

**Introduction to Organic Materials**  
EMA 3066 Section 2836  
**Class Periods:** MWF, 5<sup>th</sup>, 11:45am-12:35pm  
**Location:** Florida Gym 280  
**Academic Term:** Fall 2017

**Instructor:**

Chris Batich, PhD

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Office Phone Number: 392-6630

Office Hours: TBD

Office Location: 317 MAE (not MAE-A, B or C)

**Teaching Assistants:** Akshay Rajopadhye

**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 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.

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 a 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):**

This is a 3 credit course. It provides 2 credits towards engineering sciences and 1 credit towards design.

**Relation to Program Outcomes (ABET):**

| Outcome   | Coverage* |
|---|-----------|
| a. Apply knowledge                                  | Medium    |
| b1. Conduct experiments                             |           |
| b2. Statistical design of experiments               |           |
| c. Design   | High      |
| d. Function on teams                                |           |
| e. Solve problems                                   | Medium    |
| f. Professional and ethical responsibility          | Medium    |
| g. Communicate                                      |           |
| h1. Economic impact                                 | High      |
| h2. Global, societal, and environmental impact      | High      |
| i. Lifelong learning                                | Medium    |
| j. Contemporary issues                              | Medium    |
| k. Techniques, skills, and tools for degree program | Medium    |

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

### **Recommended Textbook and Software**

- Title: Introduction to Polymers
- Authors: Young and Lovell
- Publication Date and edition: 2011, 3rd edition (CRC Press)
- ISBN: 978-0-8493-3929-5 (Paperback)

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

| <b>Week of:</b> | <b>Topic #</b>  |
|-----------------|---|
| Aug. 21         | 1. Course Overview                                      |
|                 | 2. Types of Polymers                                    |
|                 | 3. Molecular Weight Distributions                       |
| Aug. 28         | 4. Polymer Synthesis: Step-Growth (Condensation)        |
|                 | 5. Free-radical polymerization                          |
|                 | 6. Chain-Growth (Addition) Polymerization:              |
| Sept. 4         | <i>Labor Day Holiday</i>                                |
|                 | 7. Coordination/Insertion Polymerizations and Catalysts |
|                 | <b>Exam 1: Wed. Sept. 6</b>                             |
| Sept. 11        | 8. Ionic polymerizations                                |
|                 | 9. Polymerization Practice (pg. 91, Young)              |
|                 | 10. Copolymerization (pg. 227 Braun)                    |
| Sept. 18        | Cont.   |
|                 | 11. Bonding   |
|                 | 12. Chain Conformation & Dimensions                     |
| Sept. 25        | 13. Polymer Morphology                                  |
|                 | <b>Exam 2: Wed. September 27</b>                        |
|                 | 14. Properties of Semicrystalline Polymers              |
| Oct. 2          | 15. Polymer characterization methods                    |
|                 | 16. Glass transition                                    |
|                 | 17. Factors effecting Tg                                |
| Oct. 9          | 18. Solubility pg.2 50 Young                            |
|                 | 19. Crystallization pg. 399 Young                       |

|         |  |
|---------|--|
|         | <i>Fri. 6<sup>th</sup>: Homecoming Holiday</i>         |
| Oct. 16 | 19. Kinetics of crystallization pg. 428                |
|         | <b>Exam 3: Wed. Oct. 18<sup>th</sup></b>               |
|         | 20. Factors effecting Crystallinity and T <sub>m</sub> |
| Oct. 23 | 21. Liquid Crystalline Molecules and Polymers          |
|         | 22. Polymer blends pg. 449                             |
|         | 23. Flory-Huggins Theory                               |
| Oct. 30 | 24. Polymer Phase Diagrams                             |
|         | Cont.  |
|         | 25. Mechanical Properties of Polymers                  |
| Nov. 6  | 26. Rubber Elasticity                                  |
|         | <b>Exam 4: Wed. Nov. 8<sup>th</sup></b>                |
|         | <i>Fri. 10<sup>th</sup>: Veterans Day Holiday</i>      |
| Nov. 13 | Cont.  |
|         | 27. Rheology of Polymer Melts                          |
|         | 28. Viscoelasticity                                    |
| Nov. 20 | 29. Hydrogels  |
|         | <i>Wed. 22<sup>nd</sup>: Thanksgiving Holiday</i>      |
|         | <i>Fri. 24<sup>th</sup>: Thanksgiving Holiday</i>      |
| Nov. 27 | 30. Dynamic Mechanical and Thermal Analysis (DMTA)     |
|         | 31. Materials Selection & Design                       |
|         | 32. Materials Selection & Design                       |
| Dec. 4  | <b>Exam: December 6</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).
- **Policy on Class Attendance:** Lecture attendance is recommended. While attendance is not mandatory, experience has shown that those who attend lectures earn higher grades in the course.
- **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.

***Grades: each of the five exams is worth 20 points***

### ***Grading Policy***

| <b>Percent</b> | <b>Grade</b> | <b>Grade Points</b> |
|----------------|--------------|---------------------|
| 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:***

#### *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/>.

**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_Complaints_policy.pdf).

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