

# Properties of Materials

## EMA 6001 Section: 34H3

**Class Periods:** Monday, Wednesday, Friday      Period 2      08:30-9:20 am

**Location:** LIT 0101  
**Academic Term:** Fall 2018

### **Instructor:**

G. Bahar Basim

[gbbasim@ufl.edu](mailto:gbbasim@ufl.edu)

205 C PS&T Building

Office Hours: Tuesday 1:00 pm-3:00 pm [205C PS&T]

Thursday 1:30 pm- 2:30 pm [205C PS&T] Graduate students only

### **Teaching Assistant:**

Please contact through the Canvas website

- Darshan Bamney,  
[darshan.bamney@ufl.edu](mailto:darshan.bamney@ufl.edu)      Office NEB 257  
Office Hours: Thursday 12:00 – 2:00 pm      [Rhines Hall Library, Room 123]

### **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

### **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

- ISBN number : 9780471753650

**Course Schedule**

Week	Class Date	Topic	Chapter
1	August 22	Course Objectives, Syllabus, Introduction	1
	August 24	Atomic Structure and Interatomic Bonding	2
2	August 27	The Structure of Crystalline Solids	3
	August 29		
	August 31		
3	<b>September 3</b>	<b>Labor Day</b>	
	September 5	Imperfections in Solids	4
	September 7	Imperfections in Solids/ Diffusion	4-5
4	September 10	Diffusion	5
	September 12	Mechanical Properties of Metals	6
	September 14		
5	September 17	Dislocation and Strengthening mechanisms	7
	September 19		
	September 21	Review	1-7
6	<b>September 24</b>	<b>In Class Midterm Exam 1</b>	<b>1-7</b>
	September 26	Failure	8
	September 28		
7	October 1	Phase Diagrams	9
	October 3	Phase Diagrams	9
	October 5	Phase Diagrams	9
8	October 8	Phase Diagrams (Review)	9
	October 10	Phase Transformations	10
	October 12	Phase Transformations	10
9	October 15	Phase Transformations (Review)	10
	October 17	Thermal Processing of Metal Alloys and Metal Alloys	11
	October 19	Thermal Processing of Metal Alloys and Metal Alloys/Review	11

Week	Class Date	Topic	Chapter
10	October 22	Review	7-11
	<i>October 24</i>	<i>In Class Midterm Exam 2</i>	<i>7-11</i>
	October 26	Structure and Properties of Ceramics	12
11	October 29	Ceramic Processing	13
	October 31	Polymer Structures	14
	<b>November 2</b>	<b>Homecoming</b>	
12	November 5	Polymer Processing	15
	November 7	Composites	16
	November 9	Corrosion and Degradation of Materials	17
14	<b>November 12</b>	<b>Veteran's Day</b>	
	November 14	Review	12-17
	<i>November 16</i>	<i>In Class Midterm Exam 3</i>	<i>12-17</i>
15	November 19	Electrical Properties	18
	November 21	Electrical Properties	18
	<b>November 23</b>	<b>Thanksgiving</b>	
16	November 26	Thermal Properties	19
	November 28	Magnetic Properties	20
	November 30	Optical Properties	21
17	December 3	Economics, environmental issues/Review (18-22)	22
	December 5	Review	All

### Course Website

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

### 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.

### Homework (due as shown in WileyPlus Assignments)

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. There will be 12 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 multiple-choice and 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, so start your homework assignments early to allow time for resubmission. Please see the TAs during office hours to discuss homework problems.

### ***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 will be asked to work individually depending on the type of given assignment. ICE will either be graded or assigned as bonus point as an indicator of class participation.

### ***Bonus points***

There may be some bonus point activities that will be assigned during the class hours.

### ***Attendance***

Attendance is not required but highly encouraged since there will be In Class Exercises (ICE) that may be graded or accounted as bonus for participation. Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required based on the ICE discussions and grading as needed.

There is no make-up for the pop-quizzes and the In-Class Exercises. If you miss a quiz or a graded ICE, you will get “0”. However, 2 lowest ICE (among the graded ones) grades will not be accounted for your final grade.

### ***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 20% of your final grade. There will be a comprehensive Final Exam which is also 20% of your final grade. Review sessions will be given prior to each exam. The tentative exam dates are as follows;

Midterm Exam 1	: Monday, September 24, 2018
Midterm Exam 2	: Wednesday, October 24, 2018
Midterm Exam 3	: Friday, November 16, 2018
Final Exam	: Wednesday, December 12, 2018

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

### **Midterm Exam Rules**

- 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.

### ***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.***

Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <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.

### ***Evaluation of Grades***

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Homework Sets (10/12)	10 each	10%
ICE (10/TBD)	10 each	10%
Midterm Exam 1	100	20%
Midterm Exam 2	100	20%
Midterm Exam 3	100	20%
Final Exam	100	20%
		100%

### ***Grading Policy***

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

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.

More information on UF grading policy may be found at:  
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>  
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***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.

### ***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.

### ***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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Campus Resources:***

#### ***Health and Wellness***

##### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**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 Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

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](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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