

CHEM 381

Polymer Chemistry I

Spring 2022

Millersville University of Pennsylvania

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- 1 To explain the structure-property relationships of macromolecules
- 2 To name common polymers depending on their growth mechanism and on IUPAC nomenclature.
- 3 To interpret kinetic data, probabilities and statistics to explain polymerization growth
- 4 To analyze the morphology and structure of polymers based on their thermal properties
- 5 To explain mechanical and rheological properties based on the polymer
- 6 To characterize polymers by common spectroscopic techniques.

Please wear a mask!

Painter, Paul C. and Coleman, Michael M. (2009). *Essentials of Polymer Science and Engineering*. Lancaster, Pennsylvania: DEStech Publications, Inc. ISBN: 978-1-932078-75-6

COURSE MATERIALS

A composition notebook – 7 ½" x 9 ¾", College-Ruled, 100 Sheets--any color

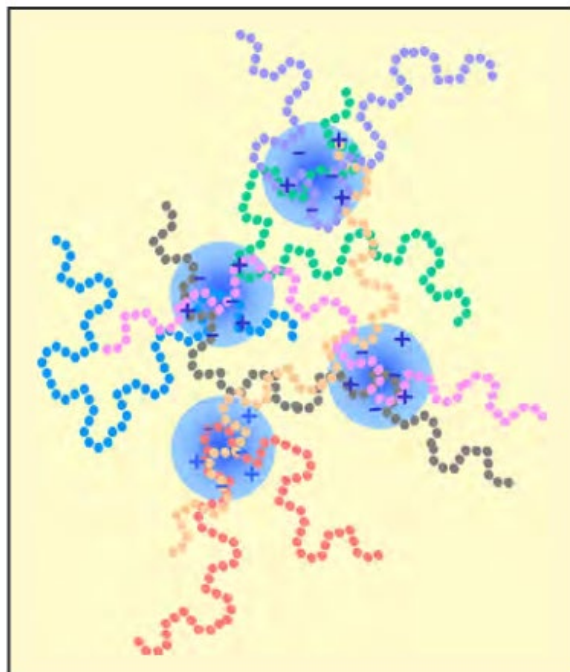
Lab notebook. Carbonless copy, top page perforated: Hayden McNeil ISBN 978-1930882096

Lab safety glasses

Computer access is required. Some assignments are given using <https://www.pslc.ws/macrog/index.htm>

COURSE STRUCTURE

- ① **COMPOSITION NOTEBOOK:** Macrogalleria/txtbook assignments will be given as take-home work. These must be completed in the composition notebook and handed in to Dr. Allen's office by the due date. Composition notebooks will not be collected in class.
- ② **IN-CLASS WORK:** You will complete assigned work in class as a group and will complete the work in a composition notebook. All of these must be completed.
- ③ **LAB:** *In order to obtain a grade of B or higher in this course, you must pass the lab portion of the course and complete all labs.* All labs must be submitted on D2L as .PDF files. These files must be uploaded by the due date for full credit. TurnItIn will analyze your assignments for plagiarism, grammar, and punctuation. The labs must be handed in following the ACS template guidelines (see D2L).
- ④ **POSTER:** Pairing into groups of two or three, develop a poster elucidating the information as laid out in the poster guidelines on D2L. This must be completed as a team, and each partner must contribute equally. The instructor reserves the right to grade students differently, in the event that one student does not contribute equally.
- ⑤ **TERM PAPER:** The term paper, and each draft, must be submitted on D2L as .PDF files. These files must be uploaded by the due date for full credit. TurnItIn will analyze your assignments for plagiarism, grammar, and punctuation. See D2L for details.



COURSE STRUCTURE (Cont.)

"I was working with these very long-chain...extended-chain polymers, where you had a lot of benzene rings in them...Transforming a polymer solution from a liquid to a fiber requires a process called spinning...We spun it and it spun beautifully. It [Kevlar] was very strong and very stiff-unlike anything we had made before. I knew that I had made a discovery....we were looking for something new. Something different. And this was it." ~Stephanie Kwolek

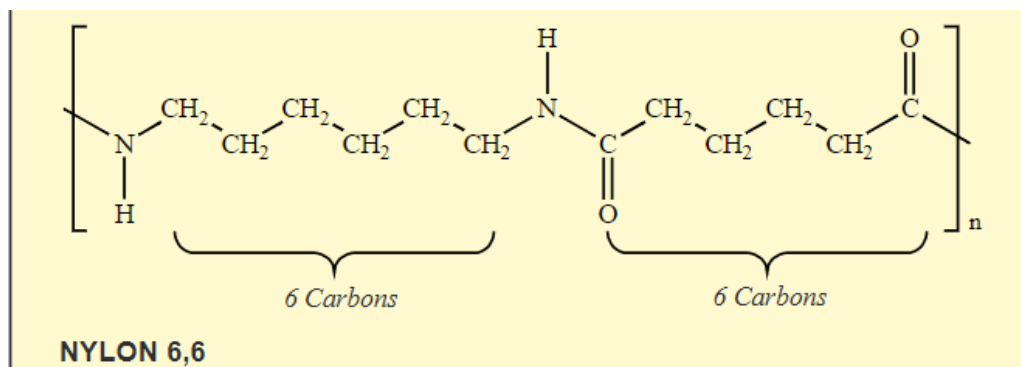
NOTE:

This course is structured with the assumption that students will self-motivate and put in work outside of class to maximize lecture time. This is a 300-level course and requires time and effort above and beyond that of first and second-year courses. Please assume that attendance is mandatory for every class.

Letter Grade	Percentage
A	≥94.0%
A-	90.0-93.9%
B+	88.0-89.9%
B	84.0-87.9%
B-	80.0-83.9%
C+	78.0-79.9%
C	74.0-77.9%
C-	70.0-73.9%
D+	68.0-69.9%
D	64.0-67.9%
D-	60.0-63.9%
F	Below 60.0%

GRADING SUMMARY

Hwk Assignments	20%
In-Class Work	20%
Poster	15%
Term Paper	20%
Laboratory Work (6 labs)	25%
Total Class %	100%



COURSE STRUCTURE (Cont.)

This is a tentative lecture schedule which outlines content as drawn from the Painter and Coleman textbook resource.

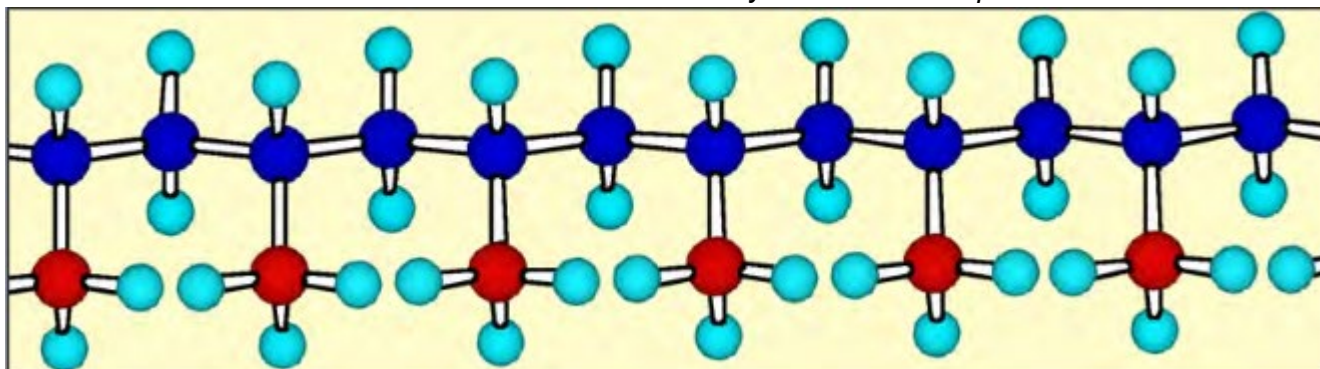
COURSE SCHEDULE

Week Beginning	Topics
Jan. 18 th (1 lecture)	Chapter 1: Intro
Jan. 24 th (2 lectures)	Chapter 1: Intro + Chapter 2: MW
Jan. 31 st (2 lectures)	Chapter 2: MW + Chapter 12: Characterizing MW
Feb. 7 th (2 lectures)	Chapter 12: Characterizing MW + Chapter 3: Synthesis
Feb. 14 th (2 lectures)	Chapter 3: Synthesis
Feb. 21 st (2 lectures)	Chapter 4 + 5: Polymerization
Feb. 28 th (2 lectures)	Chapter 4 + 5: Polymerization
Spring Break	
March 14 th (2 lectures)	Chapter 4 + 5: Polymerization
March 21 st (2 lectures)	Chapter 4 + 5 + 6: Polymerization/Copolymerization
March 28 th (2 lectures)	Chapter 8: Morphology
April 4 th (2 lectures)	Chapter 8: Morphology + Chapter 10: Crystallization, Melting and T_g
April 11 th (2 lectures)	Chapter 10: Crystallization, Melting and T_g + Chapter 11: Polymer Solutions and Blends*
April 18 th (2 lectures)	Chapter 11: Polymer Solutions and Blends*
April 25 th (2 lectures)	Chapter 13: Mechanical and Rheological Properties*
May 2 nd (1 lecture)	Chapter 13: Mechanical and Rheological Properties*
Comprehensive Final Exam (Term Paper) – due during Finals	

Chapter 7: Spectroscopy and Characterization of Chain Microstructure carried out in lab

* Chapters may or may not be covered. These depend on course pace.

Note: If a class is canceled due to bad weather, then the missed assignment or quiz will be given the next time the class meets. Check the Millersville University website for campus closure due to storms.



CHEM 381 SUPPORT

You Are NOT Alone!

REMIND APP

You may optionally enroll in the Remind app in order to text the professor, and to be texted when the professor has an announcement to make. This does not count toward your grade. Directions: Go to remind.com/join/chem381s22 or text @chem381s22 to 81010. You will need the Remind app downloaded on your phone.

COURSE EXPECTATIONS

MORE OF THIS

Work lots of problems. *Then do more problems!*

A minimum rule-of thumb in study time for each course you are taking should be about 4 hours for each 1 hour spent in class per week. That is, 12 hours of study time outside of class for a typical 3 hour per week lecture course.

Ask questions! There is no such thing as a “dumb” question.

Get help when needed!!! Don't put it off.

LESS OF THAT

ACADEMIC DISHONESTY

If you break the academic honesty policy of Millersville University, there are severe penalties. A failing grade will be assigned and you may be prosecuted by an Academic Review board.

FALLING BEHIND

Falling behind in a chemistry class by missing lectures, lab, or recitation is a BAD IDEA!

DISRESPECTFUL LANGUAGE

Students are not allowed to call themselves, or others, 'stupid', 'dumb', or any other derogatory term.

COURSE POLICIES

ACADEMIC ACCOMMODATIONS

Please see the Office of Learning Services in Lyle Hall (<http://www.millersville.edu/learning-services/>) as soon as possible if you have special learning needs for this class.

MAKE-UP POLICIES

Students who miss a scheduled assignment will be weighted heavier on the remaining assignments as a make-up. Please see the University Attendance Policy for more information. Flexibility in the above policies is at the instructor's discretion.

<https://tinyurl.com/y53qn9nw>

COURSE POLICIES (Cont.)

GRADING POLICIES

IF your grade falls between the delineated grades on the rubric, the instructor will 'bump' you UP or DOWN depending on: regular attendance at office hours, regular attendance at class, general quality work improvement (i.e. homework, poster etc.). You agree to this policy by enrolling in the course.

SAFE AND PRODUCTIVE ENVIRONMENT

Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project.

QUESTIONS????

OFFICE HOURS:

M 1 – 2 PM

T 11 – 1 PM

W 3 – 5 PM