

Materials

EMA 3010 Section 0019 and 3111

Class Periods: M, W, F, Period 4, 10:40-11:30

Location: NEB 100

Academic Term: Fall 2019

Instructor:

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352-846-3557

Office Hours: Wednesday 13:00-14:00

Particle Science and Technology Building

1180 Center Drive

205 C

Teaching Assistants:

Please contact through the Canvas website

- [Linyuan Shi](#)
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Course Description

Conceptual perspective for origin of materials behavior and the interrelationships of structure/property /performance. Materials selection and use of familiar material (metals, ceramics, polymers, electronic materials and composites) in electronics and structural and other engineering applications.

Course Pre-Requisites / Co-Requisites

CHM 2045 (or equivalent)

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

Professional Component (ABET):

State the contribution of the course to meeting the professional components of the ABET-accredited degree.

Relation to Program Outcomes (ABET):

The table below is an example. Please consult with your department's ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	High
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	

3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	
4. An ability to communicate effectively with a range of audiences	
5. 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.	
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	

*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 : Fundamentals of Materials Science and Engineering: An Integrated Approach
- Author : William D. Callister and David G. Rethwisch
- Publication date and edition: Wiley 5th Edition
- ISBN number : 9781119035640

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	Class dates	Topic	Chapter
1	August 21	Course Objectives, Syllabus, Wiley Introduction	0
	August 23	Introduction	1
2	August 26	Atomic Structure and Interatomic Bonding	2
	August 28	Atomic Structure and Interatomic Bonding	2
	August 30	Structure of metals, ceramics	3
3	September 2	Labor Day	

Week	Class dates	Topic	Chapter
	September 4	Structure of metals, ceramics	3
	September 6	Structure of metals, ceramics	3
4	September 9	Structure of metals, ceramics	3
	September 11	Structure of metals, ceramics	3
	September 13	Structure of Polymers	4
5	September 16	Structure of Polymers	4
	September 18	Structure of Polymers	4
	September 20	Defects in Solids	5
6	September 23	Defects in Solids	5
	September 25	Review/ Carrier showcase	
	September 27	Review	1-5
7	September 30 October 1	Recitation Midterm Exam I (Tentative)	1-5
	October 2	Diffusion	6
	October 4	Homecoming	
8	October 7	Diffusion	6
	October 9	Mechanical Properties	7
	October 11	Mechanical Properties	7
9	October 14	Mechanical Properties	7
	October 16	Deformation and strengthening mechanisms	8
	October 18	Deformation and strengthening mechanisms	8
10	October 21	Failure	9
	October 23	Failure	9
	October 25	Review	6-9
11	October 28 October 29	Recitation Midterm Exam II (Tentative)	6-9
	October 30	Phase Diagrams	10
	November 1	Phase Diagrams	10
12	November 4	Phase Diagrams	10
	November 6	Phase Diagrams	10
	November 8	Phase transformations	11

Week	Class dates	Topic	Chapter
14	November 11	Veteran's Day	11
	November 13	Phase transformations	
	November 15	Phase transformations	
15	November 18	Phase transformations	11
	November 20	Synthesis, fabrication, and processing of materials	14
	November 22	Synthesis, fabrication, and processing of materials	14
16	November 25	Synthesis, fabrication, and processing of materials	14
	November 27	Thanksgiving	
	November 29	Thanksgiving	
17	December 2	Review (18-22)/ Recitation	10, 11, 14
	December 4	Make Up Exams/ Review Midterm Exam III	10, 11, 14

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.

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 **15%** 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 3 Midterm exams throughout the semester. The exam content may change and the dates are tentative and will be finalized after the add/drop period. All EMA3010 students will be given the same Midterm exams together. The time and location of the exams will be announced.

Each exam 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;

Midterm Exam 1 : Tuesday, October 1, 2019 (Tentative)
 Midterm Exam 2 : Tuesday, October 29, 2019 (Tentative)

Chapters on each exam:

- Exam 1: Atomic structure and bonding (Ch 2), Structure of metals, ceramics (Ch 3), Structure of polymers (Ch 4), Defects in solids (Ch 5)
- Exam 2: Diffusion (Ch 6), Mechanical properties (Ch 7), Deformation and Strengthening Mechanisms (Ch 8), Failure (Ch 9)
- Exam 3: Phase diagrams (Ch 10), Phase transformations (11), Synthesis, Fabrication, and Processing of Materials (Ch 14)

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 who do not take an exam will receive a grade of 0. There will be a make-up for a missed exam. 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.

All the Make up exams will be scheduled by the course instructors.

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.

In Class Exercises (ICE)

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

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.

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	15%
Quizzes /ICE (TBD)	10 each	10%
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:

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

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, 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/>.

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>.