

Properties of Materials
EMA 6001 Sections 1FE2, 2FED, CAMP, OVER
Class Periods: M, W, F, Period 2, 8:30-9:20
Location: Online, PS&T
Academic Term: Fall 2020

Instructor:

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352-846-3557
Particle Science and Technology Building
1180 Center Drive
205 C

Office Hours: TBD

Teaching Assistant:

Please contact through the Canvas website
TBD

Office Hours: TBD

Please schedule a phone meeting if you are an EDGE student

Course Description

Review of physical properties of materials such as mechanical, electrical, optical, magnetic, and thermal properties.

Course Pre-Requisites / Co-Requisites

Bachelor's degree in physics, chemistry, or engineering.

Course Objectives

This is an introductory course, designed to provide the fundamental concepts of Materials Science and Engineering. Students will be able to describe structure, properties, and applications of metallic, ceramic, polymeric and composite materials and the significance of the electronic, thermal, magnetic and photonic properties in applications.

Materials and Supply Fees

N/A

Required Textbooks and Software

- Title : Materials Science and Engineering: An Introduction
- Author : William D. Callister and David G. Rethwisch
- Publication date and edition: 2018, Wiley 10th Edition
- ISBN number : 9781119405498

Recommended Materials

- Title : Understanding Materials Science
- Author : Rolf Hummel
- Publication date and edition : 1998, Springer 1st Edition
- ISBN number : 0387983031

- Title : Essentials of Modern Materials Science and Engineering
- Author : James Newell
- Publication date and edition : 2009, Wiley 1st Edition

Tentative Course Schedule

Week	Topic	Chapter
1	Course Objectives, Syllabus, Wiley Introduction	0
	Introduction/Atomic Structure and Interatomic Bonding	1-2
2	The Structure of Crystalline Solids	3
3	Imperfections in Solids	4
	Imperfections in Solids / Diffusion	4-5
4	Diffusion	5
	Mechanical Properties of Metals	6
5	Mechanical Properties of Metals	6
	Dislocation and Strengthening mechanisms	7
6	Review	1-7
	Midterm Exam 1	1-7
7	Dislocation and Strengthening mechanisms/Failure	7-8
	Failure / Phase Diagrams	8-9
8	Phase Diagrams	9
	Phase Diagrams/ Phase Transformations	9-10
9	Phase Transformations	10
	Thermal Processing of Metal Alloys and Metal Alloys/ Recitation	11
10	Thermal Processing of Metal Alloys and Metal Alloys	11
	Midterm Exam 2	7-11
11	Structure and Properties of Ceramics/ Ceramic Processing	12-13
	Polymer Structures	14
12	Polymer Processing / Composites	15-16
	Midterm Exam 3	12-16

Week	Topic	Chapter
13	Corrosion and Degradation of Materials	17
	Thanksgiving	
14	Electrical Properties/ Thermal Properties	18
	Magnetic Properties/ Optical Properties/Review	19
15	Midterm Exam 4	17-21

Course Website

The course website is on the Canvas system <http://elearning.ufl.edu/https://ufl.instructure.com/>, where you can find the syllabus, lecture notes, homework problems, announcements, and your grades. Please check it frequently.

Lectures and Attendance Policy

Lectures are critical to success in this MSE course.

Attendance is not required but highly encouraged since there will be In Class Exercises (ICE). Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required based on the ICE discussions and exam results as needed.

For face to face courses:

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.

This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.

Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.

Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.

If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.

Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

For online courses with recorded materials:

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.

The university syllabi policy, including the information regarding COVID impacts can be found on the following website

<http://www.syllabus.ufl.edu/syllabus-policy/>

Homework, due as shown in WileyPlus Assignments

Homework exercises from the end of chapters will be assigned. These homework questions are essential to your study and some exam questions will be adapted from them. There will be 11 homework assignments throughout the semester, and the lowest 2 will be dropped from the final score. Each homework assignment is weighted equally, and the homework will account for **10%** of your grade. Homework will be posted, submitted, and graded through the Canvas/WileyPLUS web site via e-learning. **No late homework assignments will be accepted.** You will be allowed 1 or more re-submission attempts for each homework, but this must be done before the homework due date/time. Please see the TAs during office hours to discuss homework problems.

Exams

There will be 4 Midterm exams throughout the semester. The lowest exam grade will be dropped from your final grade. Each exam accounting for your final grade is weighted equally, and each exam will be worth 25% of your final grade. Review sessions will be given prior to each exam. The tentative exam dates are as follows;

You have two weeks after the test results are posted to resolve any questions about scores and grades. No changes to your exam grade will be made after that time.

Exam Conflicts with other course exams

The official UF policy on exam conflict resolution states that when two exams conflict, the course with the higher number will take priority. There will be no exceptions to this rule.

Make-up exams

Students not presenting an exam will receive a grade of 0. There will be a make-up scheduled for a missed exam. In all cases, excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation. Additional information can be found here:

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

Bonus points

There may be some bonus point activities that will be assigned during the class hours. Bonus points may also be added to the midterm exams.

Quiz/In Class Exercises (ICE)/ Reports

There will be multiple quizzes and “in class” exercises during the class hours. Students will be allowed to work in small groups or work individually depending on the type of the given assignment. ICE may be assigned as bonus points as an indicator of class participation or graded. Reports will be assigned through Canvas and should be submitted electronically.

Rules for the Midterm Exams

- All cell phones must be turned off and they cannot be used in place of a calculator.
- 1 letter size paper can be used as a cheat sheet for the exams that only contains the formula relevant to the chapters included in the exam.
- You are responsible to know all the functions of your calculators
- Show all your work as needed
- Any suspicious activity during exam will result in marking of your exam paper to be evaluated accordingly.

Behavior in class

- No behavior that can distract the other students in class will be allowed.
- Jean-Jacques Rousseau Principle “Ones freedom ends where the others freedom starts.”
- Destructive behavior will result in your dismissal from the class.
- The Zoom instructions will be discussed in the beginning of the class in detail.

Record keeping

All materials from this class that students will be saved for a year and will be shredded afterwards.

Syllabus Changes

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

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (10)	10 each	10%
Quizzes /Reports/ ICE (TBD)	10 each	15%
Midterm Exam I	25	25%
Midterm Exam II	25	25%
Midterm Exam III	25	25%
		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.0 - 100	A	4.00
90.0 - 93.0	A-	3.67
87.0 – 90.0	B+	3.33
83.0 – 87.0	B	3.00

80.0 - 83.0	B-	2.67
77.0 – 80.0	C+	2.33
73.0 – 77.0	C	2.00
70.0 - 73.0	C-	1.67
67.0 – 70.0	D+	1.33
63.0 – 67.0	D	1.00
60.0 - 63.0	D-	0.67
0.00 – 60.0	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

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 feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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.

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, ttitle-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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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