

## Standardized Syllabus for the College of Engineering

EMA 3010  
Section 1933 (14002)

Materials

Spring 2019

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. Relation to MSE Program Outcomes:

Outcome	Coverage*
a. Ability to apply knowledge of mathematics, science, and engineering to materials systems. Demonstrated through homework problems and exams.	High
b1 Ability to conduct experiments, analyze and interpret data.	
b2 Ability to conduct and analyze design of experiments (DOE).	
c Ability to apply and integrate knowledge of structure, properties, processing, and performance to solve materials selection and design problems within realistic constraints.	
d Ability to function on multi-disciplinary teams. Demonstrated through in-class exercises and course projects.	Low
e Ability to identify, formulate, and solve engineering problems. Demonstrated through homework problems and exams.	High
f Understanding of professional and ethical responsibility.	
g Ability to communicate effectively in both oral and written form. Demonstrated through in-class participation and project presentations.	Low
h1 Understanding of the economic impact of engineering solutions.	
h2 Understanding of the global, societal, and environmental impact of engineering solutions.	
i Ability to engage in lifelong learning. Demonstrated through assigned homework on material not covered in class or textbook.	Medium
j Knowledge of contemporary issues. Demonstrated through homework on recent materials related news.	Medium
k Ability to use the techniques, skills, and tools needed for practice as a materials engineer. Demonstrated through in-class exercises, homework problems, and exams.	High

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

6. Instructor: **Dr. Juan Claudio Nino**
  - a. Office location: **166 Rhines Hall**
  - b. Telephone: **(352) 846 3787**
  - c. E-mail address: **jnino@mse.ufl.edu**
  - d. Office hours: **Open door policy; T 10:00 – 11:00 am; by appointment; or by e-mail.**
7. Teaching Assistant: **Jacob Hirschhorn**
  - a. Office location: **267 Rhines Hall**
  - b. Telephone: **(717) 487-7115**
  - c. E-mail address: **jacob.hirschhorn@ufl.edu**
  - d. Office hours: **T & R 12-3 pm**
8. Meeting Times and Location: **M, W, F Period 3, 9:35 – 10:25 am  
NEB 202**
9. Textbook Required
  - a. Title: **Fundamentals of Materials Science and Engineering: An Introduction**
  - b. Author: **William D. Callister, Jr. and David G. Rethwisch**
  - c. Year and edition: **2018 10<sup>th</sup> Edition (John Wiley & Sons, Inc.), e-book with Wiley Plus Access**
  - d. ISBN: **978-1-119-40549-8**
10. On the Web: This course will use CANVAS extensively as a communication and archival tool. The students can access all relevant course information (book, course notes, homework and exam solutions, announcements, grades, etc.) via the CANVAS entry link: <https://lss.at.ufl.edu/>. Within CANVAS the students can purchase the book and access to Wiley Plus to submit the homework. Please check CANVAS frequently.

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

S	Date	Topics	Chapter	Points	Homework
	Jan				
1	7	Introduction, Types and Applications of Materials	1		
2	9	Atomic Structure	2		
3	11	Interatomic Bonding	2	0	HW 0 Due (1/13)
4	14	Structures of Crystalline Solids	3		
5	16	Structures of Crystalline Solids	3		
7	18	Structures of Crystalline Solids	3	2	HW 1 Due (1/20)
	<b>21</b>	<b>MLK</b>			
8	23	Point Defects	4		
9	25	Line and Extended Defects/Diffusion Mechanisms	4-5	2	HW 2 Due (1/27)
10	28	Steady and Nonsteady State Diffusion	5		
<b>11</b>	<b>30</b>	<b>REVIEW</b>	<b>1-5</b>		
	Feb				
<b>E</b>	<b>1</b>	<b>EXAM 1 (In Class)</b>		<b>30</b>	
12	4	Mechanical Properties (Metals)	6		
13	6	Mechanical Properties (Metals)	6		
14	8	Strengthening Mechanisms	7	2	HW 3 Due (2/10)
15	11	Failure	8		
16	13	Binary Phase Diagrams	9		
17	15	Phase Diagrams (Metals)	9		
18	18	Advanced Phase Diagrams (Ceramics)	9		
19	22	Kinetics	10	2	HW 4 Due (2/24)
20	25	Phase Transformations	10		
<b>21</b>	<b>27</b>	<b>REVIEW</b>	<b>6-10</b>		
	Mar				
<b>E</b>	<b>1</b>	<b>EXAM 2 (In Class)</b>		<b>30</b>	
	<b>4-8</b>	<b>SPRING BREAK</b>			
22	11	Thermal Processing of Alloys	11		
23	13	Thermal Processing of Alloys	11		
24	15	Structure and Properties of Ceramics	12	2	HW 5 Due (3/17)
25	18	Processing of Ceramics	13		
26	20	Polymer Structures	14		
27	22	Polymer Processing	15	2	HW 6 Due (3/24)
28	25	Composites	16		
<b>29</b>	<b>27</b>	<b>REVIEW</b>	<b>11-16</b>		
<b>E</b>	<b>29</b>	<b>EXAM 3 (In Class)</b>		<b>30</b>	
	Apr				
30	1	Corrosion and Degradation	17		
31	3	Corrosion and Degradation	17		
32	5	Electrical Properties	18	2	HW 7 Due (4/7)
33	8	Electrical Properties	18		
34	10	Thermal Properties	19		
35	12	Magnetic Properties	20		
36	15	Optical Properties	21		
37	17	Economics, Environmental, and Societal Issues	22		
<b>38</b>	<b>19</b>	<b>REVIEW</b>	<b>17-22</b>	2	HW 8 Due (4/21)
39	22	Course Review (Evaluation)	1-22		
<b>E</b>	<b>24</b>	<b>EXAM 4 (In Class)</b>		<b>30</b>	
		<b>NO FINAL EXAM</b>	Total	136	

12. **Conduct, Attendance and Expectations:** Proper behavior in class is always important and leads to a relaxed and productive educational environment. Thus, **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. 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.** 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 audio/video recording is allowed.
13. **How to Ensure a Response to Your E-mail:** e-mail me ONLY to [jnino@mse.ufl.edu](mailto: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 writing, please visit UF's The Writing Studio.
14. **Grading:** Although not mandatory, 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. 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 (drop lowest)	4(3)	30	90
Individual Homework*	8(5)	2	10
Bonus (in class)	?	?	?
		<b>Course Total</b>	<b>100</b>

Exams there will be four closed book exams in class as scheduled below:

- Exam 1: Friday, February 1, 2019  
 Exam 2: Friday, March 1, 2019  
 Exam 3: Friday, March 29, 2019  
 Exam 4: Wednesday, April 24, 2019.

Students are allowed to bring one letter-sized paper (8½"x11") with equations, annotations and any relevant information, all on a single machine printed. **NO PEN or PENCIL ANNOTATIONS, glued pages or similar deviations from a simple printed page are allowed.** Printing on both sides (if needed) is allowed. The page should include the student's name machine printed or else the page will not be allowed for the exam. This page must be turned in with the exam or the exam will not be graded. Exams are multiple choice, and thus no re-grading or partial credit issues are expected. Solutions will not be posted. Students can review the exam solution during office hours.

Students not presenting an exam will receive a score of 0. **There will be no make-up exams given the advanced exam scheduling.** Instead, students are allowed to drop one exam (only the top three exam scores will count towards the class). In all cases, excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**There will be no final exam.**

\***Homework** problems are assigned roughly every fortnight with the exercises posted on CANVAS and require access to Wiley Plus. Homework is to be submitted online on CANVAS (Wiley Plus) and will be due by **11:59 pm on Sundays**. 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 Wiley Plus, on an all or nothing value scheme. You will have **twenty minutes total** to upload the answers, and you will be allowed 1 or more re-submission attempts for each homework; however, the resubmission must be finished 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. **This resubmission**

**and time limitation does not apply to HW0.** HW0 is given to you as a mandatory exercise to familiarize yourself with the CANVAS/Wiley Plus submission system.

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.

**\*\*Bonus Pull-up Quiz** (or an applied group psychology problem) will be on April 22<sup>nd</sup>. If more than 70% of the registered students attend class, every student will get 3 points. If less than 70% of the students attend class, then the Pull-up Quiz will become an attendance quiz (getting all 3 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	≥92.0	≥88.0	≥84.0	≥80.0	≥76.0	≥72.0	≥68.0	≥65.0	≥62.0	≥59.0	≥56.0	<56.0
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

Additional bonus questions may be added to the exams and thus exam scores over 30 points will carry over and count toward the final grade.

In the event that the class average is below 70.0%, the distribution will be shifted so that the average equals 70%. 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>.

15. Requirements for class attendance, make-up exams, assignments, and other work are consistent with university policies (see <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>). Homework is due online in e-learning, no late homework will be accepted. If you have trouble with on time submission on e-learning you need to get a trouble ticket from the UF help desk before the deadline and also send an email alerting the instructor about the problem before the deadline. Late submissions without trouble ticket and email alert will not be considered.
16. **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.
17. **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/>.
18. **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 in this class. (See page 6 of this syllabus).
19. **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.

20. **Student Privacy.** There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments (see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>).

21. **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.

**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.