

Standardized Syllabus for the College of Engineering

EMA 3010
Section 5823

Materials

Fall 2015

1. 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)
2. Course Objectives: To present the fundamental concepts in materials science and engineering. To describe the structure, properties, and applications of metallic, ceramic, polymeric and composite materials. To generalize structure-property-performance interrelationships in materials.
3. Prerequisites: CHM 2045 General Chemistry
4. Contribution of course to meeting the professional component: This course provides 3 credits towards engineering sciences.
5. Instructor: **Dr. Juan C. Nino**
 - a. Office location: **172 Rhines Hall**
 - b. Telephone: **(352) 846 3787**
 - c. E-mail address: **jnino@mse.ufl.edu**
 - d. Office hours: **M & W 9:30-11:00 am (or any day by appointment).**
6. Teaching Assistants:
 - a. Name: TBA
 - b. Office location:
 - c. Telephone:
 - d. E-mail address:
 - e. Office hours:
 - a. Name: TBA
 - b. Office location:
 - c. Telephone:
 - d. E-mail address:
 - e. Office hours:
7. Meeting Times and Location: **T Period 4, 10:40 – 11:30 pm WEIL 270**
R Periods 4 & 5, 10:40 – 12:20 pm (no break) WEIL 270
8. Textbook Required
 - a. Title: **Fundamentals of Materials Science and Engineering: An Integrated Approach**
 - b. Author: **William D. Callister, Jr. and D.G. Rethwisch**
 - c. Year and edition: **2012 Fourth Edition (John Wiley & Sons, Inc.)**
 - d. ISBN: **978-1-118-06160-2**
9. On the Web: This course will use CANVAS extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework and exam solutions, announcements, grades, etc.) via the CANVAS entry link: <https://lss.at.ufl.edu/>.
10. Conduct, Attendance and Expectations: Proper behavior in class is always important and leads to a relaxed and productive educational environment. Thus, **eating, drinking, texting, reading of newspapers, 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. Leaving your cell phone on, leaving early or arriving late can be VERY distracting, you should avoid it. All electronic devices (laptops, cell-phones, etc.) should be turned off or in silent mode. If your cell phone rings during class it will be confiscated for the remainder of the class period.** Use of smartphones, laptops, tablets or similar personal computers is not allowed unless explicitly requested by the individual student the first day of class and for note taking purposes only. No audio/video recording is allowed.
11. How to Ensure a Response to Your E-mail: e-mail me ONLY to jnino@mse.ufl.edu. DO NOT USE CANVAS MAIL. Furthermore, because of the volume of e-mails I receive, in the subject line you should always include the course number (EMA3010) and your first and last name. Please begin your e-mail with a salutation. [I know that personal e-mails and texts are often sent without a name to address the recipient at the opening of the communication, but professionally that is unacceptable]. Close your e-mails by typing your name. Check your e-mail for grammar and spelling. Be concise. If I have to sift through what you have written, my response time drops significantly. All of

these guidelines are to promote professionalism. If you need help with professional writing, let me know. We have people on campus that can help you.

12. Grading: Attendance is highly encouraged since significant amount of individual and collaborative work will be performed during the class sessions. Moreover, key explanations and examples that will aid in preparation for the exams will be presented in class. Grading and Grading Scale: The course grade will be based on a point system as follows:

<u>Activity</u>	<u>Number</u>	<u>Points per Activity</u>	<u>Total Points</u>
In Class Exams	4	20	80
Individual Homework*	8	2	16
Pull-up Quizz**	1	4	4
		Course Total	100

Exams will be closed book and in class as scheduled below. Students are allowed to bring one letter-sized paper (8½"x11") with equations, annotations and/or any relevant information machine printed (NO PEN or PENCIL ANNOTATIONS) on both sides (if needed). Exams are multiple choice (scantron sheets provided), and thus no re-grading or partial credit issues are expected. Solutions will not posted. Students can review the exam solution during office hours. **There will be no make-up exams given the advanced exam scheduling.** Exceptions will be made only due to verified personal emergency supported by written documentation. **There will be no final exam.**

*Homework problems are assigned roughly every fortnight with the exercises posted on CANVAS. Homework is to be submitted online on CANVAS and will be due by **8 pm on Sunday** (except HW3 due on Wednesday at 11 pm). The availability to submit homework answers online is controlled automatically. **No late homework will be accepted.** Group discussions towards homework solving and teamwork are encouraged but all answers that are turned in should be the result of your own work. In addition, **you should keep records of the work leading to your answers throughout the semester**, as they will be randomly requested for grading clarification. Each question in the homework will be graded automatically by CANVAS, on an all or nothing value scheme; you will **twenty minutes total** to upload the answers in at most 2 tries. **This does not apply to HW0.** HW0 is given to you as a mandatory exercise to familiarize yourself with the CANVAS submission system. **VERY IMPORTANT:** The score of your homework will be weighed (adjusted) by your performance on the exams. If the average score on your exams (E) is more than 20% higher than your average score on your homework (HW), the score of your HW will become 0.8 of your E score. Conversely, if HW is more than 20% higher than your E, HW will become 1.2 of your E score. If the difference between E and HW is within 20%, HW scores are unmodified. That is, if $E > 0.8HW \rightarrow HW = 0.8E$; else, if $HW > 0.8E \rightarrow HW = 1.2E$; else, $HW = HW$. Why do I do this? This scheme strongly motivates students to do the homework as preparation for the exam but at the same time discourages cheating on homework assignments by devaluing raw HW points should you fail to confirm your understanding of the material on the exams. By the same token, if you demonstrate your understanding of the material on the exams but failed to do so in the HW, your HW score will not be severely affect your overall class score. If your performance is similar on both HW and E, then there is confirmation of your overall performance and the HW scores are thus untouched.

Worksheets will be distributed in class. Students will work in pairs on some of the problems for a few minutes of class time. The purpose of this activity is to elicit questions from students on the topics covered. While this is not a graded activity, it will further serve as preparation for the exams.

Pull-up Quiz (or an applied group psychology problem) will be on November 24th. If more than 70% of the registered students attend class, every student will get 4 points. If less than 70% of the students attend class, then the Pull-up Quiz will become an attendance quiz (getting all 4 points) and **students not attending that day will receive a score of zero points in that activity.

Grading will be assigned based on the total course points earned as follows:

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

Grades will not be curved and there is no extra credit. However, additional bonus questions may be added to the exams and thus scores over 100 points will carry over and count toward the final grade.

13. Course Outline: Below is the tentative schedule of topics, activities, reading assignments, exams, and homework.

S	Date	Topics	Reading Assignments	Points	Homework
	Aug				
1	25	Introduction, Types and Applications of Materials	Ch. 1 & 13		
2	27	Atomic Structure	Ch 2		
3	27	Interatomic Bonding	Ch 2	2	HW 1 Due (Su)
	Sep				
4	1	Structures of Metals	Ch 3		
5	3	In Class Exercises			
7	8	Structures of Ceramics	Ch 3		
8	10	Organic Molecules	Ch 4		
9	10	Structures of Polymers and Biologics	Ch 4	2	HW 2 Due (Su)
10	15	Composites	Ch 15		
E	17	EXAM 1 (In Class)		20	
1	22	Point Defects	Ch 5		
2	24	Line and Extended Defects	Ch 5		
3	24	Diffusion Mechanisms	Ch 6		
4	29	Steady and Nonsteady State Diffusion	Ch 6	2	HW 3 Due (We)
	Oct				
5	1	In Class Exercises			
7	6	Binary Phase Diagrams	Ch 10		
8	8	Phase Diagrams (Metals)	Ch 10		
9	8	Advanced Phase Diagrams (Ceramics)	Ch 10	2	HW 4 Due (Su)
E	13	EXAM 2 (In Class)		20	
1	15	Kinetics	Ch 11		
2	15	Phase Transformations	Ch 11		
3	20	Mechanical Properties (Metals)	Ch 7		
4	22	Mechanical Properties (Ceramics and Polymers)	Ch 7		
5	22	Deformation Mechanisms	Ch 8	2	HW 5 Due (Su)
6	27	Strengthening Mechanisms	Ch 8		
7	29	Fracture	Ch 9		
8	29	Fatigue and Creep	Ch 9	2	HW 6 Due (Su)
	Nov				
9	3	In Class Exercises			
E	5	EXAM 3 (In Class)		20	
1	10	Electrical Conduction	Ch 12		
2	12	Semiconductivity	Ch 12		
3	12	Dielectric and Ferroic Properties	Ch 12	2	HW 7 Due (Su)
4	17	Electrochemistry	Ch 16		
5	19	Corrosion and Degradation	Ch 16		
6	19	In Class Exercises			
7	24	Thermal Properties and Applications	Ch 17	4	If < 70 % Quiz
	Dec				
8	1	Magnetic Properties and Applications	Ch 18		
9	3	Optical Properties and Applications	Ch 19		
10	3	Economic and Environmental Considerations	Ch 20	2	HW 8 Due (Su)
E	8	EXAM 4 (In Class)		20	
		NO FINAL EXAM	Total	100	

14. Relation to Program Outcomes:

Outcome	Coverage*
1. Apply knowledge.	HIGH
2. Conduct experiments.	
3. Statistical design of experiments.	
4. Design.	
5. Function on teams.	Medium
6. Solve problems.	HIGH
7. Professional and ethical responsibility.	
8. Communicate	
9. Economic impact.	
10. Global, societal, and environmental impact.	
11. Lifelong learning.	Medium
12. Contemporary issues.	Medium
13. Techniques, skills, and tools for MSE.	HIGH

* Coverage is given as high, medium, or low. An empty box indicates that this outcome is not a part of the course.

15. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing them 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.
16. 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.
17. UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
 - SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
 - Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.
18. 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.