Polymers Lab

EMA 4161L Section PLML (23739)
Class Periods: R, Period 7-9 (1.55 pm 4.55 pm)
Location: Rhines Hall 204
Academic Term: Fall 2025

Instructor:
Prajakatta Mulay, PhD
prajakatta@ufl.edu
(352) 846-3300
Office Hours: By appointment – in-person or zoom.

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Chih-Yi Wang, chihyiwang@ufl.edu, office hours in-person or via zoom. If requesting zoom, please contact TA for zoom link.

Course Description
Hands-on laboratory experience in the synthesis, characterization, and processing of polymers. (1 credit hours)

Course Co-Requisites
EMA 4161 – Polymer Physics

Course Objectives
The objective of this course is for students to become familiar with basic polymer synthesis, characterization, and processing. Students will investigate the structure, properties, and applications of polymeric materials. Student will review and design experiments as well as analyze and interpret data.

Materials and Supply Fees
$80/student

Relation to Program Outcomes (ABET):
This course provides 3 credits towards engineering sciences.

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	Medium
3. An ability to communicate effectively with a range of audiences	Medium
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	Low
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives	Low

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

Recommended Materials

No required textbook. Course material will be provided by the instructor. Other reference material (i.e. literature manuscripts, video lab demonstrations etc.) will be used throughout the class. These will be indicated by the instructor and provided as used or needed.

Required Computer

Recommended Computer Specifications: https://it.ufl.edu/get-help/student-computer-recommendations/
HWCOE Computer Requirements: https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/

Course Schedule

Below is the intended/tentative schedule of classes. The instructor reserves the right to make changes to the syllabus as needed. Any changes will be clearly announced on CANVAS and in class.

Week	Class
1	Intro Class
2	Module 1: Synthesis – Step Growth
3	Module 1: Synthesis – Chain Growth
4	Module 1: Synthesis – Ring Opening
5	Module 1: Synthesis – RAFT
6	Module 2: Characterization - Sample Prep – SEC and NMR
7	Module 2: Characterization - SEC
8	Module 2: Characterization – NMR
9	Module 1: Synthesis – Emulsion Polymerization
10	Module 2: Characterization – DLS
11	Module 2: Characterization - DSC
12	Module 2: Characterization - TGA
13	Module 2: Characterization - Mechanical Testing
14	Module 2: Characterization - Viscometry

Descriptions of the Course Modules

- ***Module I. Polymer Synthesis***
  In this module we will synthesize polymers using step-growth, chain-growth, ring-opening, reversible addition-fragmentation chain transfer (RAFT), and emulsion polymerization.

- ***Module II. Polymer Characterization***
  In this module we will characterize the synthesized polymers using techniques such as size-exclusion chromatography (SEC), nuclear magnetic resonance spectroscopy (NMR), dynamic light scattering (DLS), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), tensile testing, and viscometry.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance: This lab is a hands-on lab experience, **therefore attendance in Lab is required**. 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/

We will make every attempt to provide an opportunity to make up a missed lab, however, this may not always be possible when working with live cells. Missed or late lab assignments as a result of an excused absences may be made up provided that appropriate documentation is submitted. Contact instructor to arrange the make-up. Missed or late assignments under any other circumstances will not be accepted.

Lectures, online demos, videos etc. will be posted online through Canvas prior to the lab. You are expected to view the lectures and lab materials for each module and complete any pre-lab assignments prior to coming into the laboratory. Our schedule is pretty tight, so there won't be time in lab for you to read the lab for the first time and figure out what you are doing for the day. **You are expected to come to lab prepared to start the lab right away.** Your lab assignments will be submitted through Canvas.

Discussion Board: Throughout the course, questions related to experimental research will be posted on the Canvas Discussion Board. Your participation is required on these discussion posts. You are required to 1) post a new comment; and 2) post a comment in response to a classmate's comment. The discussion thread will stay open as long as the module is open. Some modules may have multiple discussion board prompts. There will be 4 discussion threads. Participation in the discussion threads will comprise 5% of your grade.

Lab Participation: Students will work in groups or 3 or 4 throughout the semester, and these groups will remain the same throughout the semester. I expect equal effort and distribution of the groups work among all members. Group engagement will be assessed via peer feedback as well as TA and instructor evaluations. The assessment of your participation will comprise 25% of your grade.

Lab Assignments: You will be given post-lab assignments. Some post-lab assignments are smaller version of your lab report. There will be at least 3 assignments. Additional assignments post-lab or on Open lab weeks may be given. The quiz/assignment assessment combined will comprise 30% of your grade.

Lab Reports: Following each lab exercise you will be expected to complete a lab report. While you work in groups in the laboratory and share the data collected within your group, the writing of the report is a solitary activity. No joint reports will be accepted. Additional details on Lab report format, grading, and expectations will be provided. You will have 4 lab reports. Lab reports will be due 1 week after the module or lab ends.

Communications: This course will use CANVAS extensively as a communication and archival tool. Students can access all relevant course information (course notes, announcements, grades, etc.) via the CANVAS. **Communications to the Instructor should be sent through the CANVAS website to ensure timely response.**

Evaluation of Grades

Assignment	Percentage of Final Grade
Canvas Discussion Board	5%
Lab Participation	25%
Lab Assignments	30%
Lab Reports	40%
	100%

Grading Policy

Final letter grade will be assigned based on a student's overall performance during the semester. The following scale will be used as a guideline.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67

76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	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.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-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://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.

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.

Commitment to a Positive 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.

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 Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

Software Use

All faculty, staff, and students at 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

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://elearning.ufl.edu/.

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*.

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 Policies & Resources
Please visit academic policies and campus resources: https://go.ufl.edu/syllabuspolicies for more information.