

**Mechanical Behavior of Materials**

EMA 4223 Section 0593

**Class Periods:** Tuesdays, Period 2-3 (8:30-10:25am) | Thursdays, Period 3 (9:35-10:25am)**Location:** McCarty Hall A 1142**Instructor:**

John J. Mecholsky, Jr. (He/His)

352-846-3306

Office Hours: TBA,

**Teaching Assistant/Peer Mentor/Supervised Teaching Student:**

None

**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.

## Quiz

### **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**

<b>Week (Dates)</b>	<b>Topic Area</b>	<b>Book Sections</b>	<b>Assignment</b>
Week 1: (1/10)	Introduction		*Quiz (Thursday)
Week 2: (1/17-1/19)	Elastic Properties	2.1-6, 2.8, 2.11	
Week 2: (1/24-1/26)	Elastic Properties	2.9, 2.11, 2.12, 2.13	Homework
Week 3: (1/31-2/2)	Plasticity: Yield Criteria	3.2, 3.5-7, 4.2	Quiz
Week 4: (2/7-2/9)	Plasticity: Dislocations	4.4.1, 4.4.6-8, 6.2.2-5	Homework
Week 5: (2/14-2/16)	<b>EXAM 1</b> and Dislocations		
Week 6: (2/21-3/2)	Plasticity: Dislocations	4.4.8-14, 5.4	
Week 7: (3/7-3/9)	Strengthening Mechanisms	5.4, 6.3, 10.2-3	Homework
Week 8: (3/28-3/30)	Strengthening Mechanisms	10.3-5	Quiz
Week 9: (3/13-3/17)	<b>SPRING BREAK</b>		
Week 10: (3/28-3/30)	Time-Dependent Deformation	2.12-13, 13	Quiz
Week 11: (4/4-4/6)	<b>EXAM 2</b> and Fracture		
Week 12: (4/11-4/13)	Fracture	7.1-8, 7.10	*Quiz
Week 13: (4/18-4/20)	Fracture	8.1-4	Homework
Week 14: (4/18-4/20)	Fatigue	14.1-8	Homework
Week 15: (4/26)	<b>EXAM 3</b>		

\*The quizzes and Exams will be on Thursday. All homework is due on Tuesday morning at 8:30am.

### **Attendance Policy, Class Expectations, and Make-Up Policy**

**Class Format:** This course is in-person.

**Class Attendance:** Attendance is expected and all class notes are the responsibility of the student. Participation will be awarded for in-class group activities held at least once a week. Must participate in 80% of activities to receive full participation credit.

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.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

### **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. 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 throughout the semester using participation "quizzes." Must participate in 80% of activities to receive full participation credit.

### ***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.ua.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.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

### ***In-Class Recording***

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***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 Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation

of this code and the possible sanctions. 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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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](mailto: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/>.

**COVID-19**

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

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>.