

COURSE: EMA 4223
Mechanical Behavior of Materials

Catalog Description:

Credits: 3

Plastic deformation and fracture of metals and alloys, ceramics and polymers.

Prerequisites: EGM 3520

Instructor: Amanda R. Krause, pronouns – she/her/hers

- a. Office location: 150 Rhines Hall
- b. Office telephone: (352) 294-6609
- c. E-mail address: a.krause@ufl.edu
- d. Class Web site: login to e-Learning at <https://lss.at.ufl.edu/>
- e. Office hours: TBA and appointment

Teaching Assistant: Shangradhanva Eswara Vasisth, pronouns – he/him/his

- a. Office hours location: Rhines 123
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- d. Office hours: TBA

Lecture: T – 8:30-9:20AM, R 8:30- 9:20AM and 9:35-10:25 AM

Meeting Location: NEB 0202

Text: R.W. Hertzberg, R.P. Vinci, J.L. Hertzberg, Deformation and Fracture Mechanics of Engineering Materials, 5th ed. Wiley (2013).

Reference Texts: M.F. Ashby & Jones, Engineering Materials, 1 & 2, Pergammon Press (1980).

T.H. Courtney, Mechanical Behavior of Materials, McGraw-Hill (2000).

M. A. Meyers and K. K. Chawla, Mechanical Behavior of Materials, Prentice-Hall 2nd ed. (2009).

Online Resources: All necessary documents will be shared on canvas.

Software Requirements: none.

Course Outline: Subject to changes throughout the semester as necessary.

Week		Topic
1	1/8	Elastic Properties
2	1/15	Elastic Properties
3	1/22	Plasticity
4	1/29	Plasticity
5	2/5	Review and Exam 1
6	2/12	Strengthening Mechanisms
7	2/19	Time-Dependent Deformation
8	2/26	Review and Exam 2
9	3/5	SPRING BREAK
10	3/12	Fracture
11	3/19	Fracture
12	3/26	Fracture
13	4/2	Review and Exam 3
14	4/9	Environment Effects
15	4/16	Fatigue
16	4/23	Review and Exam 4
17	4/30	Wrap up

Purpose: To introduce the student to problem solving techniques which involve structural materials in adverse mechanical and chemical environments. To demonstrate the common themes of mechanical behavior for different classes of materials.

Outcomes: 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.

Grade Determination

Tests	80 %	*4 tests, each 20%
Quizzes/Homework	20 %	

Grading Scale - The grading scale is indicated below. Grades are not curved and there is no final exam in this course.

Percentage	≥92	≥90	≥87	≥84	≥80	≥77	≥74	≥71	≥67	≥63	≥60	<60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0

Any tests missed will count as zero unless a written excuse is submitted before the test. The make-up test will have to be taken at the earliest possible date. Emergencies that arise will have to be documented by the appropriate authority. Attendance is expected. Quizzes will count as a record of attendance. Thus, the penalty for unexcused absences is a lower grade.

Homework Assignments: Homework groups of 3-5 students must be formed. Grades will be assigned to the group, i.e., everyone in the group will receive the same grade. Homework is due by 5:00PM of the due date. Homework turned in the day following the due date by 5:00PM will receive a reduction in grade by ten percent. No homework will be accepted after 5:00PM on the day following the due date. (For example, homework due on Thursday at 5:00PM will not be accepted after 5:00PM on Friday.)

Quizzes: Quizzes will be conducted individually and will be announced ahead of time.

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.

Academic Honesty:

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.

- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

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.

Software Use – All faculty, staff and student 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.

Professional Component Content:	Math and Basic Science:	20%
	Engineering Topics	
	Engineering Science	30%
	Design	30%
	General Education	10%
	Other	10%

Relation to Program Outcomes:

Outcome	Level*	%
1. Know fundamentals	3	19
2. Apply fundamentals	3	19
3. Design experiments	1	6
4. Design Materials	3	19
5. Work in teams	2	13
6. Communicate	2	13
7. Issues in practice	1	6
8. Society issues	1	5

*Levels of contribution toward attainment of this ability
 1 - Touched upon
 2 - Significant
 3 - Primary