

**Properties of Materials**  
EMA 6001 Section 02AE and 6111  
**Class Periods:** T, Period 2, 8:30-9:20  
R, Period 2-3, 8:30-10:25  
**Location:** NEB 201  
**Academic Term:** Fall 2019

**Instructor:**

G. Bahar Basim  
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352-846-3557

Office Hours: Thursday 11:00-12:00  
Particle Science and Technology Building  
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205 C

**Teaching Assistants:**

Please contact through the Canvas website

- Kimberly Beers, [kimberlybeers@ufl.edu](mailto:kimberlybeers@ufl.edu), PS&T 205G, office hours TBD

**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

**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 10<sup>th</sup> Edition
- ISBN number : 9781119405498

**Recommended Materials**

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

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

***Tentative Course Schedule***

<b>Week</b>	<b>Class dates</b>	<b>Topic</b>	<b>Chapter</b>
<b>1</b>	August 20	Course Objectives, Syllabus, Wiley Introduction	<b>0</b>
	August 22	Introduction/Atomic Structure and Interatomic Bonding	<b>1-2</b>
<b>2</b>	August 27	The Structure of Crystalline Solids	<b>3</b>
	August 29		
<b>3</b>	September 3	Imperfections in Solids	<b>4</b>
	September 5	Diffusion / Mechanical Properties of Metals	<b>5-6</b>
<b>4</b>	September 10	Mechanical Properties of Metals	<b>6</b>
	September 12	Mechanical Properties of Metals/ Dislocation and Strengthening mechanisms	<b>6-7</b>
<b>5</b>	September 17	Dislocation and Strengthening mechanisms	<b>7</b>
	September 19	Failure	<b>8</b>
<b>6</b>	September 24	Review	<b>1-8</b>
	September 26	<b>Midterm Exam 1</b>	<b>1-8</b>
<b>7</b>	October 1	Phase Diagrams	<b>9</b>
	October 3	Phase Diagrams	<b>9</b>
<b>8</b>	October 8	Phase Transformations	<b>10</b>
	October 10	Phase Transformations	<b>10</b>
<b>9</b>	October 15	Phase Transformations	<b>10</b>
	October 17	Thermal Processing of Metal Alloys and Metal Alloys	<b>11</b>
<b>10</b>	October 22	Review	<b>9-11</b>
	October 24	<b>Midterm Exam 2</b>	<b>9-11</b>
<b>11</b>	October 29	Structure and Properties of Ceramics	<b>12</b>
	October 31	Ceramic Processing	<b>13</b>
<b>12</b>	November 5	Polymer Structures	<b>14</b>

Week	Class dates	Topic	Chapter
	November 7	Polymer Processing / Composites	15-16
13	November 12	Corrosion and Degradation of Materials	17
	November 14	Electrical Properties	18
14	November 19	Thermal Properties	19
	November 21	Magnetic Properties/ Optical Properties	20-21
15	November 26	Economics, environmental issues/Review (18-22)	12-22
	<b>November 28</b>	<b>Thanksgiving</b>	
16	December 3	<b>Midterm Exam 3</b>	12-22

### 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 **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 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. Each exam is weighted equally, and each exam will be worth 25% of your final grade. The lowest exam score will be dropped. 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.

## 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.

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
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](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)

### ***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](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>.