

## Physical Properties of Polymers

EMA 4161L, Section 1C21

**Class Periods:** 10 through 11

**Location:** 115 Rhines Hall

**Academic Term:** Fall 2017

### **Instructor:**

Anthony B. Brennan, PhD

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Office Hours: Tue/Thur: Period 2 and by appointment

### **Teaching Assistants:**

Please contact through the Canvas website: <https://ufl.instructure.com/courses/339208>

- Dr. Shema Freeman, [sfree@ufl.edu](mailto:sfree@ufl.edu), 313 Materials Engineering Building, Tel: 352-256-4025
  - Office hours: Mon-Wed: Period 2
- Mr. Clayton Argenbright, [cargenbright@ufl.edu](mailto:cargenbright@ufl.edu), 305 Materials Engineering Building, Tel: 407-462-9509
  - Office hours: Tue/Thu: Period 9

### **Course Description**

Concepts, skills, and techniques required for an understanding of polymer and polymer composite processing.

### **Course Pre-Requisites / Co-Requisites**

Credits: 1; Coreq: EMA 4161

### **Course Objectives**

- Students will be able to:
  - Apply first order thermodynamics to describe molecular dimensions of polymers/plastics
  - Correlate physical and mechanical properties with thermodynamic properties of polymers/plastics
  - Correlate morphology with physical, mechanical and thermal properties of polymers/plastics
  - Correlate rubber elastic behavior with molecular structure, composition and network structure of polymers/plastics

### **Materials and Supply Fees**

\$80.00

### **Professional Component (ABET):**

This course provides 1 credit towards engineering sciences

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

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

k. Techniques, skills, and tools for degree program	High
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\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

### **Required Textbooks and Software**

- Title: Introduction to Physical Polymer Science
- Author: L.H. Sperling
- Publisher: John Wiley & Sons
- Published: 2006, 4<sup>th</sup> Edition
- ISBN: 978-0471706069
- Lecture notes/slides provided on:
  - Website: Canvas: EMA 4161/EMA4161L { <https://ufl.instructure.com/courses/339208>}

### **Recommended Materials**

- Additional materials provided on Website: Canvas: EMA 4161/EMA4161L
- Laboratory Experiments will be provided on Canvas
- Equipment Required:
  - Bound Engineering Laboratory Notebook (Pages Must Be Numbered)
    - Name Clearly Marked
    - Table of Contents
    - Date for Each Experiment
    - Experiment Title
    - Purpose
    - Background Information
    - RECORD ALL INFORMATION WITH INK!
  - Safety Glasses
  - Leather Shoes/Sneakers, (Closed Toe)
  - Long Pants
  - Calculator

### **Course Schedule**

To be announced after scheduling is completed during the first meeting of the laboratory section.

### **Attendance Policy, Class Expectations, and Make-Up Policy**

Attendance is required to complete the lab assignments. Arrival on time is expected. Please turn off all cell phones upon entering class. Reading of newspapers, work on assignments for this or other classes, or other activities that are not part of the class are not allowed. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom. Make up labs will be provided only with the **approval of the instructor in accordance with university policies.** 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. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, and religious holidays. In all cases, you will be required to provide written documentation, and obtain instructor approval. You will not be excused from any lab without following the policy above, with no exceptions. Students not in attendance for the scheduled lab will receive a score of zero.

### **Evaluation of Grades ( A total of 6 laboratory experiments)**

Assignment	Total Points	Percentage of Final Grade
Laboratory Technique	20	20%
Laboratory Safety	20	20%
Laboratory Notebook	10	10%
Laboratory Reports	45	45%

**Laboratory Report Formatting for Grading**

- Format of Laboratory Reports: Overall length 3 to 4 pages (not including title, reference, and appendices)
  - Abstract: 5 points 2 to 3 paragraphs summarizing the purpose, protocol, important results, and significance of the experiment. Be concise in the wording.
  - Objective: 5 points Provide a clear statement of the objective of the laboratory experiment(s).
  - Background: 15 points Provide pertinent information regarding the procedure, materials, characterization methods, etc. Literature references such as textbook(s), standards, i.e., ASTM, encyclopedia, or scientific articles should be used and properly referenced. Be cautious of plagiarism.
  - Methods: 10 points Describe testing and experimental procedures. Any change in the protocol should be defined.
  - Results: 15 points The data collected including processing parameters should be clearly provided in the appropriate format, i.e., graphs, tables, etc. Any statistical analysis performed must be identified in the methods section. All data should be recorded with proper units, significant figures, etc. (Photocopy notebook pages and include as an appendix.) Trends should also be noted, as well as peculiar data; these will be explained in the discussion section.
  - Discussion: 20 points The significance of your laboratory experiments should be discussed in terms of polymer processing. It would be appropriate to provide supporting arguments for achieving the objectives of the experiment. IF the objectives were NOT met, state what corrective action would be appropriate.
  - Questions: 20 points Answer all questions in the lab handouts.
  - Appendix: 5 points Include any raw data and calculations.
  - References: 5 points Reference all bodies of work used in all sections of the report.
  - Total: 100 points

**Grading Policy**

Percent	Grade	Grade Points
93.1 - 100	A	4.00
89.8 - 93.0	A-	3.67
86.5 - 89.7	B+	3.33
83.2 - 86.4	B	3.00
79.9 - 83.1	B-	2.67
76.6 - 79.8	C+	2.33
73.3 - 76.5	C	2.00
70.0 - 73.2	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 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:**

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](mailto: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:** <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/>.

#### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto: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>.