

# EMA 3010 – Introduction to Materials Science and Engineering

## Course Syllabus – Spring 2017

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### Course Description (3 credit hours)

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

### 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.

### Class Time

Monday, Wednesday, Friday      Period 2    8:30-9:20      Norman Hall 137

### Prerequisites: CHM 2045

### Text book: (required)

Title:            Fundamentals of Materials Science and Engineering: An Integrated Approach  
Author:        William D. Callister and David G. Rethwisch  
ISBN:           9781119035640

### Course Website

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

### Lectures

Lectures are critical to success in this MS&E course. However, I will not require attendance. Questions are highly encouraged. It will make the class more interesting, wake up your fellow students and give me a chance to explain things better. If you do not understand something, chances are that most of the class missed that point too. If you as students do not ask enough questions, I may start asking you.

### Homework, due Wednesdays at midnight

Homework exercises from the end of each chapter will be assigned. These homework questions are essential to your study and some exam questions will be adapted from them. I expect to have about 10 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 25% of your grade. Homework will be multiple-choice and will be posted, submitted, and graded through the Canvas/Wiley Plus web site. **No late homework assignments will be accepted.** You will be allowed 1 re-submission attempt for each

homework, but this must be done before the homework due date/time, so start your homework assignments early to allow time for resubmission. Please see the TAs during office hours to discuss homework problems.

### Exams

We will have 3 exams throughout the semester, the exam content may change but the dates will not. There will be no Final Exam. 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. Exam dates are as follows

Exam 1: Thursday, February 2, 2017

Exam 2: Thursday, March 16, 2017

Exam 3: Tuesday, April 18, 2017

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

Make up exams will be provided only with the *prior approval of the instructor in accordance with university policies*. (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) In general, acceptable reasons for excused absence from an exam include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, and religious holidays. In all cases, you will be required to provide written documentation, and obtain prior instructor approval. You will not be excused from any exam without following the policy above, with no exceptions. Students not in attendance for the scheduled exam will receive a score of zero. **You must notify the instructor no less than 1 week of the scheduled exam of your intent and justification for missing the exam.** Make-up exams for excused absences as well as exam conflicts must occur within 1 week of the missed exam, and may occur before the missed exam.

### Grading

Grades will be based on your understanding and mastery of the material as demonstrated by quantitative scores on homework (25%) and the three exams (25% each).

### Grading Scale

Percentage	≥92	≥88	≥84	≥80	≥76	≥72	≥68	≥65	≥62	≥59	≥56	<56
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

A “C-“ will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: A C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## **Office Hours**

If I am in my office with the door open, you are welcome to come in and ask questions. A closed door means I am either not there or on a conference call, or writing an exam/proposal. Official office hours are Tuesday afternoons 2:00-3:00 p.m. TA office hours will be scheduled the afternoon before the homework is due.

I will always try to respond to e-mail questions as fast as possible. Important e-mail questions (minus identifying information) and answers will be posted to the class either by e-mail or on the course website for the benefit of other students.

## **Contribution of course to meeting the professional component**

(ABET only – undergraduate courses)

This course addresses the following MSE Program outcomes (note: Numbers refer to the list of MSE Program outcomes):

1. Ability to apply knowledge of mathematics, science, and engineering to materials systems. (High coverage)

## **Honesty Policy**

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 UF student and to be honest in all work submitted and exams taken in this course and all others.

Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

See <http://www.dso.ufl.edu/sccr/procedures/honorcode.php>.

## **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:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

## **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.

## Tentative Course and Lecture Outline

Week	Class dates	Topic	Chapter
1	January 4	Introduction	1
	January 6	Atomic Structure and Bonding	2
2	January 9		
	January 11	Structure of Metals and Ceramics	3
	January 13		
3	January 18		
	January 20	Structure of Polymers	4
4	January 23		
	January 25	Defects of Crystals	5
	January 27		
5	January 30	Diffusion	6
	February 1	Review Session	
	February 2	Evening Exam 1	1-5
	February 3	Diffusion (cont.)	6
6	February 6		
	February 8	Mechanical Properties of Materials	7
	February 10		
7	February 13		
	February 15	Deformation and Strength of Materials	8
	February 17		
8	February 20		
	February 22	Failure	9
	February 24		
9	February 27		
	March 1	Video Lecture	
	March 3	Phase Diagrams	10
10		Spring Break	
11	March 13	Phase Diagrams	10

Week	Class dates	Topic	Chapter
	March 15	Review Session	
	March 16	Evening Exam 2	6-9
	March 17	Phase Diagrams	10
12	March 20		
	March 22	Phase Transformations and Kinetics	11
	March 24		
13	March 27		
	March 29	Electronic Materials	12
	March 31		
14	April 3		
	April 5	Video Lectures	
	April 7		
15	April 10		
	April 12	Synthesis, Fabrication and Processing of Materials	14
	April 14		
16	April 17	Review Session	
	April 18	Exam 3	10-12, 14