

Properties of Materials – A Survey

EMA 6001 Sections: 12994, 19155, 19259, and 20900

Class Periods: T 4 (10:25 am – 11:15 am) and R 3-4 (9:35 am – 11:15 am)

Location: CSE E118

Academic Term: Fall 2023

This course is meant for incoming students to the MSE Graduate Program that do not have a background or solid foundation in the main Materials Science and Engineering concepts. It is intended to be an introductory graduate course that will serve as intellectual backdrop for all future graduate coursework and research activities. Because every student enters the MSE Program with their own intellectual background, success in this course will require a considerable investment in preparing for lectures by using textbooks and other sources that you seek out, solving problems, and studying for exams. It is expected that you will have to exhibit significantly more independence, initiative, and ownership of the learning process than was required for success at the undergraduate level.

1. Instructor:

Dr. Juan Claudio Nino

jnino@mse.ufl.edu, +1 (352) 846 3787

Office Hours: M, W 10:30-11:30 am in 166 RHN (first come, first served); else, via e-mail or by appointment.

2. Teaching Assistant:

- Chaitanya Sharma, chaitanya.sharma@ufl.edu, by appointment in MSE Library or Zoom. Please post all your open questions in the Discussions within CANVAS before contacting the TA.

3. Course Description

The course will cover materials science and engineering fundamentals including bonding, structures and defects across metals, ceramics, and polymers. Kinetics, phase diagrams and mechanical properties of materials will be covered as well. (3 Credit Hours)

4. Course Pre-Requisites / Co-Requisites

Students taking EMA 6313 should not be enrolled in EMA 6001 at the same time.

5. Course Objectives

This is an introductory course, designed to provide the fundamental concepts of Materials Science and Engineering. Students will be able to describe the structure, defects, phase equilibria, and describe the mechanical properties of metallic, ceramic, and polymeric materials.

6. Required Textbooks and Software

- Fundamentals of Materials Science and Engineering: An Integrated Approach**
William D. Callister, Jr. and David G. Rethwisch
2021 6th Edition (Wiley), **e-book with Wiley Plus and Perusall Access**
ISBN 978-1-119-68894-5

PLEASE NOTE: You need to acquire the e-book version with access to both Wiley Plus and Perusall as these online tools will be used for assessment as indicated in the evaluation of grades and will provide you with additional learning tools. The simplest and cheapest way to acquire the e-book is via UF ALL ACCESS. This includes a UF Negotiated rate for both products of \$87.50. Login at the following website and Opt-In to gain access to your UF All Access course materials - <https://www.bsd.ufl.edu/AllAccess> – UF All Access will provide you with your required materials digitally at a reduced price, and the charge will be posted to your student account. This option will be available starting one week prior to the start of the semester and ends three weeks after the first day of class.

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/>

Our class sessions will be audio visually recorded for students in the class to refer back and for enrolled online students who are unable to attend live. Students who participate in class are agreeing to being recorded.

7. Course Schedule

Below is the intended/tentative schedule of classes and exams. All Exams are on CANVAS and are scheduled for 50 minutes. Students requiring, needing, or simply wanting additional time can take up to 100 minutes. On campus students are required to present the exams in the classroom on Thursdays as shown in the schedule. **The window to take the exam opens on CANVAS at class time on Thursday and ONLINE students have until Sunday at 11 PM to complete the 50 minute exam.** This window should be able to accommodate any conflict with their employment or similar situation. Furthermore, given the well in advance schedule, no additional accommodation will be granted unless properly documented, justified and requested before the second week of classes.

Week	Class Date	Topics	Book Chapter	Pre-Class Activity
1	Aug			P = Perusall
	24	Introduction - Course Workflow - CANVAS - PERUSALL	0	
	24	Types and Applications of Materials	1	P0
2	29	Q&A	2	P1
	31	Atomic Structure and Interatomic Bonding	2	
	31	Atomic Structure and Interatomic Bonding (G)	2	
3	Sep			
	5	Q&A	3	P2
	7	Structures of Metals	3	
	7	Structures of Metals (G)	3	
4	12	Q&A	3	P3
	14	Structures of Ceramics	3	
	14	Structures of Ceramics (G)	3	
5	19	Q&A	4	P4
	21	Polymer Structures	4	
	21	Polymer Structures (G)	4	
6	26	Q&A	1-4	
	28	EXAM I (IN CLASS - CANVAS)	1-4	
	28			
7	Oct			
	3	Post Exam Q&A	5	P5
	5	Imperfections in Solids	5	
	5	Imperfections in Solids (G)	5	
8	10	Q&A	6	P6
	12	Diffusion	6	
	12	Diffusion (G)	6	
9	17	Q&A	7	P7
	19	Mechanical Properties	7	
	19	Mechanical Properties (G)	7	
10	24	Q&A		
	26	EXAM II (IN CLASS - CANVAS)	5-7	
	26			
11	31	Post Exam Q&A	8	P8
	Nov			
	2	Deformation and Strengthening Mechanisms	8	
	2	Deformation and Strengthening Mechanisms (G)	8	
12	7	Q&A	10	P9
	9	Phase Diagrams	10	
	9	Phase Diagrams	10	
13	14	Q&A	10	P10
	16	Phase Diagrams (G)	10	
	16	Phase Transformations	11	
14	21	Phase Transformations (G)	11	
15	28	Q&A	8,10-11	P11
	30	EXAM III (IN CLASS - CANVAS)	8,10-11	
	30			
16	Dec			
	5	Course Review and Evaluation		

8. Course Format

This course uses a **team-based learning approach** that uses pre-class preparation materials (including reading assignments on Perusall as indicated in the course schedule) and diverse active learning activities during class time. Your completion and involvement in all these aspects of the course is critical to success.

9. Pre-Class Preparation

- a) **Reading assignments** will be your first exposure to the course topics, will engage you in social learning, and will be a key pre-class activity helping you prepare for both the pre-recorded lectures and the in-class active learning activities. Your completion of the reading and interaction will be worth 40% of the course grade and will be assessed using Perusall. Beyond their grade value, your completion and involvement in this component is critical to success. Details on Perusall platform use, social learning interaction and assessment will be covered in the first class.
- b) **Posting questions in Perusall** is the method by which the content of the class sessions is determined. In essence, if students have not posted questions before class, the class session is simply discussing the summary of topics and it is wrapped up. Therefore, it is essential that the students attend class and post questions before class to make the interaction with the Instructor and the time together in class worthwhile.

10. Active Learning Activities

- a) **Social Learning in Perusall** will allow you to interact with your classmates and the TA by collaboratively annotating the textbook and pre-recorded lectures. You can start a new annotation thread in Perusall by highlighting text, asking a question, or posting a comment; you can also add a reply or comment to an existing thread. Each thread is like a chat with one or more members of your class, and it happens in real time. Your goals in annotating each reading assignment are to stimulate discussion by posting good questions or comments and to help others by answering their questions. Through your Perusall interaction, you also advise the Instructor how to make class time most productive during the Q&A sessions.
- b) **Attendance to Live Classes** is technically not required but it is highly encouraged since there will be discussion as well as individual and group work on exercises. Students are encouraged to ask questions and participate. The fundamental concepts will be discussed in detail as guided by the student's questions before and during class.

11. Exams

- a) There will be 3 exams presented in the classroom throughout the semester. Each exam is weighted equally, and each exam will be worth 25% of your final grade. You will have 80 minutes to complete each exam. Exams will be presented on CANVAS using Respondus LockDown Browser if you are on campus. If you are an Online student, in addition, you will have to use Honorlock on a secondary device to use as proctoring side camera. If this poses an inconvenience, please reach out to the instructor before the second week of classes.
- b) You have one week 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.
- c) **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.
- d) **Make-up exams**. Students who do not take an exam will receive a grade of 0. Excused absences require appropriate documentation to warrant a make-up exam and must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).

12. Syllabus Changes

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

13. Attendance Policy, Class Expectations, and Make-Up Policy

Attendance for campus students 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 exercises will be worked out in class before the quizzes presented on CANVAS.

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 quiz. Exceptions will only be entertained in cases of excused absences with proper documentation, which must comply with university policies in the Graduate Catalog (<https://gradcatalog.ufl.edu/graduate/regulations/>).

14. Communication

I prefer to be emailed directly at 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 and because I am teaching several courses this time around 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.

15. Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Exams (3; 25 points each)	Up to 75 points total	Up to 75% Maximum of 100 points
Perusall (11, 4 points each)	Up to 44 points total	Up to 44% of 100 points
119 possible total points, yet grade based on a total 100-points basis.		
This is essentially a built-in 19% extra credit or cushion.		

Perusall and Exams are graded automatically. All scores are added up and counts towards your grade in points scale. In theory, a student can score up to 119 points in the course. Regardless, the grades will be calculated on a 100-points basis (see next section).

16. 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. In order to graduate, graduate students must have an overall GPA and an upper-division GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. More information on UF grading policy found at: <https://gradcatalog.ufl.edu/graduate/regulations/>

17. 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.

18. 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.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

19. 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.

20. 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/scrr/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 5 of this syllabus).

21. Commitment to a Safe and Inclusive Learning Environment

The College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

22. 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.

23. Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, see: <https://registrar.ufl.edu/ferpa.html>

24. 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 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

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 (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://career.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance when 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. <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.