

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

EMA 3066; Class Number 13200

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

**Location:** Room: CSE A101

**Academic Term:** Fall 2021

Class Dates: 08/23/2021 - 12/08/2021

**NOTE: as of August 20, 2021, all classes will be synchronous in the classroom AND on Zoom. They will all also be recorded and available for subsequent viewing on Zoom. You do not need to physically attend the live class.**

### ***Instructor:***

Chris Batich, PhD

Email: cbati@ufl.edu

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

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

Office Location: 135 RHN

### ***Supervised teaching assignment: Nathan Grinalds***

Email: grinalds.nathan@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:

- To be able to choose the appropriate synthetic and processing strategy for preparing special polymers
- To be able to predict the properties of polymers and advanced molecular materials based on a knowledge of structure and morphology.
- 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. 23	Course Overview and Applications
	Types of Polymers
	Configurations
Aug. 30	Polymer Synthesis: Step-Growth (“Condensation”)
	Free-radical polymerization
Sept. 6	<i>Labor Day Holiday</i>
Sept. 8	Coordination and ionic polymerizations
	Polyethylene: the largest volume synthetic polymer
	Cellulose: the largest volume polymer
Sept. 13	Polymerization Practice
	Copolymerization
	PET and Phenolic polymers
Sept. 20	Chain Conformation & Dimensions
	Review for Test 1
	<b>Test 1: Friday September 24</b>
Sept. 27	Semi-crystalline Polymers
	Glass transition and PVC
	What affects the glass transition T
Oct. 4	Polymer characterization
	Solubility, Crystallization
	<b>HOLIDAY FOR HOMECOMING: OCT 8</b>
Oct. 18	Kinetics of crystallization
	Factors effecting Crystallinity and T <sub>m</sub>
	Examples of amorphous and crystalline polymers

Week of:	Topic #
Oct. 25	Liquid Crystalline Molecules and Polymers
	Review for test 2
	<b>Test 2: Friday, Oct. 29</b>
Nov 1	Polymer blends, Polymer Phase Diagrams
	Mechanical Properties
	Mechanical Properties
Nov. 8	Elasticity
	<i>Elastomers</i>
	Rheology
Nov 15	Viscoelasticity
	Time-temperature superposition
	Polymers in packaging
Nov. 22	Polymers and food
	<i>Wed. 24: Thanksgiving Holiday</i>
	<i>Fri. 26: Thanksgiving Holiday</i>
Nov. 29	Biomaterials
	Additives
	Processing
Dec. 6	Review for test 3
	<b>Test 3: Wed. December 8</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.

### **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 requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### **Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open.

Summary results of these assessments are available to students at: <https://evaluations.ufl.edu/results/>.

### ***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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

### ***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:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Campus Resources:***

#### ***Academic Resources:***

#### **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 Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://www.dso.ufl.edu/documents/UF Complaints policy.pdf](https://www.dso.ufl.edu/documents/UF%20Complaints%20policy.pdf).

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

### *Health and Wellness:*

**U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**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/>.

### **“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. “

### **Online Course Recording**

Our class sessions may 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.

## COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.