Mechanics of Materials Fall 2020

EGM 3520 Section 2607

Lecture: Video link will be posted to Canvas every Monday/Wednesday/Friday
Virtual Office Hours: Monday/Wednesday/Friday, Period 5, 11:45 am – 12:35 pm
In-Person Office Hours: To be determined based on University of Florida policy

Professor

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Teaching Assistants

Virtual office hours for TAs will be communicated through Canvas.

Course Description

Introduction to stress and strain, stress-strain-temperature relations and mechanical properties of materials. Analysis of systems subjected to axial load, torsion load and bending. Design concepts, indeterminate structures and applications.

Course Pre-Requisites

EGM 2511 (not EGM 2500) and MAC 2313
Engineering Mechanics: Statics and Analytical Geometry/Calculus III

Required Textbooks and Software

Mechanics of Materials, Eighth Edition
Beer, F.P.; Johnston, Jr., E.R.; DeWolf, J.T.; and Mazurek, D.F.
The seventh edition of this textbook is sufficient, but it is the student's responsibility to confirm that problems assigned from the eighth edition are consistent with those in the seventh edition.

Course Objectives

The purpose of this course is to provide students with the means to analyze and design load bearing structures including machines. Upon completion of this course, each student should have:

1. A basic understanding of engineering mechanics and the ability to apply this understanding to analyze and solve a given problem.
2. A basic understanding of material properties and mechanical deformation.
3. The ability to apply advanced science and engineering principles in the design and analysis of structures to support loads within a given limit of safety.

Assessment Methods

Your grade for this course will be determined based on your performance on homework, quizzes, and exams as follows:

Homework 10%

Your 2 lowest homework assignments will be dropped.

Homework is to be submitted electronically on Canvas by the specified due date and time. Working in groups (virtually) is permitted. However, copying homework is NOT permitted. Written homework should adhere to the following format: Each problem should be on a single sheet of paper, with a clear problem statement, appropriate free-body diagram, and the solution with reasonable

significant digits inside a box. Use of solution manuals or websites to complete homework is considered cheating and a violation of the honor policy, and will be fully enforced.

Homework in this class is VERY IMPORTANT. The problem solving skills that you develop by doing the homework are similar to the skills that you will need in the real world of engineering practice. Students are encouraged to develop a problem solving procedure, rather than memorize how to complete a certain type of problem. TAs have been instructed to look for problem solving process and explanations, not just answers.

Quizzes (8) (12% each with your lowest quiz counted as 6%)
Quizzes will be 45 minutes in length and distributed/collected through Canvas. Quizzes will be scheduled at the same day as the other section of Mechanics of Materials. Each quiz will primarily focus on a specific chapter or major topic in the course. However, you may be required to understand and apply material from prior chapters in order to solve quiz problems. Use of Chegg, CourseHero or other websites designed to provide live expert help on quizzes is cheating.

Honorlock
Honorlock will be used proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from your home. You do not need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection. To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so do not attempt to search for answers, even on a secondary device.

Grading Scale
An example numerical grading scheme is shown below. This information should only be used as a general guide as the course instructor reserves the right to adjust the final numerical grading demarcations. Course grades will be "elevated" if necessary – this decision will not be made until the end of the semester once all exams and homework assignments are graded.

100–93 = A, 92.9–90 = A-, 89.9–87 = B+, 86.9–83 = B, 82.9–80 = B-, 79.9–77 = C+, 76.9–73 = C
72.9–70 = C-, 69.9–67 = D+, 66.9–63 = D, 62.9–60 = D-, 60-0 = F

Additional information may be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Professional Component (ABET)
EGM 3520 supports several program outcomes enumerated in the Mission Statement of the Department of Mechanical & Aerospace Engineering (MAE). Specific MAE program outcomes supported by this course include being able to work professionally in the area of mechanical systems including the design and realization of such systems.

Relation to Program Outcomes (ABET)

Outcome	Coverage*
1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Low
3) An ability to communicate effectively with a range of audiences	
4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low

5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not addressed by this course.

Attendance Policy, Class Expectations, and Make-Up Policy

Lecture videos will be posted asynchronously to Canvas. Excused absences for homework submission and quizzes must be consistent with university policies in the undergraduate catalog and requires appropriate documentation. Homework extensions and make-up quizzes will be provided for excused absences in which notification is provided before the assignment due date.
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

If you are experiencing COVID-19 symptoms (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please use the UF Health screening system. You will be given a reasonable amount of time to make up work.
https://coronavirus.ufhealth.org/screen-test-protect/covid-19-exposure-and-symptoms-who-do-i-call-if/

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc). Once registered, students will receive an accommodation letter, which must be presented to the instructor when requesting accommodation. Students with disabilities should initiate this procedure as early as possible in the semester.

Privacy Information

It is not expected, but if synchronous lecture delivery is used, students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Discrimination and Harassment

The instructor is committed to providing a safe learning environment for all students that is free from all forms of discrimination and harassment. Online message boards in Canvas are to be used to discuss course topics and homework in a respectful and constructive manner. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

Your academic advisor or Graduate Program Coordinator
Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Course Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a

professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals. Summaries of results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with Prof. Spearot.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy regarding grades earned in courses and on individual assignments. For more information, please see:
http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources

Health and Wellness

U Matter, We Care
If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center
http://www.counseling.ufl.edu/cwc or 352-392-1575; or contact the University Police Department: 352-392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Contact the Student Health Care Center at 352-392-1161.

University Police Department
Contact UFPD at 352-392-1111 (or 9-1-1 for emergencies) or http://www.police.ufl.edu/.

Academic Resources

E-learning technical support
Call 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. You may also find answers to common problems at https://lss.at.ufl.edu/help.shtml.

Career Resource Center
Located in the Reitz Union and offers career assistance and counseling. Call 352-392-1601 or https://www.crc.ufl.edu/.

Library Support
Information on various ways to receive assistance using the libraries or finding resources. http://cms.uflib.ufl.edu/ask.

Teaching Center
Located in Broward Hall and provides general study skills and tutoring. Call 352-392-2010 or 352-392-6420 or https://teachingcenter.ufl.edu/.

Writing Studio
Located at 302 Tigert Hall. Provides help brainstorming, formatting, and writing papers. Call 352-846-1138 or https://writing.ufl.edu/writing-studio/.

Students Complaints Process
http://www.distance.ufl.edu/student-complaint-process.

Date	***Topics***	***Sections***	***Homework (8th Edition)***
8/31	Syllabus, Statics	1.1	----------
9/2	Axial, Shear and Bearing Stress	1.2	----------
9/4	Stresses on Oblique Planes	1.3, 1.4	HW1: 1.3, 1.17, Handout1
9/7	NO CLASS: Labor Day Holiday	----------	HW2: 1.23, 1.35, Handout2
9/9	Ultimate Strength, Factor of Safety	1.5	----------
9/11	Axial Strain, Stress-Strain Diagram	2.1	**Quiz 1: Statics, 1.1-1.5**
9/14	Axial Deformation, True Stress-Strain	2.1	----------
9/16	Statically Indeterminate Problems	2.2	----------
9/18	Temperature Effects	2.3	HW3: 2.13, 2.19, Handout3
9/21	Generalized Hooke's Law	2.4, 2.5, 2.7, 2.8	HW4: 2.35, 2.40, Handout4
9/23	Stress Concentrations	2.11	----------
9/25	Shear Stresses in Shafts	3.1	**Quiz 2: 2.1-2.8, 2.11**
9/28	Angle of Twist	3.2	----------
9/30	Gears, Indeterminate Problems	3.3	HW5: 3.7, 3.13, Handout5
10/2	Power, Stress Concentrations	3.4, 3.5	----------
10/5	Shear Force / Bending Moments	5.1	HW6: 3.41, 3.46, Handout6
10/7	V-M Relationships	5.2	----------
10/9	Singularity Functions	5.4	**Quiz 3: 3.1-3.5**
10/12	Bending Stresses	4.1, 4.2	----------
10/14	Bending Strain, Curvature	4.2, 4.3	HW7: 5.6, 5.12, Handout7
10/16	Composite Beams	4.4	HW8: 4.10, 5.19, Handout8
10/19	Section Modulus, Beam Design	5.3	----------
10/21	Shear Flow in Beams	6.1	----------
10/23	Shear Stresses in Beams	6.1, 6.2	**Quiz 4: 4.1-4.3, 5.1-5.4**
10/26	Horizontal Shear Flow/Stress	6.3, 6.4	----------
10/28	Stress Transformations	7.1	HW9: 6.1, 6.11, Handout9
10/30	Principal Stresses	7.1	HW10: 6.22, 6.33, Handout10
11/2	Mohr's Circle	7.2, 7.3	----------
11/4	3D Mohr's Circle	7.3, 7.4	----------
11/6	Failure Criteria	7.5	**Quiz 5: 6.1-6.4**
11/9	Pressure Vessels	7.6	----------
11/11	NO CLASS: Veteran's Day	----------	----------
11/13	Strain Transformations	7.8	HW11: 7.15, 7.31, Handout11
11/16	Strain Measurement, Rosettes	7.9	HW12: 7.81, 7.85, Handout12
11/18	Combined Loading 1	8.1	----------
11/20	Combined Loading 2	8.3	**Quiz 6: 7.1-7.9**
11/23	Combined Loading 3	8.3	HW13: 8.3, 8.33, Handout13
11/25	NO CLASS: Thanksgiving	----------	----------
11/27	NO CLASS: Thanksgiving	----------	----------
11/30	Combined Loading 4	8.3	HW14: 8.38, 8.40, Handout14
12/2	Beam Deflections	9.1	----------
12/4	Statically Indeterminate Beams	9.2	**Quiz 7: 8.1-8.3**
12/7	Singularity Functions	9.3	----------
12/9	Method of Superposition	9.4	HW15: 9.5, 9.21, Handout15
12/11	----------	----------	HW16: 9.44, 9.71, Handout16
12/16	Period 4 10:40 – 11:30 am (to be finalized)		**Quiz 8: 9.1-9.4**

Any changes to the schedule and homework problems will be communicated in-class and electronically