

CHM 5511 – Physical Chemistry of Macromolecules (S21)

- Instructor:** Daniel Savin, 318 Leigh Hall (LEI), savin@chem.ufl.edu, 352-392-9150
- Office Hours:** T Period 6 (12:50-1:40) or by appointment. I am generally available to answer questions via Canvas or Zoom.
- Lecture:** T R Period 4 (10:40 – 11:30)
This class will be conducted completely via synchronous online instruction. The Zoom link is provided on the Canvas site.
- Course Materials:** This course has a Canvas page for lecture notes, supplemental videos, answer keys, and announcements.
- Textbook:** Polymer Chemistry (3rd Ed.), by Lodge and Hiemenz. You may also use the 2nd Ed. of this book.
- Course Description:** Topics include: Chain statistics, solution thermodynamics, light scattering, polymer solution dynamics, introduction to linear viscoelasticity. CHM 5511 is a class that provides an opportunity for participants to develop skills, strategies and methods necessary to understand the basic principles of the physical chemistry of polymers. The course is targeted to first-year graduate students.

At the conclusion of this course the successful student should be able to:

1. Understand moments in the molecular weight distribution of polymers.
2. Understand various ways to calculate polymer chain dimensions.
3. Define polymer chemical thermodynamics terms from a statistical mechanics perspective.
4. Distinguish between theories of mixing for polymers, *e.g.* Flory-Huggins.
5. Recognize the relationship between solution viscosity and polymer hydrodynamic volume and explain how this can be used to determine molecular weights of polymers.
6. Describe the mechanism and methods of size exclusion chromatography and recognize and interpret SEC chromatograms.
7. Review the theories of classical light scattering and dynamic light scattering and show how these can be used to determine polymer molecular weights and diffusion properties.
8. Describe the mechanical behavior of polymers using viscoelastic models.
9. Describe polymer dynamics in dilute and semi-dilute solutions using Rouse, Zimm, and Reptation Models.

Exams: There will be one midterm exam, tentatively scheduled for February 26th. There will be a cumulative final exam, currently scheduled for: Friday April 30th, from 10:00 AM – 12:00 PM.

Homework: There will be ~ 4–5 homework assignments throughout the semester. Homework assignments will be worth 20 points each. The assignments should be presented in a **professional** manner, with the work, any assumptions and explanations presented **clearly**. When preparing graphs, you *must* use Excel or a comparable program. If you are doing a curve-fit, you must justify the choice of fitting function. While you are strongly advised to work in groups, **you must turn in your own work to receive any credit!** You must also reference the other members of your study group. Failure to adhere to these requirements will result in zero credit for the assignment.

Makeups: Homework assignments that are turned in late will not be accepted unless prior arrangements have been made.

Grading: Your final grade will be determined from the following:

Homework = 30%
Midterm Exam = 35%
Final Exam = 35%

Approximate Grade Ranges:			
> 90	A	69 - 72.99	C+
86 - 89.9	A-	64 - 68.9	C
82 - 85.9	B+	60 - 63.9	C-
77 - 81.9	B	56 - 59.9	D+
73 - 76.9	B-	50 - 55.9	D
		< 50	E

Attendance: Lecture attendance is essential for your success in this class. **More than three (3) absences for any reason is considered to be excessive.** If circumstances place the student in a situation that involves excessive absenteeism, the student should plan on dropping the class before the drop date or ask for a withdrawal from the class after the drop date. Unless special circumstances are involved, no work, including exams, can be made up if more than three absences are on record. Communication and the timing of the communication are keys to acceptable outcomes. Poor timing or no communication will result in an unacceptable outcome.

Class Participation: Students are expected to be prepared for class and to respond to questions from the instructor. Reading the material in the text, working problems, listening in class, and studying notes should prepare the student for answering the questions. Students are required to have their cameras on from start to finish during our classes on Zoom. A default setting for our sessions in Zoom is that participants will be muted when they enter, so you will unmute yourself when you comment or ask questions. Your instructor may also ask students to reply in the chat box for specific activities. Oral

comments on camera and written comments in the chat box are considered activities for participation. If you have technical issues, please immediately consult UF IT Help to resolve them and then contact your instructor. Zoom sessions will not be recorded by the instructor and may not be recorded by students. As in all courses, unauthorized recording and unauthorized sharing of recorded material is prohibited.

Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, 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 accommodations. Students with disabilities should follow this procedure as early as possible in the semester.

Counseling: The University of Florida provides counseling services for students, staff, and faculty. See <http://www.counsel.ufl.edu/> or call (352) 392-1575 during regular service hours (8am – 5pm). For other hours or on weekends call the Alachua County Crisis Center (264-6789). Students may also call the clinician on-call at Student Mental Health for phone callback and consultation at (352) 392-1171.

Cell Phones: Please put all cell phones and other digital devices on “silent mode” during all class periods. Thank you.

Honor Code: This class will operate under the policies of the student honor code, which can be found at: <http://www.registrar.ufl.edu/catalog/policies/students.html>. The students, instructor, and TAs are honor-bound to comply with the Honors Pledge: **We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.**

Class Schedule*

CHM 5511 S21					
Week of		T	R	Videos	
Jan	11	Intro/Ch. 1	Ch. 6	Math, FRC	
	18			T-Dep HRC	
	25				
	2	Ch. 7			
Feb	9			FH Entropy	
	16				
	23	Ch. 8	Midterm Exam		
	2				
Mar	9			Brownian 1, 2	
	16	Ch. 9			
	23				
	30				
Apr	6	Ch. 11			
	13		Ch. 12	Dynamic 1, 2, 3	
	20		Reading Day		
		Final Exam	April 30th		

*Schedule may be revised if necessary. Students will be notified if this is the case.