

Introduction to Organic Materials
EMA 3066, Section 2837 (Class #24040)
Class Periods: M, W, F 12:50–1:40 PM (Period 6)
Location: CSE E222
Academic Term: Fall 2024

Professor:

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Course Description

Uses structure, processing, and properties of organic materials, including polymers, biomacromolecules, and small molecule organic materials. Introduces scientific principles through discussion of developed organic materials for high technology applications. (3 credit hours)

Course Pre-Requisites

EMA 3010 or BME 3101

Course Objectives

This is an introductory course in organic materials, with significant emphasis on polymer science and engineering. Four general subject areas will be emphasized: (i) polymer synthesis, (ii) polymer characterization; (iii) polymer solids, including glassy, semicrystalline, and rubbery states; (iv) selected physical properties, and their relation to structure. The specific objectives for the course are:

- a. To be able to choose the appropriate synthetic strategy for common and novel polymers
- b. To be able to predict the properties of polymers based on a knowledge of structure and morphology
- c. To be able to determine what structural and chemical information is provided through polymer characterization techniques
- d. To be able to choose appropriate polymers based on the properties needed for targeted applications and to be aware of the social and environmental impacts (both positive and negative) of polymers

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
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	Medium
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	Medium

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

Recommended Materials

No textbooks are strictly required, as the key content will be covered in lecture notes, homework assignments, and other materials provided through Canvas. Course content will be primarily based on the most recent edition of the following (highly recommended) textbook, although the earlier (2nd) edition is also acceptable:

- Title: Polymer Chemistry
- Authors: Timothy P. Lodge and Paul C. Hiemenz
- Publication date and edition: 2021 (3rd edition)
- ISBN #: 9781466581647

Additional reference texts include:

- Title: Essentials of Polymer Science and Engineering
- Authors: Paul C. Painter and Michael M. Coleman
- Publication date and edition: 2009 (1st edition)
- ISBN #: 978-1-932078-75-6
 - This textbook has also been modified into an eBook that is only \$19.99 (see link below)
 - https://polymer-ebook.flickrocket.com/us/polymer-science-_engineering/p/190444

Required Computer

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

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is not strictly required. However, lectures will not be recorded and the lecture course content will be featured in the exams; it is therefore in your best interest to attend every lecture if possible. If you must miss class, coordinate with your peers to catch up on the notes.

It is expected that you show up to lecture on time and maintain a respectful environment conducive to learning; this means no distracting cell phone/technology use, no unrelated side conversations, etc. You are encouraged to take handwritten notes, either on paper or on a tablet.

Exams will exclusively be given in-person during scheduled course times. The only exceptions are for DRC accommodations (which are each student's responsibility to arrange with the instructor as soon as possible and *preceding* exams) or for academic, extenuating, or unavoidable excused absences.

Excused absences must be consistent with university policies and require appropriate documentation (see: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>). Make-up exams will be

provided only with the *prior approval of the instructor or excused absence*. In general, the earlier you contact me about an excused absence or extenuating circumstance, the better.

Evaluation of Grades & Grading Policy

Your final grade will be based on the following assignments and distribution (tentative):

Assignment	Percentage of Final Grade
Homework	15%
Quizzes	10%
Exam 1	25%
Exam 2	25%
Exam 3	25%

Percentage	≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60	< 60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade points	4.00	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.67	0.00

The instructor reserves the right to adjust the grade distributions, and grades **will not** be adjusted for individuals.

Homework: Homework problems and corresponding due dates will be assigned through Canvas, which is also where the assignments will be turned in. Corresponding answer keys will be posted just after the due date/time. **Late homework assignments will not be accepted and will receive a grade of zero.**

Quizzes: Quizzes will periodically be given in-class at the beginning of lecture. They will be short (5–15 min) and meant to solidify conceptual knowledge from previous lectures and homework assignments. Quizzes will likely not be advertised more than one lecture in advance. If you are late to class on a quiz day, you do not get extra time to do the quiz.

Exams: There will be three in-class exams throughout the semester; the exam content may change but the dates will likely not. Some exam questions will likely be adopted from the homework and quiz questions. Requests for re-grading must be in writing, include justification, and made within one week of the exam.

Course Schedule (tentative, subject to change)

Lecture	Date	Day	Topic	Lodge & Hiemenz
1	08/23	F	Syllabus / Introduction to polymers & their applications	
2	08/26	M	Organic structure & nomenclature basics	
3	08/28	W	Polymer "size", structure, and categories	Chapter 1
4	08/30	F	Molecular weight distributions & their measurement	Chapter 1
	09/02	M	UF Holiday – no class	
5	09/04	W	Step growth (condensation) polymers	Chapter 2
6	09/06	F	Step growth (condensation) polymers	Chapter 2
7	09/09	M	Chain growth (addition) polymers	Chapter 3
8	09/11	W	Chain growth (addition) polymers	Chapter 3
9	09/13	F	Controlled polymerizations – ionic	Chapter 4
10	09/16	M	Controlled polymerizations – radical & ring-opening	Chapter 4
11	09/18	W	Copolymers and microstructure	Chapter 5
	09/20	F	Exam 1 (Lectures 1-10)	
12	09/23	M	Polymer conformations	Chapter 6
	09/25	W	UF Career Technical Day – class cancelled	
13	09/27	F	Polymer conformations	Chapter 6
14	09/30	M	Thermodynamics of polymer mixtures	Chapter 7

15	10/02	W	Thermodynamics of polymer mixtures	Chapter 7
16	10/04	F	Thermodynamics of polymer mixtures	Chapter 7
17	10/07	M	Light scattering by polymer solutions	Chapter 8
18	10/09	W	Light scattering by polymer solutions	Chapter 8
19	10/11	F	Dynamics of dilute polymer solutions	Chapter 9
20	10/14	M	Dynamics of dilute polymer solutions	Chapter 9
	10/16	W	Lecture catch up	
	10/18	F	UF Holiday - no class	
	10/21	M	Exam 2 (Lectures 11-20)	
21	10/23	W	Networks, gels, and rubber elasticity	Chapter 10
22	10/25	F	Networks, gels, and rubber elasticity	Chapter 10
23	10/28	M	Networks, gels, and rubber elasticity	Chapter 10
24	10/30	W	Linear viscoelasticity	Chapter 11
25	11/01	F	Linear viscoelasticity	Chapter 11
26	11/04	M	Linear viscoelasticity	Chapter 11
27	11/06	W	Glass transition	Chapter 12
28	11/08	F	Glass transition	Chapter 12
	11/11	M	UF Holiday - no class	
29	11/13	W	Glass transition	Chapter 12
30	11/15	F	Polymer crystallinity	Chapter 13
31	11/18	M	Polymer crystallinity	Chapter 13
32	11/20	W	Polymer crystallinity	Chapter 13
33	11/22	F	Lecture catch up & Polymer sustainability	
	11/25	M	UF Holiday - no class	
	11/27	W	UF Holiday - no class	
	11/30	F	UF Holiday - no class	
33	12/02	M	Polymer sustainability	
	12/04	W	Exam 3 (Lectures 21-33)	
	12/06	F	UF reading days - no class	

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 the student's responsibility to contact the DRC as well as 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 Graduate Program Coordinator
- HWC OE 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

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://lss.at.ufl.edu/help.shtml>.

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>.