

Mechanical Behavior of Materials

EMA 4223 Section 0593

Class Periods: Tuesdays, Period 2 (8:30-9:20am) | Thursdays, Period 2-3(8:30-10:25am)

Location: Zoom Link TBA

Academic Term: Spring 2021

Instructor:

Amanda Krause (she/her/hers)

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352-294-6609

Office Hours: TBA

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Bryan Conry (he/him/his)

bconry@ufl.edu or Canvas

Office hours: TBA

Course Description

Plastic deformation and fracture of metals, ceramics and polymers. Course credits: 3

Course Pre-Requisites / Co-Requisites

Pre-requisite: EGM 3520

Course Objectives

At the end of the course, the student should be able to predict the stress distribution in, and failure mode of, materials subjected to flexural or tensile stresses in uniform or cyclic loading conditions. The student will be able to estimate the time under load for materials that exhibit creep and/or viscoelastic behavior. The student will be able to determine the failure mode and stress levels for plastic deformation, and fracture behavior in materials that fail in a brittle manner.

Materials and Supply Fees

None

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	Medium
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	Medium
3. An ability to communicate effectively with a range of audiences	Low
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	Low

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

Title: Mechanical Behavior of Materials

Authors: M.A. Meyers and K.K. Chawla

Publication Year: 2009, Edition: 2

ISBN: 978-0-521-86675-0

Recommended Materials

Title: Deformation and Fracture Mechanics of Engineering Materials

Author: R.W. Hertzberg, R.P. Vinci, J.L. Hertzberg

Publication date: 2013, Edition: 5th

ISBN: 978-0-470-52780-1

Course Schedule

Week (Dates)	Topic Area	Book Sections	Assignment
Week 1: (1/12-1/14)	Elastic Properties	2.1-6, 2.8, 2.11	Quiz and Personal Card
Week 2: (1/19 – 1/21)	Elastic Properties	2.9, 2.11, 2.12, 2.13	Homework
Week 3: (1/26 – 1/28)	Plasticity: Yield Criteria	3.2, 3.5-7, 4.2	Quiz
Week 4: (2/2 – 2/4)	Plasticity: Dislocations	4.4.1, 4.4.6-8, 6.2.2-5	Homework
Week 5: (2/9 – 2/11)	Review and Exam 1		
Week 6: (2/16 – 2/18)	Plasticity: Dislocations	4.4.8-14, 5.4	Homework*
Week 7: (2/23 – 2/25)	Strengthening Mechanisms	5.4, 6.3, 10.2-3	Quiz
Week 8: (3/2 – 3/4)	Strengthening Mechanisms	10.3-5	Homework
Week 9: (3/9 – 3/11)	Review and Exam 2		
Week 10: (3/16– 3/18)	Time-Dependent Deformation	2.12-13, 13	Quiz
Week 11: (3/23 – 3/25)	Fracture	7.1-8, 7.10	Homework
Week 12: (3/30 – 4/1)	Fracture	8.1-4, 9.2, 9.6-7	Quiz
Week 13: (4/6 – 4/8)	Fatigue	14.1-8	Homework
Week 14: (4/13 – 4/15)	Review and Exam 3		
Week 15: (4/20)	Special lecture	TBD	Quiz

*This homework will be due the following Monday (2/22) but cover the content from Week 6. All other homework will be due Friday of that week.

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. 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 during class 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.

Attendance Policy, Class Expectations, and Make-Up Policy

Class Format: Please read carefully the descriptions for the classes below and see the calendar posted on Canvas. This class has both pre-recorded videos and synchronous (live) Zoom sessions.

Week 1: Two pre-recorded lectures will be posted by Tuesday at noon. Tuesday will be a live session on Zoom at 8:30am that discusses the class structure and allow for questions. This lecture will be recorded and posted afterwards. Office hours will be held between 8:30am-10:25am on Thursday using the class link for Zoom.

Weeks 2-4, 6-8, and 10-13 (excludes test weeks and first and weeks of class): Each week will have two pre-recorded lectures posted by the Tuesday at 8:30am of that week. The Thursday Period 3 – (9:35-10:25), class will be held live on Zoom. Attendance will be recorded on Thursdays and used for participation credit (see below). Thursday lectures will not be recorded because students will be working in breakout rooms on practice problems. Office hours will be held on Tuesdays and Thursdays at 8:30-9:25am using the zoom link.

Weeks 5, 9, and 14 (exam weeks): Tuesday will be a review session held live on Zoom. The exams will be given on Thursdays that will use the entire two block period. Additional office hours will be held – times TBA.

Week 15 (Last Day of Class): After the last exam, there will be one pre-recorded lecture posted by Tuesday at 8:30am. Office hours will be held at Tuesday at 8:30am using the Zoom link for the class.

Class Attendance: Students are expected to watch all course videos, and all class notes are the responsibility of the student. Opportunities for extra credit for watching recorded lectures are described below. Quizzes and tests will be held exclusively during scheduled course times and used as a record of attendance. Thus, the penalty of unexcused absences is a lower grade. Additionally, **participation credit (10% of total grade) will be awarded for Thursdays on Weeks 2-4, 6-8, and 10-13.** The participation credit will be further discussed below.

Class Expectations:

Homework Assignments: Homework is due at 8:30am on the due date. Homework turned in within 24 hours after the due date will receive a reduction in grade by 10 percent. No late homework will be accepted for credit after 24 hours on the day following the due date unless given prior approval by the instructor in agreement with university policies for excused absences. (For example, homework due on Friday at 8:30am will not be collected after Saturday at 8:30am.)

Quizzes and Exams: Quizzes and exams must be conducted individually without external help from peers or internet resources in agreement with the honor code. All quizzes and exams will be given through Canvas. Quizzes and Exams will be announced ahead of time and will be exclusively held during class times. If a student is late for a quiz or exam, the student will have less time to complete the assignment.

Exam/Quiz Makeup Policy: Any missed exams or quizzes will count as zero unless a written excuse is submitted before the test or in agreement with university policies regarding excused absences. The make-up exam will be rescheduled for the earliest possible date. Emergencies that arise will have to be documented by the appropriate authority.

Participation Credit: Participation credit (10% of total grade) will be awarded on Thursdays on Weeks 2-4, 6-8, and 10-13. Students must attend at least 8 of these sessions (out of a total of 10) to receive full credit. Student participation will be recorded with Zoom, which logs the time that students are logged in. Half credit will be awarded to students that are only logged in for half of the time. Internet or other technical issues should be addressed with the instructor in a timely manner.

Extra Credit Lecture Notes: Students can provide copies of their own handwritten to accrue extra credit for each test. (Please request approval for typed notes.) On Thursday of every week (except exam days), the instructor will request a set of notes to be uploaded onto Canvas. Students have 24 hrs to upload the notes

requested. For each set of notes, students will earn 1 point to their upcoming exam. Notes that are deemed incomplete or inaccurate may receive half a point. Students are encouraged to use the instructor's provided powerpoint slides for each lecture but are not required.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework + Quizzes	10 each	30%
Participation	10	10%
Exam 1	100	20%
Exam 2	100	20%
Exam 3	100	20%
		100%

There is no final exam for this course.

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Syllabus Changes: I reserve the right to make changes in the syllabus and class schedule as needed. Any changes will be announced clearly on canvas and in class.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, 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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-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.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. 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

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 with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

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 Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

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 support, 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://care.dso.ufl.edu>.

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