs, and - to do what is required by the instructor to make up all missed assignments and/or examinations.
- Instructors are required to assist students in these occasional situations of excused absences.

Honor Code:

All students at the University of Evansville agree to the University honor code: *I will neither give nor receive unauthorized aid, nor will I tolerate an environment that condones the use of unauthorized aid.*



AI may be used only with prior permission or direction by the instructor.

- All work submitted in this course must be your own.
- The use of generative AI composition tools, such as those offered by ChatGPT, Google Bard etc. is prohibited in this course except for specific assignments and subject to the instructor's guidelines.
- Work generated by such tools without proper attribution is plagiarism and, thereby, a breach of the University's Plagiarism and Academic Honesty policy.

Disability Policy:

It is the policy and practice of the University of Evansville to make reasonable accommodations for students with properly documented disabilities. Students should contact Disability Services within the Office of Counseling Services by calling 812-488-2663 to seek services or accommodations for disabilities. Written notification to faculty from Disability Services is required for academic accommodations.

The University of Evansville Disability Services office will share the request for academic accommodations with the Academic Support team at Harlaxton College. Staff members at Harlaxton will meet individually with students to discuss needs and provide additional information related to examinations or other assessments.

Students from partner institutions should provide the appropriate letter of accommodation from their institution to the Academic Support team at Harlaxton College.



Non-Discrimination Statement

The University of Evansville expects all members of its community to treat each other with respect and civility. Harassing behaviors directed towards any member of our community will not be tolerated. As part of its commitment to non-discrimination, the University specifically prohibits harassment based on any other characteristics set forth in its nondiscrimination statement as follows: including race, color, gender, gender identity and expression, sexual orientation, creed or religion, national origin, age, disability, veteran status and all federally protected groups/classes. Any form of harassment undermines the mission of the University and negatively impacts the University community as a whole.

Prohibited Conduct and Confidentiality

The University of Evansville is committed to fostering an atmosphere free from harassment and discrimination. This commitment includes identifying problems that may lead to sexual harassment and misconduct, as well as other forms of harassment and discrimination, by creating an atmosphere in which the entire University community is sensitive to preventing prohibited conduct. Additionally, the University is committed to providing support and resources to individuals who have experienced prohibited conduct. This commitment includes effectively responding when a student, visitor, guest or program participant is the victim of prohibited conduct.

All campus employees, students, and guests are required to abide by the Title IX and Other Sexual Harassment and Misconduct Policy, the Harassment and Discrimination Policy, and the Consensual Sexual or Romantic Relationships Between Employees and Students Policy. Violation of these policies could result in disciplinary action, up to and including expulsion for students and termination for employees.

Faculty members at the University of Evansville are considered “Responsible Employees” under the applicable federal guidelines and the University’s policies. This means that I am unable to offer you confidentiality if you report any incidence of prohibited conduct to me as defined by Title IX statute. If I am made aware of a violation, I am required to report any known information to the Office of Institutional Equity.

You may choose to report the violation yourself the following ways:

Email: · Annie Sills, Assistant Director of Institutional Equity and Title IX Coordinator:

cs175@evansville.edu ·

Keith Gehlhausen, Executive Director of HR and Institutional Equity: kg77@evansville.edu ·

Title IX: titleix@evansville.edu

Phone: [812-288-5261](tel:812-288-5261)



Online: <https://www.evansville.edu/safety/report.cfm>

You may also choose to speak with a Confidential Resource. Confidential Resources are required to maintain confidentiality and cannot report violations to the Office of Institutional Equity:

University of Evansville

- Counseling Services: counselingservices@evansville.edu, 812-488-2633
- Health Center Professionals: healthcenter@evansville.edu, 812-488-2033
- University Chaplain: chaplain@evansville.edu, 812-488-5262

Harlaxton College

- College Nurse: Lesley Selby, RGN, +44 01476 403027, lseyby@harlaxton.ac.uk
- Counselling Services: counselling@harlaxton.ac.uk