

Polymer Processing
EMA 4666, Section 25081 (Class #25081)
EMA 6667, Sections 25078, 25079, and 25080
Class Periods: M, W, F 9:35–10:25 AM (Period 3)
Location: NEB 0102
Academic Term: Spring 2025

Professor:

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(352) 273-0264
Office Hours: TBD

Teaching Assistant:

N/A

Course Description

Major processing methods for polymers and polymeric composites as related to the rheological behavior of these systems. Synthesis of polymers via industrial processes. (2-3 credit hours)

Course Pre-Requisites

EMA 3066 or equivalent.

Course Objectives

This is an upper-level undergraduate elective course and a graduate elective course on polymers, with focus on their industrial production and processing. Some specific objectives are:

- a. To be able to use materials science and engineering fundamentals to understand polymer processing
- b. To be able to design polymer processes within realistic physical constraints
- c. To perform and communicate in a professional environment
- d. To be able to choose appropriate polymer processing techniques based on the properties and scale needed for targeted applications and to be aware of the social and environmental impacts (both positive and negative) of polymer products and processing strategies

Materials and Supply Fees

N/A

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	High
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	Low
3. An ability to communicate effectively with a range of audiences	Low
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 and inclusive 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	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Recommended Materials

No textbooks are strictly required, as the key content will be covered in lecture notes, homework assignments, and other materials provided through Canvas. Course content will be primarily based on the following (highly recommended) textbook:

- Title: Understanding Polymer Processing: Processes and Governing Equations
- Author: Tim A. Osswald
- Publisher and edition: Hanser publications (2nd edition)
- ISBN #: 9781569906477

Required Computer

UF student computing requirement: <https://news.it.ufl.edu/education/student-computing-requirements-for-uf/>

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is not strictly required, but it is in your best interest to attend every lecture if possible. Lectures will be recorded and made available to students through Canvas postings or mediasite.

It is expected that you show up to lecture on time and maintain a respectful environment conducive to learning; this means no distracting cell phone/technology use, no unrelated side conversations, etc. You are encouraged to take handwritten notes, either on paper or on a tablet.

Exams will be given in-person during scheduled course times or via Honorlock. The only exceptions are for DRC accommodations – which are each student's responsibility to arrange with the instructor as soon as possible and *preceding* exams (see section in syllabus below) – or for academic, extenuating, or unavoidable excused absences.

Excused absences must be consistent with university policies and require appropriate documentation.

For EMA 4666, see: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

For EMA 6667, see: <https://catalog.ufl.edu/graduate/regulations>. Additional information can be found here: <https://gradcatalog.ufl.edu/graduate/regulations/>

Make-up assignments/exams will be provided only with the *prior approval of the instructor or excused absence*. In general, the earlier you contact me about an excused absence or extenuating circumstance, the better.

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 the student's responsibility to contact the DRC as well as to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Evaluation of Grades & Grading Policy

Your final grade will be based on the following assignments and distribution (tentative):

EMA 4666 (undergraduate)		EMA 6667 (graduate)	
Assignment	% of Final Grade	Assignment	% of Final Grade
Exam 1	20%	Exam 1	20%
Exam 2	20%	Exam 2	20%
Exam 3	20%	Exam 3	20%
Project	20%	Project	20%
Final Exam	20%	Paper	20%

Percentage	≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60	< 60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade points	4.00	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.67	0.00

The instructor reserves the right to adjust the grade distributions, and grades **will not** be adjusted for individuals.

For EMA 4666, more information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

For EMA 6667, more information on UF grading policy may be found at:

[UF Graduate Catalog](#)

[Grades and Grading Policies](#)

Homework

Homework problems will be assigned throughout the semester but will not be graded. Corresponding answer keys will be posted approximately one week from the assignment posting. It is highly recommended that you work through the homework problems by yourself (without looking at the key), keeping pace with the class rather than waiting until just before an exam to “cram” the homework material.

Exams

There will be three in-class exams throughout the semester; the exam content may change but the dates will likely not. Some exam questions will likely be adopted from the homework questions. For EMA 4666, there will be a cumulative final exam during the pre-scheduled time (see below).

Project (EMA 4666 and 6667)

In mid-March, a group project will be assigned. It will consist of a group presentation on a research article that covers one or several processing techniques. A preliminary list of 3–5 articles should be submitted to the instructor by the assigned groups (see due dates in course schedule below); based on instructor evaluation of the list, a final selection will be made on which article will be presented by each group. The project presentations will be 20 minutes long with up to 5 minutes of Q&A; the presentation dates are mid- to late April (see course schedule below).

Paper (EMA 6667 only)

In mid-March, the graduate students will be assigned a paper that will be due at the end of the semester (see course schedule below). The paper will be on a topic of your choice but must be tied to one or several concepts from the course. A preliminary list of topics should be submitted to the instructor (see due date in course schedule below); based on instructor evaluation of the list, a final selection will be made on which topic will be covered in the paper. More specific criteria will be given during the actual assignment but expect 10–15 pages and 15–30 references.

Course Schedule (tentative, subject to change)

Lecture	Date	Day	Topic	Book chapter
01	01/13	M	Syllabus / polymer basics	1
02	01/15	W	Polymer basics	1
03	01/17	F	Polymer basics	1
	01/20	M	UF Holiday – no class	
04	01/22	W	Polymer basics, plastics & additives	1
05	01/24	F	General categories of polymer processing	1
06	01/27	M	Mechanical behavior & time temperature superposition	2
07	01/29	W	Mechanical behavior & time temperature superposition	2
08	01/31	F	Tensile, creep, stress relaxation, and dynamic tests	2
09	02/03	M	Tensile, creep, stress relaxation, and dynamic tests	2
10	02/05	W	Impact strength, fatigue, and weathering	2
11	02/07	F	Melt rheology	3
12	02/10	M	Melt rheology	3
13	02/12	W	Melt rheology	3
14	02/14	F	Extrusion	4
15	02/17	M	Extrusion	4
16	02/19	W	Extrusion	4
	02/21	F	Exam 1 (Lectures 1–13)	
17	02/24	M	Mixing (pre-recorded, no in-class lecture due to travel)	5
18	02/26	W	Mixing	5
19	02/28	F	Mixing	5
20	03/03	M	Injection molding	6
21	03/05	W	Injection molding	6
22	03/07	F	Injection molding	6
23	03/10	M	Additive manufacturing	7
24	03/12	W	Additive manufacturing	7
	03/14	F	Exam 2 (Lectures 14–22)	
	03/17	M	Spring break – no class	
	03/19	W	Spring break – no class	
	03/21	F	Spring break – no class	
25	03/24	M	Additive manufacturing – preliminary articles for project due (6667) – preliminary paper topic selection due (6667)	7
26	03/26	W	Other plastic processes – finalization of project articles & paper topics (6667)	8
27	03/28	F	Other plastic processes	8
28	03/31	M	Other plastic processes	8
29	04/02	W	Other plastic processes – preliminary articles for project due (4666)	8
	04/04	F	TBD (review, project work, guest lecture) – finalization of project articles (4666)	
	04/07	M	TBD (review, project work, guest lecture)	
	04/09	W	Exam 3 (Lectures 22–29)	
	04/11	F	Possible instructor travel – class TBD (if so, project work)	
	04/14	M	Project presentations (6667)	
	04/16	W	Project presentations (finish 6667, start 4666)	
	04/18	F	Project presentations (4666)	
	04/21	M	Project presentations (4666)	
	04/23	W	Project presentations (4666) or course review	

	04/25	F	UF Reading day – no class	
	04/30	W	EMA 6667 only: paper due by 11:59 PM	
	05/02	F	EMA 4666 only: final exam, 10AM–12PM	

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/>.

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 varied perspectives and lived experiences within our community and is committed to supporting the University’s core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, 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 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 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/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.