Mechanics of Materials

EGM 3520 - Section 4547

Class Periods: MWF Period 7 (1:55 – 2:45pm)

Location: Larsen 239

Academic Term: Fall 2019

Instructor

Dr. Chelsey Simmons
Email: css@ufl.edu (Please contact through Canvas or using your UFL email; I cannot respond to non-UFL addresses)
Office: MAE-B 222
Office Hours: Tuesdays and Thursdays Period 8 (3:00 – 3:50pm) or by appointment in MAE-B 222
Travel dates (no office hours) will be posted on my office door and announced in class. You may request an appointment by visiting www.doodle.com/profsimmons. Follow the instructions carefully!

Course Description

Stress and strain at a point, stress-strain-temperature relations and mechanical properties of materials. Systems subject to axial load, torsion and bending. Design concepts, indeterminate structures and applications. *Credits*: 3

Course Pre-Requisites / Co-Requisites

EGM 2511 Statics (not EGM 2500) and MAC 2313 Analytical Geometry/Calc III

Course Objectives

The purpose of the course is to provide students with the means of analyzing and designing various machine and load bearing structures. Upon completion of this course each student should have (a) basic understanding of engineering mechanics and the ability to apply this understanding to analyze and solve a given problem; (b) basic understanding of material properties and mechanical deformation; and (c) 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.

Required Textbooks: Beer, Johnston, DeWolf, and Mazurek, "Mechanics of Materials", **8th edition**, McGraw Hill

Materials and Supply Fees: None

Professional Component (ABET):

Specific MAE program outcomes supported by this course include: Being able to work professionally in mechanical systems areas including the design and realization of such systems (ME Program Outcome M4).

Relation to Program Outcomes (ABET):

Outcome	Support for Outcome in this course
An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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
An ability to communicate effectively with a range of audiences	
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
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	
An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Date	***Topics***	***Sections Covered***	***Homework Collected***
8/21	Syllabus, Statics	1.1	----------------
8/23	Introduction to Stresses	1.2	HW0 (opt.): Handout 0
8/26	Stress Components	1.3, 1.4	----------------
8/28	Factor of Safety, Design	1.5, **Quiz 1**	----------------
8/30	Axial Strain, Hooke's Law	2.1	HW1: 1.32, 1.38, Handout 1
9/2	--------------------------	Labor Day Holiday	----------------
9/4	Axial Deformation, Ductility	2.1	HW2: 2.4, Handout 2
9/6	Statically Indeterminate	2.2, 2.3	HW3: 2.16, 2.20, Handout 3
9/9	3D Hooke's Law	2.4 – 2.8	----------------
9/11	Stress Concentrations	2.10, 2.11, **Quiz 2**	----------------
9/13	Torque and Torsion Stress	3.1	HW4: 2.46, 2.68, 2.96, Handout 4
9/16	Angle of Twist	3.2	----------------
9/18	Gears, Indeterminate Problems	3.3 – 3.5	HW5: 3.9, 3.38, Handout 5
9/20	Power Transmission	3.3 – 3.5	HW6: 3.41, 3.51, Handout 6
9/23	Transverse Loading	5.1	----------------
9/25	Chapter 1-3 Review	***Exam 1 on 9/26***	----------------
9/27	V-M Relationships	5.2	----------------
9/30	Singularity Functions	5.4	----------------
10/2	Pure Bending	4.1, 4.2	HW7: 5.4, 5.102, Handout 7
			HW8 (due 10/3 mid.): 4.3, 5.7, Handout 8
10/4	--------------------------	Homecoming	----------------
10/7	Bending Strain, Curvature	4.2, 4.3	----------------
10/9	Composites	4.4, **Quiz 3**	----------------
10/11	Design of Beams for Bending	5.3	HW9: 4.12, 4.39, Handout 9
10/14	Shear Flow in Beams	6.1	----------------
10/16	Shear Stresses in Beams	6.1, 6.2	HW10: 5.77, 6.4, Handout 10
10/18	Horizontal Shear Flow	6.3, 6.4	HW11: 6.5, 6.10, Handout 11
10/21	Principal Stresses	7.1	----------------
10/23	Mohr's Circle	7.2, 7.3	HW12: 6.32, 6.34, Handout 12
10/25	3D Mohr's Circle	7.3, 7.4	HW13: 7.32, 7.40, Handout 13
10/28	Chapters 4-6 Review	***Exam 2 on 10/29***	----------------
10/30	Failure Criteria	7.5	----------------
11/1	Pressure Vessels	7.6	HW14: 7.68, 7.96, Handout 14
11/4	Strain Rosettes	7.8, 7.9	----------------
11/6	Combined Loading 1	8.1, **Quiz 4**	----------------
11/8	Combined Loading 2	8.3	HW15: 7.103, 7.144, 7.154, Handout 15
11/11	--------------------------	Veterans Day Holiday	----------------
11/13	Combined Loading 3	8.3	HW16: 8.33, 8.37, Handout 16
11/15	Beam Deflections	9.1	HW17: 8.51, Handout 17
11/18	Statically Indeterminate Beams	9.2	----------------
11/20	Singularity Functions	9.3, **Quiz 5**	----------------
11/22	Method of Superposition	9.4	HW18: 9.8, 9.21, 9.51, Handout 18
11/25	Column Buckling	10.1	HW19 (due 11/26 mid.):
11/27	--------------------------	Thanksgiving Holiday	------- 9.66, 10.19, Handout 19
11/29	--------------------------	Thanksgiving Holiday	----------------
12/2	Design of Columns	10.4, **Quiz 6**	----------------
12/4	Chapters 7-10 Review	--------------	----------------
12/12		***Exam 3 – 10:00am***	*Larsen 239*

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

Attendance Policy, Class Expectations, and Make-Up Policy

Class attendance is highly recommended. Excused absences for quizzes and exams must be consistent with university policies in the undergraduate catalog and require appropriate documentation. Homework extensions and make-up quizzes/exams may be provided for excused absences in which notification is provided **before** the assignment date.
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Assessments

Homework (10%): To motivate you to keep up with the material, homework sets will be collected and graded to provide regular feedback on your understanding of the material. **No late homework accepted unless documented per University policy.** Homework is to be turned in electronically on the Canvas website **before class (1:55pm) on the date indicated** or as specified in Canvas. Working in groups is permitted; however, copying homework is NOT permitted. Written homework must adhere to the following format: it should be written and photographed/ scanned clearly, with a clear problem statement, appropriate free-body diagram, and the solution with appropriate significant digits inside a box. Use of solution manuals to complete homework is considered cheating and a violation of the honor policy; this and other violations will be fully enforced.

Homework in this class is VERY IMPORTANT. The problem-solving skills you develop in doing the homework are skills that are difficult to test in an exam. They are much more like the skills you will need in the real world than those you develop in preparing to take an exam. Also, communication skills are important in the real world, not just answers. Your TAs and graders have been instructed to look for explanations, not just answers.

Quizzes (15%): Quizzes will be given during class on assigned days. **No makeup quizzes are allowed unless absence documented per University policy.** Quiz problems will be similar to the homework and include conceptual questions. Students are permitted to use a calculator for quizzes. Relevant formulas will be provided; no additional materials are allowed. The lowest quiz score will be dropped.

Exams (75% total, 25% each): Exams will be given in the evenings and during finals block as indicated on schedule. **No makeup exams are allowed unless absence documented per University policy.** Exam problems will be similar to the homework but will include longer, comprehensive questions as well as short conceptual questions. Students are permitted to use a calculator for exams. Relevant formulas will be provided; no additional materials are allowed.

Grading Policy

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.

A	95-100	B+	89–91.9	C+	79–81.9	D+	69–71.9
A-	92–94.9	B	85–88.9	C	75–78.9	D	65–68.9
		B-	82–84.9	C-	72–74.9	E	<65

N.B. A grade of C- will not be a qualifying grade for critical tracking courses. Furthermore, in order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Re-grading Policy: Any and all re-grade requests must be submitted by email to professor **within one week** after return of the graded work. The written request must explain in detail where you believe the grader has made a mistake in grading, the correction you have identified, and have your original assignment attached.

Student Privacy

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

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) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
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, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/

University Honesty Policy
UF students are bound by The Honor Pledge which states, "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 the instructor or TAs in this class.

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.

Campus Resources:

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

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

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

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

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.