Syllabus CHM 5275 – Organic Chemistry of Polymers, Fall 2022

Instructor & Contact Information: Prof. Austin M. Evans, AustinEvans@chem.ufl.edu, LEI 402
Class Time & Location: Tuesday/Thursday 3-4 PM, MAT 0010
Class Dates: August 24th 2022 – December 7th 2022
Office Hour: Wednesday 3-4 PM – Subject to change. Please email me if you plan to attend.

Conspectus. Polymer chemistry is the study of macromolecular systems that are of immense importance in biological and industrial contexts. This course evaluates these materials from a mechanistic organic chemistry perspective. Primarily, this course will be focused on describing polymeric structure and practical methods of their preparation. A subfocus of this course is the characterization of polymer systems and how chemical structure translates to physical properties.

Course Goals. The central objective of this course is for students to feel confident proposing macromolecular syntheses and devising plans for their characterization. In addition, students who successfully complete this course will be able to navigate contemporary polymer chemistry literature including being able to read, present and propose polymer chemistry research.

Learning Objectives:

- Describe the nomenclature, structure, architecture, physical/chemical properties, and reactivity of macromolecules
- Suggest methods for polymer synthesis including, condensation polymerization, radical chain polymerization, ionic chain polymerization, ring-opening polymerization, controlled radical polymerization, and metal-catalyzed polymerization, with an understanding of their mechanisms, monomer compatibility, benefits, and drawbacks
- Define how polymer structure impacts the observed bulk and solution-phase properties of macromolecular systems. Propose polymer designs to meet particular parameters (strength, optical transparency, etc.)
- Appreciate how polymer chemistry is relevant in chemical industry, living organisms, and academic materials science

Prerequisites. CHM 2210, CHM 2211 (undergraduate organic chemistry) or equivalent.
Recommended. CHM 3120 (undergraduate analytical chemistry) or equivalent.

Textbooks. There is no required textbook for this course. The course handouts (available online) are intended to be free-standing. These course handouts are developed from the following texts, which can provide more information:

1) *Principles of Polymerization*, 4th Edition by George Odian (ISBN: 0-471-27400-3)
   Note: UF has an ebook subscription to this book (only 3 concurrent users allowed): https://ebookcentral.proquest.com/lib/ufl/detail.action?docID=469767
2) *Textbook of Polymer Chemistry* by Fred W. Billmeyer
3) *Principles of Polymer Chemistry* by Paul J. Flory
4) *Contemporary Polymer Chemistry* by Harry R. Allcock
5) *Introduction to Physical Polymer Science* by L. H. Sperling
6) *Essentials of Polymer Science and Engineering* by Paul C. Painter and Michael M. Coleman
7) *Polymer Chemistry* by Paul C. Hiemenz and Timothy P. Lodge

e-Learning Resources. All students have access to the e-Learning website: https://elearning.ufl.edu/

Login to Canvas with your Gatorlink account username and password. Lecture materials will be posted on e-Learning prior class. Check e-Learning often; the posted lecture notes should be downloaded and brought to each class. You will need them. The site may also be used for making announcements, recording grades, and listing practice problems. Additional supplemental course materials will also be posted on Canvas.

Class Format. This class is scheduled to be offered in-person only. Due to unavoidable circumstances, some of the lectures will be given virtually on Zoom. If this is to be the case, the rescheduling and Zoom link will be provided to those enrolled in the course.

Learning Assessments. The following evaluations will be used to monitor progress towards the learning objectives. All exams are inherently cumulative. A total of 1000 points are available in this course.

There will be three in-class exams (100 points each). All exams should be considered cumulative since any question may require mastery of a concept or principle addressed earlier in the course. Examinations will contain questions based on concepts discussed in lectures and assigned readings. There is no "final exam".

The format these exams is non-standard. Exams will be given out at the end of a course period and will be collected by Professor Evans in class approximately one week later. There are *no* restrictions on the resources you may use during the exam including (but not limited to) the internet, course materials, or working with your colleagues in this course. NOTE: Identical answers will be considered plagiarism and will not be accepted or graded. As such, if you choose to work with your colleagues in this course, it is suggested that you discuss the content but not share answers directly. Exams may not be shared with anyone not enrolled in CHM 5275. Many of these questions are related to or directly taken from the primary literature. It is expected that you will be able to obtain these works independently.

EXAMS ARE NOT TO BE COPIED IN ANY FORM. SHARING THE EXAM WITH THOSE OUTSIDE OF CHM 5275 OR COPYING EXAMS WILL RESULT IN AN IMMEDIATE FAILING OF THE EXAM AND A REFFERAL FOR ACADEMIC DISCIPLINE.

- Exam 1. Assigned: September 27th, 2022. Due: October 4th, 2022 *(Tentative)*
- Exam 2. Assigned: October 25th, 2022. Due: November 1st, 2022 *(Tentative)*
- Exam 3. Assigned: December 6th, 2022. Due: December 13th, 2022. *(Tentative)*

Total = 300 potential points

Modern science requires effective verbal and written communication. There will be two assignments in this course to help develop these skills. These assignments are meant to be complementary. More information for both of these assignments is provided online.

- A 15-minute proposal on a body of work (or sub-topic) by a prominent modern polymer chemist. This should focus on their fundamental developments and the broader implications of this work. It is required that all proposal topics be approved by Professor Evans.
  This assignment is worth 250 points.
- A five-page proposal that details a new direction in polymer science. It would likely be prudent, though not required, to select an area that naturally complements your selected presentation area. This assignment is meant to be completed over the course of the semester and will follow the course of a true proposal. Briefly, a one-page summary submitted detailing the general idea of the proposal will be submitted to me and evaluated. Following this, a full proposal will be invited. This full proposal will then be evaluated. Finally, corrections on the proposal to modify the identified shortcomings will be allowed. More information on this assignment is provided online.

This assignment will be worth 250 points.

Total = 500 potential points.

Throughout this course various *in class* activities will be assigned. These in-class assignments require pre-reading of materials assigned beforehand. You must do these readings to be engaged in the in-class activities. Active participation in these assignments and in-class discussions are expected. You must be *present* to receive credit for these assignments. These points will be divided evenly amongst the class periods.

Total = 200 potential points

Note: For reasons of privacy, grades will not be discussed by email. All grades will be posted on e-Learning. If you have questions about your grade, you should come to office hours to discuss your questions/concerns with me.

Exam Absence Policy. This course administers all conflicts with scheduled assessments and examinations in accord with University policy. As such, certain unavoidable absences by students from examinations are allowed, if properly documented and disclosed to Prof. Evans at least one week before the anticipated conflict. Such allowed absences include, but are not limited to, religious observances, sanctioned sporting events, military obligations, and court-imposed legal obligations. In such cases, provided documented notice was made to Professor Evans one week in advance of the exam date, students will be given the opportunity to take a conflict exam, which takes place shortly before the scheduled assessment for the class.

No exams will be administered to absent or otherwise compromised students for a grade after the established and scheduled assessment time. Exams for credit given to excused students after the rest of the class is given their exam are herein defined as *makeup exams*; no *makeup exams* are given in this course.

Unpredicted absences due to medical emergencies are not covered under the above conflict exam policy. If the time and severity of the emergency is severe enough to make continuation in scholastic activity impossible for the rest of the term, a medical withdrawal is strongly advised. If the condition warranting the absence at a scheduled exam is unexpected, relatively minor, and can be recovered from in short order, the student must provide verifiable documentation from the Dean of Students Office of the medical emergency to Prof. Evans no later than one day after the scheduled assessment date. If proper verifiable documentation of the medical emergency is acceptable to Prof. Evans at the time the student is ready to restart his/her academic pursuits, the instructor and student together decide to either: 1) allow an additional assignment to be delivered to the student, usually in the form of a 10-page term paper on a polymer-specific topic; 2) allow the final exam score to count as the score for the missed exam or 3) begin the process for the request of a medical withdrawal from the course by the student. No *makeup exams* (as defined above) are ever given.

Regrading. If you have a question concerning the grading of an assignment, you may submit the entire assignment for complete regrading. Your score may increase or decrease accordingly. The exam must be submitted for regrading by the end of the first class meeting after the date the assignment was returned to the class. This means that exams handed back on Tuesday should be submitted for regarding by the end of class on Thursday. Please note that your graded exams will be photocopied prior to being returned to you.

Attendance & Zoom Policy. This is fast-paced course where low attendance will almost certainly lead to your demise. Some lectures may be made asynchronously available via video posted to Canvas or via Zoom

in the event that students with excused absences 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.

Classroom etiquette. Cell phone use/text messaging is strictly prohibited in the lecture hall at all times.

Accommodations for students with disabilities. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

UF Honor Code. We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."** "The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior."

Cheating and Plagiarism. Cheating and/or plagiarism will not be tolerated. The minimum penalty will be an automatic zero on the assignment in question. You will not be allowed to drop this zero as your lowest exam grade. It will count toward your average. Suspension from the University may also result. Do not risk it. It is not worth it. Plagiarism consists of passing off as one's own the ideas, words, writings, etc. that belong to someone else. You are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have that person's permission. See:
http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php
http://www.dso.ufl.edu/sccr/honorcodes/conductcode.php

COVID-19. In response to COVID-19, the following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available and have been demonstrated to be safe and effective against the COVID-19 virus. Visit one.uf for screening / testing and vaccination opportunities.
- If you are sick, stay home. 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 to be evaluated.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

Copyright Notice. All handouts, videos, and audio recording used in this course are copyrighted and may not be copied without my expressly granted permission. "Handouts" include all materials generated for this class, which include but are not limited to syllabi, exams, problems, in-class materials, review sheets, problem sets, or other materials. Tutors and tutoring services are expressly forbidden from copying any or all of these materials. Only students currently enrolled in the class may make a single copy of this material for their personal use.

Disclaimer. Changes to this syllabus may become necessary and will be made with my sole discretion. Any changes will be announced during class in a timely fashion.