

## **Syllabus for “Introduction to Organic Materials”**

EMA 3066; Class Number 12935

**Class Periods:** MWF, 2<sup>nd</sup> period, 8:30 am-9:20 am

**Location:** Room: FLG 230

**Academic Term:** Fall 2022

**Class Dates:** 08/24/2022 - 12/07/2022

### ***Instructor:***

Chris Batich, PhD

Email: [cbati@ufl.edu](mailto:cbati@ufl.edu)

Office Phone Number: 392-6630 office or 256-2397 mobile

Office Hours: TBD (can be by appointment or via Zoom)

Office Location: 135 RHN or Zoom

### ***Teaching Assistant***

**Passalacqua Alvarado, Normarieli M** [npassalacquaalva@ufl.edu](mailto:npassalacquaalva@ufl.edu)

### ***Course Description (from the catalog)***

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 and one of the following: EMA 3011, CHM 2200 or CHM 2210.

### ***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. This highly versatile and widespread class of materials are expected to enable the development of many future applications in electronics, medicine, and other fields. However, there is growing recognition of problems with the very large volume of production.

The specific objectives for the course are:

- a. To be able to choose the appropriate synthetic and processing strategy for preparing special polymers
- b. To be able to predict the properties of polymers and advanced molecular materials based on a knowledge of structure and morphology.
- c. To be able to choose appropriate polymers based on the properties needed for targeted applications and to be aware of the environmental impact of plastic use.

**Materials and Supply Fees: NA**

**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.

**Recommended Textbook and Software**

Osswald, Tim A. Menges, Georg. (2012). *Material Science of Polymers for Engineers (3rd Edition)*. Hanser Publishers. NOTE: This textbook is available for free online via the UF library. You need to set up a VPN connection to the library to use it off campus: <https://cms.uflib.ufl.edu/offcampus>

We will also refer to material in other freely available books or articles from the library. A good reference for the synthesis part is the online book: Fundamental principles of polymeric materials / Christopher S. Brazel, Stephen L. Rosen (Wiley Pub., 3<sup>rd</sup> edition, 2012)

The book that is recommended as probably the easiest to read is the one by Painter and Coleman ("Essentials of Polymer Science and Engineering" DEStech Publishers, 2009). However, it is not available online and hence is not free to use from the UF library and is not needed for this class.

However, Dr. Painter has recently made an ebook version available for \$19.95 at <http://polymer-ebook.com/>

NOTE: material for the tests will be from class notes, slides, homework, and a limited amount of designated reading. You will not have to use any textbook, except for optional background reading or clarification.

***Course Schedule (tentative, according to pace and student interests)***

Week of:	Topic #
Aug. 24	Course Overview and Applications
	Types of Polymers
	Configurations
Aug. 29	Polymer Synthesis: Step-Growth (“Condensation”)
	Free-radical polymerization
Sept. 5	<b><i>Labor Day Holiday</i></b>
Sept. 7	Coordination and ionic polymerizations
	Polyethylene: the largest volume synthetic polymer
	Cellulose: the largest volume polymer
Sept. 12	Polymerization Practice
	Copolymerization
	Review for Test 1
Sept. 19	<b>Test 1: Monday September 19</b>
	PET and Phenolic polymers
	Chain Conformation & Dimensions
Sept. 26	Semi-crystalline Polymers
	Glass transition and PVC
	What affects the glass transition T
Oct. 3	Polymer characterization
	Solubility, Crystallization
	<b>HOLIDAY FOR HOMECOMING: OCT 7</b>
Oct. 10	Kinetics of crystallization
	Factors effecting Crystallinity and T <sub>m</sub>
	Examples of amorphous and crystalline polymers
Oct. 17	Liquid Crystalline Molecules and Polymers

Week of:	Topic #
	Review for test 2
	<b>Test 2: Friday. Oct. 28</b>
Oct. 31	Polymer blends, Polymer Phase Diagrams
	Mechanical Properties
	Mechanical Properties
Nov. 7	Elasticity
	Elastomers
	Rheology
Nov 11	Holiday
Nov 14	Viscoelasticity
	Time-temperature superposition
	Polymers in packaging
Nov. 21	Polymers and food
	<i>Wed. 23: Thanksgiving Holiday</i>
	<i>Fri. 25: Thanksgiving Holiday</i>
Nov. 28	Biomaterials
	Additives
	Processing
Dec. 5	Review for test 3
	<b>Test 3: Wed. December 7</b>
	No Final Exam

***Attendance Policy, Class Expectations, and Make-Up Policy***

- **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).
- **Study suggestions:** If recorded lectures are available, please do not wait until just before a test to watch them and study. A routine meeting (even with video conferencing) of a small (2-5) group seems to work best.

- **Policy on Cell Phones:** Cell phones should be turned off or on vibrate mode during a live 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.
- 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/>

### **Grades**

*Each of the three exams is worth 30 points. Homework will be worth 10 points and homework questions may be part of each exam.*

### **Grading Policy**

Percent	Grade	Grade Points
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 broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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](mailto: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/state-authorization-status/#student-complaint>.