

Introduction to Organic Materials
EMA 3066 Section 2837 (Class No. 25636)
Class Periods: MWF, 6th, 12:50 – 1:40 pm
Location: Online/Zoom
Academic Term: Fall 2023

Instructor:

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Teaching Assistant:

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Course Description

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

Course Pre-Requisites / Co-Requisites

EMA 3010 or BME 3101

Course Objectives

This is an introductory course in organic materials, with emphasis on polymer science and engineering. The topics to be covered will be broken down into three categories- (1) synthesis and processing of polymers, (2) polymer structure and characteristics, and (3) properties and applications of polymers and advanced organic materials.

The specific objectives for the course are:

- a. To be able to choose the appropriate synthetic and processing strategy for preparing common polymers
- b. To be able to predict the properties of polymers and advanced molecular materials based on knowledge of structure and morphology.
- c. To be able to choose an appropriate polymer based on the properties needed for a particular application.

Materials and Supply Fees: NA

Professional Component (ABET): 3 credits towards engineering topics.

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.	
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 A) recognize ethical and professional responsibilities in engineering situations and B) 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	

* 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: Essentials of Polymer Science and Engineering
- Authors: Paul C. Painter & Michael M. Coleman
- Publication Date and edition: 2009, 1st edition (DEStech Publications Inc)
- ISBN: 978-1-932078-75-6
- The prior book by these authors, *Fundamentals of Polymer Science*, is acceptable

Recommended Materials

- Course lecture notes, provided as Powerpoint slides, are based primarily on the text and used extensively by the instructor. It is recommended to print out a copy prior to class because the excess space is intended for additional markup during the class. Alternatively, it may be possible to mark-up the notes on some laptops or pads with markup capability.

Course Schedule (tentative, according to pace and hurricane days)

Week of:	Topic	Reading Assign.
Aug. 23	T0: Course Overview- Polymer Applications	Chapter 1
	T1: Review: Organic structures	
Aug. 28	T2: Types of Polymers	Chapter 2
	T3: Isomerism	
	T4: Molecular Weight Distributions	
Sept. 4	Monday 4th: Labor Day Holiday	
	T5: Polymer Synthesis: Step-Growth (Condensation) Polym.	Chapter 3-5 (parts)
	T6: Chain-Growth (Addition) Polymerization:	
Sept. 11	T7: Coordination/Insertion Polymerizations and Catalysts	
	T8: Ionic Polymerizations	
	T9: Polymerization Processes	
Sept. 18	T10: Copolymerization	Chapter 6 (parts)
	Wed. Sept. 20th : Career Showcase- (no class)	
	T10- Cont.	
Sept. 25	T11: Bonding	Chapter 8
	T12: Chain Conformation & Dimensions	
	T13: Polymer Morphology	
Oct. 2	Exam 1: Mon. Oct. 2nd evening (office hrs during class)	thru Topics 1-10

	T14: Properties of Semicrystalline Polymers	Chapter 10
	<i>Fri. Oct. 6th: Homecoming Holiday</i>	
Oct. 9	T15: Polarized light microscopy	Website/notes
	T16: Glass transition	Chapter 10
	T17: Factors affecting T _g	
Oct. 16	T18: Thermodynamics of crystallization	
	T19: Kinetics of crystallization	
	T20: Factors effecting Crystallinity and T _m	
Oct. 23	T21: Liquid Crystalline Molecules and Polymers	Notes
	T22: Polymer Solubility	Chapter 11
	T23: Flory-Huggins Theory	
Oct. 30	Exam 2: Mon. Oct. 30th evening (office hrs in class time)	thru Topics 11-21
	T24: Polymer Phase Diagrams	
	T25: Rubber Elasticity	Chapter 13
Nov. 6	T26: Mechanical Properties of Polymers	
	T26- Cont.	
	<i>Fri. Nov. 10th: Veterans Day Holiday</i>	
Nov. 13	T27: Rheology of Polymer Melts	
	T28: Viscoelasticity	
	T29: Dynamic Mechanical Thermal Analysis (DMTA)	
Nov. 20	T28- Cont.	
	<i>Wed. 22nd: Thanksgiving Holiday</i>	
	<i>Fri. 24th: Thanksgiving Holiday</i>	
Nov. 27	T30: Time-Temperature-Superposition	
	T31: Hydrogels (or hurricane day)	notes
	T32: Stimuli responsive “smart” polymers (or hurricane day)	notes
Dec. 4	Exam 3: Mon. Dec. 4th evening (office hrs during class)	thru Topics 22-30
	T33: Materials Selection & Design (or hurricane day)	notes
<i>Dec. 7-8</i>	<i>Reading days</i>	
<i>Dec. 14th</i>	FINAL EXAM (Thursday: 7:30am - 9:30 am)	Cumulative

Attendance Policy, Class Expectations, and Make-Up Policy

- **Homework:** Homework and grades will be posted on the class Canvas website, approximately weekly. Homework should be completed by the deadlines noted on the Canvas assignment. No late submissions will be accepted in order that solutions can be posted after class. Students may study and work together, but must perform the assignment individually for credit. It's generally advisable to try the assignments on your own first as this will help you to be better prepared for the exams.
- **Grade changes:** Requests for adjustment to any grade should occur within the 2 week period following the posted grade in question, and must be approved by the course instructor (you can discuss your concerns with the TA, but the TA cannot change grades without final approval from the instructor).
- **Policy on Class Attendance:** Lecture attendance is recommended. While attendance is not mandatory, experience has shown that those who attend lectures tend to earn higher grades in the course. It is also recommended that you bring a printout of the lecture notes to every class because they are a template for adding further information and note taking during class.
- **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>.
- **Policy on Cell Phones:** Cell phones should be turned off or on vibrate mode during class, with the exception of a primary care giver. If/when receiving a call, promptly move to outside the classroom.
- **Make-up Exam Policy-** Make-up exams will be provided only with the **prior approval of the instructor or excused absence**. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, religious holidays and participation in official university activities such as music performances, athletic competition or debate.
- **Excused absences** are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.
- **Syllabus Changes-** The schedule of topics and exams is tentative and subject to change at the discretion of the instructor. Any changes will be clearly announced on CANVAS and in class Course Communication E-Learning will be the primary avenue for communication and course management. All announcements for the course will be made using the announcement system on the ELearning site. Make sure and change your E-Learning settings so that you get notifications about announcements, assignments, exams, changes, etc. in a timely manner. If you are sending e-mails to the instructor, please use CANVAS mail and be sure to include a meaningful subject phrase.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (≈ 10)	variable	10%
Exam 1	100	20%
Exam 2	100	20%
Exam 3	100	20%
Final Exam	100	30%
		100%

Grading Policy

Percent	Grade	Grade Points
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92 - 100	A	4.00
88 - 91.9	A-	3.67
84 - 87.9	B+	3.33
80 - 83.9	B	3.00
76 - 79.9	B-	2.67
72 - 75.9	C+	2.33
68 - 71.9	C	2.00
65 - 67.9	C-	1.67
62 - 64.9	D+	1.33
59 - 61.9	D	1.00
56 - 58.9	D-	0.67
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.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.

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
- 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

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>

Online Course Recording

Our class sessions will be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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>.