

## Materials

EMA 3010 Class Number 13719

**Class Periods:** Tues 7 (1:55pm-2:45pm) and Thurs 7-8 (1:55pm-3:50pm)

**Location:** Tues FLG 0265 and Thurs FLG 0285

**Academic Term:** Spring 2020

### 1. Instructor

**Dr. Josephine Allen**

jallen@mse.ufl.edu

(352) 846-3328

Office Hours: by appointment

### 2. Teaching Assistants

Please contact through the Canvas website

- TBD, 123 Rhines Hall - MSE Library
- Wiley Plus TA: TBD

### 3. Course Description

Conceptual perspective for origin of materials behavior, including structure, property, performance interrelationships. Materials selection and use of familiar materials, including metals, ceramics, polymers, electronic materials, and composites in electronics, structural and other engineering applications. (3 Credit Hours)

### 4. Course Pre-Requisites

CHM 2045 General Chemistry.

### 5. 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.

### 6. Professional Component (ABET)

This course provides 3 credits towards engineering sciences.

### 7. Relation to MSE Program Outcomes (ABET)

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.

### 8. Required Textbooks and Software

- Title: **Fundamentals of Materials Science and Engineering: An Integrated Approach**
- Author: **William D. Callister, Jr. and David G. Rethwisch**
- Year and edition: **2019 5<sup>th</sup> Edition (John Wiley & Sons, Inc.), e-book with Wiley Plus Access**
- ISBN: **1978-1-119-65905-1**

### 9. Course Website

This course will use CANVAS extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework, problem sets, solutions, announcements, grades, etc.) via the CANVAS entry link: <https://elearning.ufl.edu/>, or <https://ufl.instructure.com>. Within CANVAS the students can purchase the book and access to Wiley Plus to submit the homework. Please check CANVAS frequently.

### 10. Course Schedule

EMA 3010 - Spring 2020

Dr. Josephine Allen

Below is the tentative schedule of topics, exams, and HW. This schedule is subject to change. Any changes will be clearly announced on CANVAS and in class.

<b>Week</b>	<b>Class dates</b>	<b>Topic</b>	<b>Chapter</b>
<b>1</b>	January 7	Course Objectives, Syllabus, Wiley Introduction	<b>0</b>
	January 9	Introduction	<b>1</b>
	January 9	Atomic Structure and Interatomic Bonding	<b>2</b>
<b>2</b>	January 14	Atomic Structure and Interatomic Bonding	<b>2</b>
	January 16	Structure of metals, ceramics	<b>3</b>
	January 16	Structure of metals, ceramics	<b>3</b>
<b>3</b>	January 21	Structure of metals, ceramics	<b>3</b>
	January 23	Structure of metals, ceramics	<b>3</b>
	January 23	Structure of metals, ceramics	<b>3</b>
<b>4</b>	January 28	Structure of Polymers	<b>4</b>
	January 30	Structure of Polymers	<b>4</b>
	January 30	Structure of Polymers	<b>4</b>
<b>5</b>	February 4	Defects in Solids	<b>5</b>
	February 6	Defects in Solids	<b>5</b>
	February 6	Defects in Solids	<b>5</b>
<b>6</b>	February 11	<b>REVIEW</b>	<b>1-5</b>
	February 13	<b>NO CLASS</b> <b>Midterm Exam I (Feb 13 - 6:15pm-8:15pm)</b>	
<b>7</b>	February 18	Diffusion	<b>6</b>
	February 20	Diffusion	<b>6</b>
	February 20	Diffusion	<b>6</b>
<b>8</b>	February 25	Mechanical Properties	<b>7</b>
	February 27	Mechanical Properties	<b>7</b>
	February 27	Mechanical Properties	<b>7</b>
<b>9</b>	<b>March 3</b>	<b>Spring Break</b>	
	<b>March 5</b>		
	<b>March 5</b>		
<b>10</b>	March 10	Deformation and strengthening mechanisms	<b>8</b>
	March 12	Deformation and strengthening mechanisms	<b>8</b>

Week	Class dates	Topic	Chapter
	March 12	Deformation and strengthening mechanisms	8
11	March 17	Failure	9
	March 19	Failure	9
	March 19	REVIEW	6-9
12	March 24	No class: Midterm Exam II (March 24 - (6:15pm-8:15pm))	6-9
	March 26	Phase Diagrams	10
	March 26	Phase Diagrams	10
13	March 31	Phase Diagrams	10
	April 2	Phase transformations	11
	April 2	Phase transformations	11
14	April 7	Phase transformations	11
	April 9	Types and Applications of Materials	13
	April 9	Types and Applications of Materials	13
15	April 14	Composites	15
	April 16	Composites	15
	April 16	REVIEW	10,11,13,15
16	April 21	No class: Midterm Exam III (April 21 - 6:15pm-8:15pm)	10, 11, 13, 15

### 11. Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is strongly suggested since it is the best way to actively engage with the instructor while the topics are being covered and get any clarifying questions answered right when they arise. In addition, a number of in class exercises will be worked out in class in small groups, and they will help as preparation for the exams.

Proper behavior in class is always important and leads to a relaxed and productive educational environment. Students are expected to arrive to class on time and be respectful to the instructor and to fellow students. Eating, drinking, texting, news reading, social media use, working on homework for this or other courses, or other activities that are not part of the class are not allowed. Students who do not comply with these requirements, or who behave disorderly or disrespectfully, will be asked to leave the classroom.

All electronic devices (laptops, mobile phones, etc.) should be on silent mode. The use of smartphones, laptops, tablets or similar personal computers is not allowed unless specific in-class activities requires them, and when explicitly indicated by the instructor. Exceptions may be granted if explicitly requested by the individual student the first day of class and for note taking purposes only. No additional audio/video recording is allowed.

Students not present for an exam, homework, or quiz, will receive a grade of zero (0) and there will be no make-up. Exceptions will only be entertained in cases of excused absences, which must comply with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. **Except in the case of an emergency, you must notify the instructor no less than 1 week of the scheduled exam of your planned 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.**

Note: 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.

### 12. Course Communication

E-Learning will be the primary avenue for communication and course management. All announcements for the course will be made using the announcement system on the E-Learning site. Discussion groups will be made for each module. All questions regarding the module and the homework assignment should be made using the discussion group. Course notes will be posted on E-Learning before each lecture. Make sure and change your E-Learning settings so that you get notifications about announcements, assignment changes, etc. in a timely manner.

### 13. Homework

Homework problems for each chapter will be assigned, submitted, and graded using Wiley Plus through the E-Learning website. These homework questions are essential to your study and some exam questions will be adapted from them. Two attempts are allowed for each question. Since you have roughly a week to work on the assigned homework, there is no late submission allowed. The availability to submit homework answers online is controlled automatically so please be sure to submit the homework before the deadline. Please see the TAs during office hours to discuss homework problems or Wiley Plus grading.

### 14. Quizzes

Throughout the semester, quizzes will be given in class on the material being covered. Quizzes will be announced, they will be short (a few questions) and may contain both conceptual as well as quantitative questions. Missed quizzes will be handled in the same manner as missed exams, with no make-up allowed except for excused absences, which must comply with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

### 15. Exams

You will be given three exams throughout the semester, the exam content may change but the dates will not. The exams will be given in the evening, periods 11-E1 (6:15pm-8:15pm). There will be no final exam. Each exam is weighted equally and will be worth 25% of your final grade. You will be allowed one sheet of notes on an 8 ½ by 11 sheet of paper (both sides) to bring to the exam. Make sure you write your name on it. It must be hand-written and not photocopied. **You must turn in your sheet with the exam for it to be graded.** Additional exam guidelines and exam location will be provided in class and posted in CANVAS a few days before the exam.

Exam #1: February 13 (Thursday)

Exam #2: March 24 (Tuesday)

Exam #3: April 21 (Tuesday)

Students have one week after test results are posted to resolve questions about scores/grades. No changes to your exam grade will be made after that time.

### 16. Evaluation of Grades

Assignment	Percentage of Final Grade
Three Exams (25% each)	75%
Homework	15%
Quizzes	10%

### 17. Grading Policy

The final grade of the course will be calculated based on the total points scored as follows:

Points	≥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

For more information on UF grading policy, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### 18. 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.

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

### **20. 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.

### **21. Commitment to a Safe and Inclusive Learning Environment**

The 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](mailto:rbielling@eng.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)

### **22. 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.

### **23. Student Privacy**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### **24. 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/>.

Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto: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](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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

**UNIVERSITY OF FLORIDA STUDENT HONOR CODE (ABRIDGED)**

Preamble: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty 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."***

**Violations of the Student Honor Code include (in part):**

(a) **Plagiarism**, in the form of quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution; or submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

(b) **Unauthorized use of Materials or Resources ("Cheating")**. A student shall not use unauthorized materials or resources in an academic activity. Unauthorized materials or resources shall include:

1. Any paper or project authored by the student and presented by the student for the satisfaction of any academic requirement if the student previously submitted substantially the same paper or project to satisfy an academic requirement.
2. Any materials or resources prepared by another student and used without the other student's express consent or without proper attribution to the other student.
3. Any materials or resources that the faculty member has prohibited.
4. Use of a cheat sheet when not authorized to do so or use of any other resources or materials during an examination, quiz, or other academic activity without the express permission.

(c) **Prohibited Collaboration or Consultation**. A student shall not collaborate or consult with another person on any academic activity unless the student has the express authorization.

1. Prohibited collaboration or consultation shall include but is not limited to:
  - Collaborating when not authorized to do so on an examination, take-home test, writing project, assignment, or course work.
  - Collaborating or consulting in any other academic or co-curricular activity after receiving notice that such conduct is prohibited.
  - Looking at another student's examination or quiz during the time an examination or quiz is given. Communication by any means during that time, including but not limited to communication through text messaging, telephone, e-mail, other writing or verbally, is prohibited unless expressly authorized.
2. It is the responsibility of the student to seek clarification on whether or not use of materials or collaboration or consultation with another person is authorized prior to engaging in any act of such use, collaboration or consultation.