EMCH 213 Course Syllabus & Policies

Instructor

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Required Textbook

R.C. Hibbeler (2015) *Mechanics of Materials*, **10th Edition**, Pearson, Hoboken, NY. You may obtain electronic access to the book and Mastering Engineering by following the directions in the document attached here: Student_Registration_Handout_passmore82239.pdf. Note **Mastering Engineering is required** for this course.

Prerequisites & Expectations

The prerequisite for E MCH 213 is E MCH 211 (statics) and by extension, MATH 141 (Calc II). If you have not had these prerequisite courses, please contact Prof. Passmore as soon as possible. In particular, each student is expected to have a working knowledge of the material covered in all prerequisite courses, which includes, but is not limited to:

- Geometry and trigonometry, including the laws of sines and cosines, direction cosines, and the like.
- Vector calculus. Vectors in 2- and 3-space, inner products, and vector products.
- Statics. How to draw correct free body diagrams, find force and moment equilibrium, write friction laws, and find support reactions. Equivalent force systems. Moments of inertia.
- Differential and integral calculus. How to differentiate and integrate most simple functions (e.g., polynomials, sine, cosine, exponentials, logarithms, and combinations of these functions); apply simple sequences and series; and apply the chain rule to both differentiate and integrate functions.

You are also expected to devote sufficient time to master the course material. It is unreasonable to expect that good performance can be achieved without study. Since I would expect students to spend about 9 hours per week on this course during a 15 week semester, you should expect to spend that much time during the six week summer session.

I expect students to watch all the lecture videos, supplemental problem solutions, do all the assigned reading, and complete all assigned homework.

Description

Engineering Mechanics is that engineering science that relates Forces (push, pull) and Torques (twists) to the Motion (deformation, acceleration, velocity) of bodies. The understanding of such concepts is essential to those who wish to design efficient engineering components ranging from a bridge to a wing strut to a robot arm to the motherboard of a computer. Statics is the foundation course in which three stems are constructed; Dynamics (E MCH 212) for motion; Strength of Materials (E MCH 213) for deformation and failure criteria for solids; and Fluid Mechanics. Mechanics courses are founded on modeling engineering components via the Free Body Diagram, applying the equations of motion, then solving for the particular set of boundary conditions appropriate to the expected situation.

Course Outcomes

E MCH 213 is intended to achieve the following educational outcomes:

- OUTCOME 1:
  - Determine normal stress and axial deformation in statically determinate and indeterminate axially loaded members.
  - Determine shear stress and angular deformation in statically determinate and indeterminate circular shafts supporting torsional loads.
  - Calculate internal shear force and bending moments in transversely loaded beams and develop shear and moment diagrams.
  - Determine normal stress and shear stress in transversely loaded beams.
  - Identify a 2-D state of stress and apply both transformation equations AND Mohr's circle to determine principal stress, maximum in-plane shear stress, and stress on an inclined plane.
  - Identify if buckling may be an issue and calculate Euler buckling load for a slender column for a variety of boundary conditions.
  - Sketch and explain both true and engineering stress/strain curves.
  - Identify ALL features (such as elastic modulus, yield stress, ultimate stress, linear elastic region, and plastic region) on a stress/strain curve as well as distinguish between ferrous and non-ferrous curves.
  - Distinguish between ductile and brittle materials' behavior and response to loads.
  - Apply generalized Hooke's Law to determine stress and/or strain.
  - Explain physical meaning and application of Poisson ratio.
  - Identify the resultant internal loads on an identified section and calculate the total stress state at a point for an object experiencing a combination of internal loads.
- OUTCOME 2:
  - Calculate and/or apply a factor of safety to any of the stress calculations.

Course Topics

E MCH 213 addresses the following course topics.

- General Stress

- General Strain
- Mechanical Properties of Materials
- Axial Loads and Deformation
- Torsional Loads and Deformation
- Thermal & Statically Indeterminate Stress
- Beams:
    - Internal Loads
    - Bending Stress
    - Transverse Shear Stress
- Combined Loading
- Stress Transformations
- Mohr's Circle for Plane Stress
- Beam Deflection
- Statically Indeterminate Beams
- Column Buckling

Academic Integrity

You are in training to become an engineer. The decisions that you will make in your professional careers have the potential to effect the lives of countless people. Part of your training will be in ethical behavior. I believe this process starts with academic integrity. I will make every effort to behave ethically and with integrity in my treatment of each of you, and the class as a whole. I will show you honesty, respect, and fairness. I will also behave responsibility in my treatment of each of you as individuals. I hope in doing so, that I can earn your trust. I expect each of you to maintain the same high standards.

The Department of Engineering Science and Mechanics at The Pennsylvania State University considers academic training to be apprenticeship for practice in the professions. Students are expected to demonstrate a code of moral integrity and ethical standards commensurate with the high expectations that society places upon professional practice. Accordingly, it is the policy of the department to maintain the highest standard of academic honesty and integrity.

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (refer to Senate Policy 49-20). Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor (this includes, for example, copying solutions from the solution manual or Chegg), or tampering with the academic work of other students. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to Senate Policy G-9).

A student charged with academic dishonesty will be given oral or written notice of the charge by the instructor. A student contesting such a charge may seek redress through informal discussions with the instructor(s), department head or college dean. If the instructor believes that the infraction is sufficiently serious to warrant referral to the Office of Conduct Standards, or if the instructor awards a final grade of F in the course because of the infraction, the student and instructor will be afforded formal due process procedures governed by Penn State Senate Policy 49-20. Policy 49-20 and procedures can be found in the document "Policies and Rules for Undergraduate Students" issued annually by the Senate Office and available through each student's home department or college dean's office. See more Academic Integrity policy information from the College of Engineering at http://www.engr.psu.edu/AcademicIntegrity.

Grading

All grades are determined by performance, which is evaluated using objective standards rather than standards based on a notion of average class performance (i.e., I do not grade on a curve). Each grade will be based on a scale of 100 percent. Letter grades will be determined according to the following table.

F	D	C's	B's	A's
0–59	60–69	70–79	80–89	90–100

****You must also score an average of 70% on the 3 course exams**

to pass this course with a grade of C or better.**

Grade Determination

The final overall percentage used to determine your grade will be determined according the weightings in the following table.

Category	Percent of Grade
Midterm Exams (2)	25% Each
Homework	15%
Final Exam	35%

Canvas (Penn State's Course Management System)

Canvas is Penn State's online course management system. It will contain, in part:

- all the lecture videos and slides
- all the supplemental example problems
- old exams to help you study
- and more

Since all announcements sent to the class will be sent from Canvas, it is important that you properly configure Notification Preferences in Canvas to alert you (options include email, text message, push notification, and more) to all announcements.

Exams

There will be two exams during the semester and a final exam. The dates of the exams can be found in your Calendar and in Assignments. ***All exams will closed book and closed notes. We will use an online proctoring system for all exams due to the COVID-19 pandemic.***

Since we are using online proctoring, I have been instructed that the following statement must be included in this course syllabus:

"This course may require you to take exams using certain proctoring software that uses your computer's webcam or other technology to monitor and/or record your activity during exams. The proctoring software may be listening to you, monitoring your computer screen, viewing you and your surroundings, recording and storing any and all activity (including visual and audio recordings) during the proctoring process. By enrolling in this course, you consent to the use of the proctoring software selected by your instructor, including but not limited to any audio and/or visual monitoring which may be recorded. Please contact your instructor with any questions."

All exams will be available for a narrow window of time, typically in the evening, Eastern Time *(you may check the current Eastern Time here to figure out how it relates to your local time).* This is due to an ongoing attempt to maintain exam and academic integrity. If you are taking this course, you must be prepared to take exams on a fixed schedule, at times that may not be convenient based on your work, and location. Plan ahead.

In the event you are unable to take one of the scheduled exams, ***no makeup exam will be administered unless all of the following conditions are met***:

1. **Legitimate Reason**
   The missed exam is due to circumstances beyond your control (e.g., illness, family emergency, or a university-sponsored activity).
2. **Prior Notification**
   It is your responsibility to notify Prof. Passmore prior to the time at which you are scheduled to start the exam if you are unable to take the exam (this may be done by phone or by email). If circumstances prevent you from contacting Prof. Passmore directly, then you must notify the ESM Office at (814) 865-4523.
3. **Verification**
   Sufficient information must be provided so that your claim can be verified.

If you miss an exam and are unable to satisfactorily fulfill each of the above three conditions, then you will receive a zero for that exam.

Homework

Each homework assignment will be posted on the Mastering Engineering website. You will have unlimited attempts to complete each problem, and you will not lose points for incorrect attempts. However, to get full points for the assignment you must work each problem to the correct final solution.

All homework assignments are weighted equally. That is, a 15 point assignment counts just as much as a 20 point assignment in your overall grade. When computing your final, overall homework grade, ***the lowest two homework scores will be dropped***.

There will be roughly two homework assignments per week that are due on the day and time indicated for each assignment. Late problem sets will be accepted, with a 20% penalty for each day that they are late. These problems are assigned to help you perform the necessary practice to become good engineers. You may use whatever references you like in order to perform this practice, however you are ***required to do the work***. It will likely be useful to write out problem solutions as you go, so that you have them to study from for the exams.

Announcements

All information I send to the class will be sent through Canvas.

If you have an administrative question, first read this Syllabus and the Announcements on Canvas. If the information you need is ***not*** contained in any of those sources, then you may contact Prof. Passmore or one of the TAs with your inquiry.

Since homework in this course is equation and diagram intensive, if you email us with a question, please include a legible scan of your attempt at the problem in question.

Students with Disabilities

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services, ODS located in room 116 Boucke Building at 814-863-1807(V/TTY). For further information regarding ODS, please visit their web site at http://www.equity.psu.edu/ods/. Instructors should be notified as early in the semester as possible regarding the need for reasonable academic adjustments.