

Materials

EMA 3010 Section 310N (27190), Section 2485 (23279)

Class Periods:

Section 310N (27190): T, Period 3 (9:35 AM - 10:25 AM)

R, Period 2-3 (8:30 AM -10:25 AM)

Section 2485 (23279): T, Period 7 (1:55 PM - 2:45 PM)

R, Period 7-8 (1:55 PM - 3:50 PM)

Location:

Section 310N (27190): LIT 0121

Section 2485 (23279): FLG 0260

Academic Term: Fall 2025

Instructor

Nagarajan (Neil) Rajagopal

nrr@mse.ufl.edu

(352) 294-7873

Office Hours: 11:30-1:30 pm, 4:00 – 6:00 pm on Tuesdays, RHN 180

Supervised Teaching Student (STS):

Please contact through the Canvas website. For grading issues related to in-class exercises, please visit the designated STS for your section. Otherwise, you may visit either STS during his/her office hours.

Section 310N (27190), 2485 (23279): Zijian Pang

email: zijian.pang@ufl.edu

Office hours: Wednesdays 2-5 pm

Office locations: RHN 123 (Rhines Library)

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

CHM 2045 (or equivalent)

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 how to select materials for a given application

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	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	

3. An ability to communicate effectively with a range of audiences	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Title: Fundamentals of Materials Science and Engineering: An Integrated Approach
- Author: William D. Callister and David G. Rethwisch
- Publication date and edition: Wiley 6th Edition
- ISBN number: 9781119035640

PLEASE NOTE: You need to acquire the e-book version with access to **zyBooks** as this interactive online learning tool will be used for assessment as indicated in the evaluation of grades. **The simplest and affordable way to acquire the e-book is via UF ALL ACCESS.** 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.

Required Computer

UF student computing requirement: <https://news.it.ufl.edu/education/student-computing-requirements-for-uf/>

Course Website

This course will use CANVAS extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework, problem sets, solutions, announcements, grades, etc.) via the CANVAS entry link: <https://elearning.ufl.edu/> or <https://ufl.instructure.com>. Within CANVAS the students can purchase and access the book. Please check CANVAS frequently. **Communications to the Instructor and the Teaching Assistant should be sent through the CANVAS website to ensure timely response.**

Course Schedule

Below is the intended/tentative schedule of classes and exams. The instructor reserves the right to make changes to the syllabus as needed. Any changes will be clearly announced on CANVAS and in class.

Week	Class #	Class dates	Topic	Chapter
1	1	August 21	Course Objectives, Syllabus, Wiley Introduction	0
	2	August 21	Introduction	1

2	3	August 26	Atomic Structure and Interatomic Bonding	2
	4	August 28	ICE1: Atomic Structure and Interatomic Bonding	2
	5	August 28	Structure of metals, ceramics	3
3	6	September 2	Structure of metals, ceramics	3
	7	September 4	ICE2: Structure of metals, ceramics	3
	8	September 4	Structure of Polymers	4
4	9	September 9	Structure of Polymers	4
	10	September 11	ICE3: Structure of Polymers	4
	11	September 11	Review lecture	1 - 4
5	12	September 16	Exam #1 (in class; lectures 2 – 11)	1 - 4
	13	September 18	Imperfections in solids	5
	14	September 18	Imperfections in solids	5
6	15	September 23	ICE4: Imperfections in solids	5
	16	September 25	Diffusion	6
	17	September 25	ICE5: Diffusion	6
7	18	September 30	Mechanical properties	7
	19	October 2	Mechanical properties	7
	20	October 2	Review lecture	5 - 6
8	21	October 7	Exam #2 (in class; lectures 13 – 17)	5-6
	22	October 9	ICE6: Mechanical properties	7
	23	October 9	Deformation and strengthening mechanisms	8
9	24	October 14	ICE7: Deformation and strengthening mechanisms	8
	25	October 16	Failure	9
	26	October 16	Phase diagrams	10
10	27	October 21	Phase diagrams	10
	28	October 23	ICE8: Phase diagrams	10
	29	October 23	Review lecture	7 - 9
11	30	October 28	Exam #3 (in class; lectures 18 - 20, 22 - 25)	7 - 9
	31	October 30	Phase transformations	
	32	October 30	ICE9: Phase transformations	11
12	33	November 4	Composites	15
	34	November 6	ICE10: Composites	15
	35	November 6	Economic, Environmental and Societal Issues in MSE	20
13		November 11	Veteran's Day - Holiday	
	36	November 13	Review lecture	10,11,15,20
	37			
14	38	November 18	Exam #4 (in class, lectures 26 – 28, 31 - 35)	10,11,15,20
	39	November 20	Hurricane Flex Day	
	40	November 20	Hurricane Flex Day	
15		November 25	Thanksgiving Holiday	
		November 27	Thanksgiving Holiday	
		November 27	Thanksgiving Holiday	
16	41	December 2	Hurricane Flex Day	
			NO FINAL EXAM	

Important Dates

Sep. 16 Exam 1 (in-class)
 Oct 7 Exam 2 (in-class)
 Oct 28 Exam 3 (in-class)
 Nov 18 Exam 4 (in-class)

Attendance Policy, Class Expectations, and Make-Up Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

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

This course uses a team-based learning approach that uses pre-class preparation materials (including watching pre-recorded lectures and reading assignments) and live lectures. The class time will be dedicated to lectures and/or In-Class Exercises and Discussions. Your completion and involvement in all these aspects of the course is critical to success.

Pre-Class Preparation Materials

Reading assignments will also help you prepare for the active learning activities and are one critical aspect of learning the course content. Your completion of the reading will be worth 15% of your grade and will be assessed using the interactive course platform zyBooks.

Active Learning Activities

Attendance to Live Classes is required and highly encouraged since there will be in-class discussions, group work and pop quizzes. This will be worth 10% of your final grade. Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required.

In-Class Exercises (ICEs) will be given during class. Students engage in small-group discussions and then individually submit own solutions. These exercises will be worth 25% of the grade. Exemptions may be given to students who have excused absences consistent with university policies (see link above).

Exams

There will be 4 exams throughout the semester. Exams will in class and will be computer-based using the Respondus LockDown Browser function in Canvas. The exam content may change, and the dates are tentative and will be finalized after the add/drop period. Each exam is weighted equally, You have one week after the test results are posted to raise any questions about scores and grades with the instructor. No changes to your exam grade will be made after that time.

Make-up exams

Students who do not take an exam will receive a grade of 0. Excused absences must be consistent with university policies (see link above) and require appropriate documentation. Other than emergency situations, you must notify the Instructor of your scheduled absence for exams and discuss make-up options **at least one week prior to your absence**; failure to do so may not allow you to make up for the missed exam.

Communications

This course will use CANVAS extensively as a communication and archival tool. Students can access all relevant course information (course notes, homework, problem sets, solutions, announcements, grades, etc.) via the CANVAS. **Communications to the Instructor and the Teaching Assistant should be sent through the CANVAS website to ensure timely response.**

Evaluation of Grades

Assignment	Numbers	Percentage of Final Grade
Reading (zyBooks)* %	13	15%
Classroom Participation	~30	10%
In-Class Exercises	10	25%
Exams (In-Class)	4	50%
Total		100%

*Earn activity points by completing textbook reading assignments in zyBooks, 23 in total (longer chapters are split into two assignments). While activity points for each reading assignment in zyBooks vary, each Canvas assignment is set as 10 points (zyBooks sends scores to Canvas as percentages).

%A penalty of 25% per day is assessed on late submissions.

Grading Policy

Final letter grade will be assigned based on a student's overall performance during the semester. The following scale will be used as a guideline.

Percent	Grade	Grade Points
92.0-100	A	4.00
88.0-91.9	A-	3.67
84.0-87.9	B+	3.33
80.0-83.9	B	3.00
76.0-79.9	B-	2.67
72.0-75.9	C+	2.33
68.0-71.9	C	2.00
65.0-67.9	C-	1.67
62.0-64.9	D+	1.33
59.0-61.9	D	1.00
56.0-58.9	D-	0.67
0.0-55.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: <https://go.ufl.edu/syllabuspolicies>. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

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.aa.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.aa.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.