University of Maryland
Dept of Materials Science and Eng.
ENMA 495
Polymeric Engineering Materials
August 16, 23, 25, 2020
THIS SYLLABUS WILL BE OFFICIAL ON September 2, 2020

Course Description: The course covers the properties of polymeric materials and some theoretical aspects of the synthesis of polymeric materials, and their relation to microstructure.

Pre-requisite: ENMA300

Textbook:
1. Required: Paul C. Painter and Michael M. Coleman. Essentials of Polymer Science and Engineering, DEStech Publications, 2009. ***Please pay attention to the faculty notes for corrections in some of the equations used.***
2. Faculty notes provided in the PDF presentations at ELMS for ENMA495, and also available as recordings with the date when they are supposed to be heard (more on this when the calendar is presented)

Course Objectives (MSEMS): At the end of this course, the student should be able to answer the following questions:
1. What are the basic characteristics of polymers?
2. Which are the basic syntheses of polymers?
3. What are the basic characterization methods of polymeric materials?

Class organization:
Time and location: Offered remotely. You can access the classes as a recording that can be downloaded in ELMS or through Panopto. The recordings available for downloading have a date associated with them, which is the last day you should have heard it for the first time, so you can answer the homeworks and eventually answer the exam questions.
The mid-term exams will take place 3:30 – 4:45 PM on the Wednesday that they are assigned and not at another time. The time and date for the final exam is set by the registrar.
Please write the exam times in a way that is most convenient for you to remember.
Please look at the course calendar available through ELMS. It lists the days when the corresponding recordings should be listened to, the days and times for the exams, and the days when the homeworks will be available for you to download and the days they have to be uploaded into ELMS.
Any changes will be announced in the Announcement section of ELMS, and if needed there will be a change in the calendar. Please check every week to see if there are announcements.

Grading:
1. Homework – every one to two weeks (20%). No homeworks will be excused.
Homeworks must be turned in at 11:59 PM via ELMS the days that they are due. **No late homeworks will be accepted**, since the solutions will be posted. ***No emailed homeworks will be accepted***.
Exams will be based on the homeworks and the problems discussed in class. Notice that we used the word "based", which means the exam problems are not exactly the homework problems, but close to them.
2. Two midterm exams - ***Please mark your calendars with the date and the times. This is to ensure that everybody has the same time to answer the exam and nobody has less time than others. There will be no change of the date or the time. The exam will be available in ELMS at 3:30 PM. You will be asked to upload the exam between 4:45 and 5 PM that same afternoon. No emailed exam or late exams will be accepted. If you need extra time, you must provide me with the authorization from the Office of Accessibility and Disability Service, by September 16, 2020, and arrangements will be done, by Prof. Martínez-Miranda especially if there are two or more students. This is necessitated by the special circumstances this year.***
a. October 7, 2020 (20%), between 3:30 - 4:45 PM
b. November 4, 2020 (20%), between 3:30 - 4:45 PM.

3. One report (term paper) (10%) – Natural Polymers due on December 2, 2020. There may be an oral component to this report and will be distributed among the 2nd, 7th, 9th of December. Details to be given after September 30, 2020. The oral part may require that the class be present between 3:30 and 4:45 PM. Please keep that in mind.
4. Final – December 18, 2020 (30%) – 1:30-3:30PM, determined by the registrar. The exam will be made available between these times, and only between these times. See notes on midterms. Note: This date and time cannot be changed (assigned by the registrar)
5. Extra work: There will be **no** extra work outside the work assigned in class.

Note on uploading homeworks, mid-terms and the final exams: Make sure the camera in your phone or whatever camera you are using is in working order and that you can transfer the pictures to a PDF (or you have a PDF app in your camera; there are several, available at no cost). Make sure your name is in the top of pages (you will notice that points are given for this). Make sure your paper lays flat on the surface, and that you have enough light so that it will produce a readable page. If a page is dark on dark, or light on light, and nothing is readable it will not be graded and you will not get points for whatever problem is in that page. There are enough of you to make it impossible to have a second look at the unreadable pages.

Make-ups for the midterm exams: will be determined on a case by case basis. No make-ups will be given for those people that did not know when the exam was, and/or forgot the day and the time of the exam. If you have a health reason you must submit a signed form from your doctor or health officer with the doctor's or health officer's address and phone number (that is, the doctor's or health officer's letterhead) certifying this reason through ELMS.
Make-up for the final exam: if you have a religious reason or more than three final exams that will make it impossible to take the exam on Friday, December 18, you must inform Prof. Martínez-Miranda **no later than November 2, 2020.** The make-up date will be determined by Prof. Martínez-Miranda, and there will be **one and only one make-up date**.

This course is guided by the University's Code on Academic Integrity,
https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a

Topics covered following the chapters in Painter and Coleman

0. Introduction (syllabus and general details of the class) – August 31, 2020

I: Chapter 1: Introduction to the class – September 2, 2020

II. Chapter 2: Microstructure and molecular weight – September 9. 2020

III. Chapter 3: Polymer synthesis – September 14 2020

IV. Chapter 4: Kinetics – September 16, 21, 2020

V. Chapter 5: Probability and Statistics – September 23, 2020

VI. Chapter 6: Copolymerization: Synthesis, Kinetics and Probability – September 28, 30, 2020

Review for Midterm #1 – Oct. 5, 2020

Midterm #1 – Oct. 7, 2020 – includes Chaps. 1 through 5

VII. Chapter 8: Microstructure in detail – October 12, 14, 2020

VIII. Chapter 10: Crystallization, melting and glass transition**- October 19, 21/26, 2020

IX. Chapter 11: Polymer solutions and blends** - October 26, 28/November 9, 2020

Review for Midterm #2 – November 2, 2020

Midterm #2 - November 4, 2020 – Includes Chaps. 6, 8 and 10

IX. Chapter 11: Polymer solutions and blends – see above

X: Chapter 13: Rheological Properties** - November 9, 11, 16, 18, 23 (Nov. 30)

Review of class – November 30

Review for the final exam – December 14

Report – Due December 2, 2020. Oral part, if it happens, will take place December 2, 7, 9.

Final – Friday, December 18, 2020

Final: the final will include **about** 30% of the material covered in the midterms and 70% of the material not covered in the midterms (that is Chaps 11 and 13). About is not exactly.
**: Selected sections of these chapters will be presented, covering the pages that refer to polymers. This is true of all chapters, but more importantly for these. The pages covered will be announced when they are covered.

Contribution of course to meeting the professional component: This course is an elective course that provides information on soft materials that relate to biomaterials and to applications.

Instructor:
Prof. Luz J. Martínez-Miranda
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elms.umd.edu click on ENMA495
Office hours: Wednesday 3:30 – 4:45 PM the first two weeks of classes (Weeks of August 31 and September 7, 2020)
On September 2, 2020, we will have a "meeting" office hour. I hope you all can attend due to the special situations of this semester.
Starting the third week of classes (September 14, 2020), the office hours will be Mondays 3:30 – 4:45 PM afterwards. Due to increased use of zoom in the afternoons that leads to it freezing, there will be another office hour in the mornings or early afternoons, time to be announced, after September 14, 2020.

Prepared by L. J. Martínez-Miranda, August 16, 23, 25, 2020