

Materials

EMA 3010 Section TR34 (22750), Section MTS1 (25593)

Class Periods:

Section TR34 (22750): T, Period 2 (8:30 AM - 9:20 AM)

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

Section MTS1 (25593): T, Period 7 (1:55 PM - 2:40 PM)

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

Location:

Section TR34 (22750): T - FLG 0230; R – FLG 0260

Section MTS1 (25593): T - LIT 0113; R- LIT 0121

Academic Term: Spring 2025

Instructor

Nagarajan (Neil) Rajagopal

nagarajanrrajago@ufl.edu

(352) 294-7873

Office Hours: 12:30-1:30pm 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 TR34 (22750): TBD
- Section MTS1 (25593): TBD
- Office hours: TBD
- 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	January 14	Course Objectives, Syllabus, Wiley Introduction	0
	2	January 16	Introduction	1
	3	January 16	Atomic Structure and Interatomic Bonding	2

2	4	January 21	ICE1: Atomic Structure and Interatomic Bonding	2
	5	January 23	Structure of metals, ceramics	3
	6	January 23	Structure of metals, ceramics	3
3	7	January 28	ICE2: Structure of metals, ceramics	3
	8	January 30	Structure of Polymers	4
	9	January 30	ICE3: Structure of Polymers	4
4	10	February 4	Review lecture	1 - 4
	11	February 6	Exam #1 (in class; lectures 2 – 10)	1 - 4
5	12	February 11	Imperfections in solids	5
	13	February 13	Imperfections in solids	5
	14	February 13	ICE4: Imperfections in solids	5
6	15	February 18	Diffusion	6
	16	February 20	ICE5: Diffusion	6
	17	February 20	Review lecture	5 – 6
7	18	February 25	Exam #2 (in class; lectures 12 – 17)	5 – 6
	19	February 27	Mechanical properties	7
	20	February 27	Mechanical properties	7
8	21	March 4	ICE6: Mechanical properties	7
	22	March 6	Deformation and strengthening mechanisms	8
	23	March 6	ICE7: Deformation and strengthening mechanisms	8
9	24	March 11	Failure	9
	25	March 13	Review lecture	7 – 9
	26	March 13	Exam #3 (in class; lectures 19 – 25)	7 – 9
10		March 18	No Class – Spring Break	
		March 20	No Class – Spring Break	
11	27	March 25	Phase diagrams	10
	28	March 27	Phase diagrams	10
	29	March 27	ICE8: Phase diagrams	10
12	30	April 1	Phase transformations	11
	31	April 3	ICE9: Phase transformations	11
	32	April 3	Review lecture	10 – 11
13	33	April 8	Exam 4 (in class; lectures 27 – 32)	10 – 11
	34	April 10	Types and Applications of Materials	13
	35	April 10	Composites	15
14	36	April 15	ICE10: Composites	15
	37	April 17	Economic, Environmental and Societal Issues in MSE	20
	38	April 17	Review Lecture	13, 15, 20
15	39	April 22	EXAM 5 (in class, lectures 34 – 38)	13, 15, 20
			NO FINAL EXAM	

Important Dates

Feb. 6	Exam 1 (in-class)
Feb 25	Exam 2 (in-class)
Mar 13	Exam 3 (in-class)
Apr 8	Exam 4 (in-class)
Apr 22	Exam 5 (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).

Homework Problems

Homework is not required for this course. However, suggested homework problems will be provided via Canvas (zyBooks) to help students prepare for the exams. These problems are not required and no credit will be awarded.

Exams

There will be 5 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, and each exam will be worth **10%** of your final grade. 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)* %	23	15%
Classroom Participation	~30	10%
In-Class Exercises**	10	25%
Exams (In-Class)	5 (10% each)	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.

**Two lowest scores (or missing submissions) within each category will be discarded when computing the total points of the category for the final grade.

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>

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.bluera.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.

Commitment to a Safe and Inclusive 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, 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 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
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, 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 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 (select option 2) or e-mail to Learning-support@ufl.edu. <https://elearning.ufl.edu/>.

Career Connections 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/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.