

Introduction to Organic Materials
EMA 3066, Section 2837 (Class #20380)
Class Periods: M, W, F 12:50–1:40 PM (Period 6)
Location: LIT 0201
Academic Term: Fall 2025

Professor:

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Office Hours: TBD

Teaching Assistant:

TBD
Office Hours: TBD

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:

- Essentials of Polymer Science and Engineering by Painter & Coleman
 - 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>
- Principles of Polymerization by Odian
 - 2004 (4th edition); ISBN #: 978-0471274001

Required Computer

Recommended Computer Specifications: <https://it.ufl.edu/get-help/student-computer-recommendations/>
 HWCOE Computer Requirements: <https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>

Attendance Policy and Class Expectations, and Make-Up Policy

Attendance is not strictly required but is strongly recommended for several reasons:

1. We will have frequent quizzes, as described in the next section.
2. Exam/homework content is based on lecture material.
3. Lectures will not be recorded and my annotated notes will not be posted online.
4. Asking questions during (or after) lecture will help you understand and retain the information.

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. If you must miss class, coordinate with your peers to catch up on the notes.

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	15%
Exam 1	17.5%
Exam 2	17.5%
Exam 3	17.5%
Exam 4	17.5%

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/times will be assigned through Canvas, which is also where the assignments will be turned in (via PDF upload – no emails, no hard copies, etc.). 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.** When uploading your homework, it is your responsibility to ensure it is legible and complete.

Homework will be graded for completion and accuracy. This course has a large enrollment, so not every single question will be graded on the homework assignments. Instead, a subset of them will be graded for accuracy and the rest for completion. In general, do all the assigned problems and clearly show your work.

Quizzes:

Short on-paper quizzes (3–5 min) will frequently be given in-class at the beginning of lecture. They are meant to keep you on pace with the class notes as well as solidify conceptual knowledge from previous lectures. You can expect 2 quizzes per week on average, and if you are late to class on a quiz day, you do not get extra time to do the quiz. **If you miss class, you miss the quiz – no exceptions;** however, some number of quizzes will be dropped at the end of the semester (probably 2–4).

Exams:

There will be four in-class exams throughout the semester, which will be taken through Canvas using the Lockdown Browser feature. The only exceptions to “in-class” would be 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*. **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.

*see: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

See the course schedule below for tentative exam dates and homework due dates. Exam questions generally come from homeworks, quizzes, and lecture notes. On days we have exams, it is especially important you show up on time and prepared with the following: a charged laptop, a secondary device for multi-factor authentication, a scientific calculator, and a pen/pencil/eraser. Exam grades are typically not “curved”.

Course Schedule (tentative, subject to change)

Lecture	Date	Day	Topic	Book	HW Due
1	08/22	F	Syllabus / Introduction to polymers & their applications		
2	08/25	M	Organic structure & nomenclature basics		
3	08/27	W	Polymer "size", structure, and categories	Ch 1	
4	08/29	F	Molecular weight distributions & their measurement	Ch 1	
	09/01	M	UF Holiday – no class		
5	09/03	W	Step growth polymerization	Ch 2	HW 1
6	09/05	F	Step growth polymerization	Ch 2	
7	09/08	M	Step growth polymerization	Ch 2	
8	09/10	W	Chain growth polymerization	Ch 3	HW 2
9	09/12	F	Chain growth polymerization	Ch 3	
	09/15	M	Exam 1 (Lectures 1-7)		
10	09/17	W	Controlled polymerization	Ch 4	
11	09/19	F	Controlled polymerization	Ch 4	
12	09/22	M	Controlled polymerization	Ch 4	HW 3
13	09/24	W	Copolymers, microstructure, and stereoregularity	Ch 5	
14	09/26	F	Copolymers, microstructure, and stereoregularity	Ch 5	
15	09/29	M	Polymer conformations	Ch 6	HW 4
	10/01	W	UF Career Technical Day – class cancelled		
16	10/03	F	Polymer conformations	Ch 6	
	10/06	M	Exam 2 (Lectures 8-14)		
17	10/08	W	Polymer thermodynamics	Ch 7	
18	10/10	F	Polymer thermodynamics	Ch 7	
19	10/13	M	Polymer thermodynamics	Ch 7	HW 5
20	10/15	W	Polymer solution dynamics	Ch 9	
	10/17	F	UF Holiday – no class		
21	10/20	M	Polymer solution dynamics	Ch 9	HW 6
22	10/22	W	Polymer solution dynamics	Ch 9	
	10/24	F	Guest lecture from industry		
	10/27	M	Lecture catch up		HW 7
23	10/29	W	Networks and gels	Ch 10	
	10/31	F	Exam 3 (Lectures 15-22)		
24	11/03	M	Networks and gels	Ch 10	
25	11/05	W	Networks and gels	Ch 11	
26	11/07	F	Networks and gels	Ch 11	
27	11/10	M	Linear viscoelasticity	Ch 11	HW 8
28	11/12	W	Linear viscoelasticity	Ch 11	
29	11/14	F	Linear viscoelasticity	Ch 11	
30	11/17	M	Thermal properties & crystallinity	Ch 12-13	HW 9
31	11/19	W	Thermal properties & crystallinity	Ch 12-13	
32	11/21	F	Polymer sustainability		
	11/24	M	UF Holiday – no class		
	11/26	W	UF Holiday – no class		
	11/28	F	UF Holiday – no class		
	12/01	M	Polymer sustainability quiz + exam 4 review		HW 10
	12/03	W	Exam 4 (Lectures 23-31)		
	12/05	F	UF reading day – no class		
			FIN		

Academic Policies & Resources

The following is a link to our academic policies and campus resources: <https://go.ufl.edu/syllabuspolices>.

This includes the 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 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
- HWC OE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu