TO: The Engineering Faculty

FROM: The Faculty of the School of Mechanical Engineering

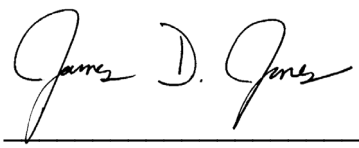
RE: New Course – ME 32301 Mechanics of Materials Laboratory

The Faculty of the School of Mechanical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ME 33201 Mechanics of Materials Laboratory, Sem. 1, 2, SS, Lab 1, cr. 1. Prerequisites: ME 27000 or equivalents. Concurrent Prerequisites: ME 32300 or equivalents.

Experimental methods and techniques employed for the measurement of mechanical properties and evaluation of mechanical structures. Application of mechanics of materials and fundamental concepts to measuring and analyzing mechanical structures. A laboratory design project on mechanical structures.

Reason: This course will be the lab component of our well-established ME 32300 Mechanics of Materials course in our ME UG Program. We have offered this pilot lab on a voluntary basis (i.e., not for credit) for 2-3 years to interested students. The faculty feel strongly that a laboratory experience in experimental methods for mechanical structures is an essential element needed in our ME UG Program. Given the recent decision by the Design Area to no longer offer ME 35401 Machine Design Laboratory and have it as a part of our required ME curriculum, makes this laboratory critical to our ME UG Program. The faculty believe that the topics covered in these new courses are central to the needs of mechanical engineering graduates. Details of this new laboratory are outlined in the appended material below.



James D. Jones, Associate Professor and Associate Head
School of Mechanical Engineering

ME 32301
MECHANICS OF MATERIALS LABORATORY

Course Outcomes [Related ME Program Outcomes in brackets]

1. Conduct simple experiments and analyze data. [1,3,5,6]
2. Enhance systematic problem-solving skills and sharpen written-communication skills through short technical laboratory memos. [1,3,5]
3. Complete a design project on a mechanical structure. [2, 3, 7]

Fundamentals.
Axial Loading. Torsion. Beam Loading.

1. Normal stress and strain.
2. Mechanical Properties
3. Torsional loading. Torsional deformation.
4. Equilibrium of beams. Shear force and bending moment diagrams.
5. Flexural stresses. Shear stresses.
6. Beam deflection.

Multiaxial Stress States

1. Transformation of stresses
2. Principal stresses and maximum shear stress.
3. Mohr's circle.
4. Stress transformation.

Analysis of Structures

1. Beams.
2. Combined loading.
3. Buckling.

Representative Laboratory Experiments

- Tensile and Poisson's ratio tests.
- Photo-elasticity test.
- Torsion tests.
- Bending tests.
- Combined loading tests.
- Column buckling test.
- Single and multiaxial fatigue tests.

COURSE NUMBER: ME 32301

COURSE TITLE: Mechanics of Materials Laboratory (1 credit)

REQUIRED COURSE OR ELECTIVE COURSE: Required

TERMS OFFERED: Fall and Spring

TEXTBOOK/REQUIRED MATERIAL:
None. Handouts provided by the instructors.

PRE-REQUISITIES:
ME 27000 Basic Mechanics I

COORDINATING FACULTY: Solid Mechanics Area Faculty

CONCURRENT PRE-REQUISITES:
ME 32300 Mechanics of Materials

COURSE DESCRIPTION: Experimental methods and techniques employed for the measurement of mechanical properties and evaluation of mechanical structures. Application of mechanics of materials and fundamental concepts to measuring and analyzing mechanical structures. A laboratory design project on mechanical structures.

COURSE OUTCOMES [Related ME Program Outcomes in brackets]:

1. Conduct simple experiments and analyze data. [1,3,5,6]
2. Enhance systematic problem-solving skills and sharpen written-communication skills through short technical laboratory memos. [1,3,5]
3. Complete a design project on a mechanical structure. [2, 3, 7]

ASSESSMENTS TOOLS:

- Laboratory memos.
- Project reports.
- Pre-lab quizzes.

NATURE OF DESIGN CONTENT: The students participate in a multi-week design project lab, in which a mechanical structure is designed to achieve a performance goal.

RELATED ME PROGRAM OUTCOMES:
1. Engineering fundamentals
2. Engineering design
3. Communication skills
4. Ethical/Prof. responsibilities
5. Teamwork skills
6. Experimental skills
7. Knowledge acquisition

PROFESSIONAL COMPONENT:

1. Engineering Topics: Engineering Science – 80%
   Engineering Design – 20%

COMPUTER USAGE: Knowledge of word processing, spreadsheet software, and basic programming (for example, MATLAB) are necessary for laboratory memo preparation.

GRADING SCALE:

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.

COURSE STRUCTURE/SCHEDULE:

a. Laboratory Prep – 1 day per week at 50 minutes
b. Laboratory – 1 day per week at 75 minutes

PREPARED BY: Solid Mechanics Area Faculty

REVISION DATE: January 21, 2022

ME 32301 - MECHANICS OF MATERIALS LABORATORY

Syllabus for __ 202 _, Purdue University

COURSE DESCRIPTION

Experimental methods and techniques employed for the measurement of mechanical properties and evaluation of mechanical structures. Application of mechanics of materials and fundamental concepts to measuring and analyzing mechanical structures. A laboratory design project on mechanical structures.

MEETING TIMES

Section	CRN	Meeting time	Location	TA	TA e-mail

The lab coordinator _____. She/he is available via e-mail (_____@purdue.edu) and typically replies within one business day. Office hours will be conducted on Zoom. The office hour schedule is available on Brightspace.

LEARNING RESOURCES, TECHNOLOGY AND TEXTS

All course materials will be posted on Brightspace.

LEARNING OUTCOMES

The course learning objectives are:

1. Conduct simple experiments and analyze data.
2. Enhance systematic problem-solving skills and sharpen written-communication skills through short technical laboratory memos.
3. Complete a design project on a mechanical structure.

COPYRIGHT MATERIALS

Please note that the ME 32301 laboratory manuals, quizzes, etc. are copyrighted materials and should not be sold, bartered to others, or posted on-line without the expressed written consent of the authors. Similarly, notes taken in class are considered to be "derivative works" of the instructor's presentations and materials and likewise should not be sold or bartered or posted on the internet without consent.

SCHEDULE

The course schedule will be posted on Brightspace.

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. It is possible that, depending on the class averages at the end of the semester, the grade cutoffs can be adjusted *slightly downward*. However, the grades in this course are *not curved* with intent of satisfying particular preset grade distribution goals. The percentage breakdowns for the components of your course grade are the following:

- Lab memos and design project 80%
- Quizzes 10%
- Peer evaluations 10%

You are expected to comply with the guidelines for academic integrity as specified in this document. Failure to do so will result in a notification to the Office of the Dean of Students (ODOS). In addition to notifying ODOS, potential consequences of a lapse in academic integrity include, but are not limited to, the following.

- Earning a zero (0) for the assignment.
- Earning an F in ME 32301.

Please take to heart Purdue's Honor Pledge:

"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

ATTENDANCE POLICY

This course follows Purdue's academic regulations regarding attendance, which states that students are expected to be present for every meeting of the classes in which they are enrolled.

When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform your instructor of the situation as far in advance as possible.

For unanticipated or emergency absences when advance notification to your instructor is not possible, you should e-mail your instructor as soon as possible.

When you are unable to make direct contact with your instructor and are unable to leave word with your instructor's department because of circumstances beyond your control, and in cases falling under excused absence regulations, you or your representative should contact or go to the Office of the Dean of Students website to complete appropriate forms for instructor notification.

LAB SAFETY

Lab safety is of paramount importance. The safety issues may include, but are not limited to, electrical safety, proximity to fast-moving equipment, working in confined space, exposure to strong light, etc. In addition, all the lab equipment and instruments are very expensive to replace. All personnel working in the lab should abide by all the requirements to maintain a safe working environment. Please refer to the TA or instructor for any safety concerns.

CAMPUS EMERGENCIES

In the event of a major campus emergency (e.g., severe weather, active shooter, etc.), course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. The School of Mechanical Engineering will provide details regarding access to information online and any additional procedures that may be needed as soon as they are available or can be obtained by contacting the instructors or TAs via mail or phone. You are expected to read your @purdue.edu email on a frequent basis.

STUDENTS WITH DISABILITIES

If you have a disability that requires special academic accommodation, please make an appointment to speak with your instructor within the first week of the semester in order to discuss any adjustments and bring your accommodation letter from the Disability Resource Center. *It is important that we are informed about this at the beginning of the semester*. It is the student's responsibility to notify the Disability Resource Center (http://www.purdue.edu/drc) of an impairment/condition that may require accommodations and/or classroom modifications. If a student does not notify their instructor well in advance about the need for accommodations, there may not be time to arrange some accommodations.

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 their 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.

A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

MENTAL HEALTH/WELLNESS STATEMENT

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 on the second floor of the Purdue University Student Health Center (PUSH) during business hours.