

## Fundamental Principles of Materials

EMA 3011 Section 9765 Class 12715

**Class Periods:** T, Periods 2-3 (8:30 AM - 10:25 AM) & R, Period 3 (9:35 AM - 10:25 AM)

**Location:** PSY 0130

**Academic Term:** Spring 2023

### Instructor:

Juan Claudio Nino

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Office Hours: Monday & Wednesday, 10:30 – 11:30 am, 166 Rhines Hall

### Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- None

### Course Description

Covers the fundamental principles of structure, reactivity and energies describing materials systems, directly relating individual principles to specific materials properties or functions.

### Course Pre-Requisites / Co-Requisites

EMA 3010

### Course Objectives

- Solidify and apply the concepts introduced in EMA 3010 Materials.
- Build on these concepts to introduce the electrical, electrochemical, thermal, magnetic, and optical properties of materials.
- Summarize the synthesis, fabrication, and processing of materials to then apply the materials tetrahedron approach to materials engineering.
- Introduce and apply concepts in materials selection and design concepts.

### Materials and Supply Fees

N/A

### Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

### Required Textbooks and Software

1. Materials Science and Engineering: An Introduction (10e)  
William D. Callister, Jr. and David G. Rethwisch  
ZYBOOK Edition, ISBN: 9798203068545

**VERY IMPORTANT** – 1. Click any zyBooks assignment link in your learning management system (Do not go to the zyBooks website and create a new account). 2. Subscribe. A subscription is \$58. Students may begin subscribing on Dec 22, 2022 and the cutoff to subscribe is Apr 16, 2023. Subscriptions will last until May 15, 2023.

2. Materials: Engineering, Science, Processing and Design  
Michael Ashby, Hugh Shercliff, and David Cebon  
4<sup>th</sup> Edition, ISBN: 9780081023761
3. GRANTA EduPack 2022, Available through UF APPS
4. Crystal Maker and Crystal Diffract  
Download most recent installers from <http://www.crystallmaker.com/>  
Unlock licenses available through the MSE Department.

This course will use CANVAS extensively as a communication and archival tool. Students can access all relevant course information (course notes, homework, problem sets, discussions, announcements, grades, etc.) via the CANVAS entry link:  
<https://elearning.ufl.edu/>

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

Attendance and Participated is graded (up to 10% of the course grade) and it is strongly suggested since it is the best way to engage actively with the instructor and fellow students while the topics are being covered and get any clarifying questions answered right when they arise. In addition, a number of in class exercises totaling up to 30% of the course grade will be worked out in class.

Proper behavior during class is always important and leads to a relaxed and productive educational environment. Students who behave disorderly or disrespectfully WILL be asked to leave the classroom. Students not turning in any assignment in time will receive a grade of zero (0) and there will be no make-up for a missed exam or graded activity. Exceptions will only be entertained in cases of excused absences with proper documentation, which must comply with university policies in the undergraduate catalog

(<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>)

## Course Schedule

Below is the intended/tentative schedule of classes, exams and activities. If there is a major scheduling conflict with the assigned dates, students should contact the instructor by the second day of classes the latest to resolve the situation. Else, it is understood that these dates stand.

Week	Class Date	Topics	Book Chapter
	<b>Jan</b>		C = Callister A = Ashby
1	10	Introduction - Course Workflow - ZYBOOKS - GRANTA - EMA 3010	A = Ashby
	10	EMA 3010 - Review	C1-4
	12	EMA 3010 - Review	C5-8
2	17	EMA 3010 - Review	C9-10
	17	EMA 3010 - Review	C12-15
	19	EXAM I (IN CLASS - CANVAS)	
3	24	Electrical Properties	C18
	24	Electrical Properties	C18
	26	Electrical Properties (ICE)	C18
	31	Electrochemical Properties	C17
4	31	Electrochemical Properties	C17
	<b>Feb</b>		
	2	Electrochemical Properties (ICE)	C17
5	7	EXAM II (IN CLASS - CANVAS)	
	7		
	9	Exam Review	
6	14	Thermal Properties	C18
	14	Thermal Properties	C18
	16	Thermal Properties (ICE)	C18
7	21	Magnetic Properties	C20
	21	Magnetic Properties	C20
	23	Magnetic Properties (ICE)	C20
	28	EXAM III (IN CLASS - CANVAS)	
	28		
8	<b>Mar</b>		
	2	Optical Properties	C21
9	7	Optical Properties	C21
	7	Optical Properties (ICE)	C21
	9	EXAM IV (IN CLASS - CANVAS)	
SPRING BREAK			
10	21	Processing	C11
	21	Processing	C13
	23	Processing (ICE)	C15
11	28	Materials Tetrahedron	A2
	28	Materials Tetrahedron	A2
	30	Materials Tetrahedron (ICE)	A2
12	<b>Apr</b>		
	4	EXAM V (IN CLASS - CANVAS)	
	4		
	6	Introduction to Design	A3
13	11	Introduction to Design	A3
	11	Stiffness-Limited Design	A4
	13	Stiffness-Limited Design (ICE)	A4
14	18	Simple Ideas of Crystallography (Pre-EMA 3050)	AGL1
	18	Simple Ideas of Crystallography (Pre-EMA 3050)	AGL1
	20	Simple Ideas of Crystallography (Pre-EMA 3050) (ICE)	AGL1
15	25	EXAM VI (IN CLASS - CANVAS)	
	25		

The instructor reserves the right to make changes to the syllabus as needed. Any changes will be clearly announced on Canvas and in class.

## E-mail Communication

I prefer to be emailed directly at [jnino@ufl.edu](mailto:jnino@ufl.edu) instead of CANVAS mail; however, you can choose which system to use. Furthermore, because of the volume of e-mails I receive please include in the subject line the course number (EMA6313) followed by the subject of your message. Please begin your e-mail with a salutation. [I know that personal e-mails and texts are typically without even 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. All of these guidelines are to promote professionalism.

### Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Exams (6; 15 points each, drop 2 lowest)	Up to 60 points total	Up to 60% Maximum of 100 points
ICEs (9, 5 points each, drop 3 lowest)	Up to 30 points total*	Up to 30% Maximum of 100 points
Attendance & Participation (10 points)	Up to 10 points total	Up to 10% of 100 points

### 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

In the event that the class average is below 72 points, the distribution will be shifted so that the average equals 72 points.

More information on UF grading policy may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### 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.ua.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.ua.ufl.edu/public-results/>.

### In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### 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://sccr.dso.ufl.edu/process/student-conduct-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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@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:** <https://counseling.ufl.edu>, 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://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu..>

**On-Line Students Complaints:** <https://distance.ufl.edu/state-authorization-status/#student-complaint>.

## 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.