



CHEM 664 section 001 Syllabus

Physical Chemistry of Macromolecules

COURSE INFORMATION

Physical Chemistry of Macromolecules

CHEM 664 001(3.0 Credits)

2018-2019 Spring [1194]

Description

Structure, thermodynamics, and dynamics of polymers in solution and in the bulk; theoretical models and experimental methods; polymer characterization. Enroll Info: Chem 562 or consent of instructor

Prerequisite(s)

CHEM 562 or graduate standing

Breadths

P - Physical Science

Instruction Mode

Classroom Instruction

Department: CHEMISTRY

College: Letters and Science

Canvas Course URL

<https://canvas.wisc.edu/>



2018-2019 Spring [1194]

Term Start Date: Tuesday, 22-Jan-2019 **Term End Date:** Wednesday, 22-May-2019

Location and Schedule: Chemistry Building 8335 MWF 11:00 AM-11:50 AM

CRN: 224002815

How the Credit Hours are Met

The credit standard for this course is met by an expectation of a total of 135 hours of student engagement with the courses learning activities (45 hours per credit), which include regularly scheduled instructor: student meeting times [insert meeting time expectations], reading, writing, problem sets, studio time, labs, field trips, and other student work as described in the syllabus.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor



Mark EDIGER

✉ EDIGER@CHEM.WISC.EDU

Instructor Availability

See attached sheet.

GRADING AND COURSE MATERIALS

Course Learning Outcomes (CLOs)

No Course Learning Outcomes for this course.

Grading

see attached sheet.

Discussion Sessions

see attached sheet.

Laboratory Sessions

None.

Required Textbook, Software, & Other Course Materials

See attached sheet.

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

Exams, Quizzes, Papers & Other Major Graded Work

See attached sheet.

Homework & Other Assignments

See attached sheet.

OTHER COURSE INFORMATION

Other Course Information

See attached sheet.

ACADEMIC POLICIES



ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to <https://conduct.students.wisc.edu/academic-integrity/>



ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA."

<http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>



DIVERSITY & INCLUSION

Institutional statement on diversity: “Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>

Chemistry 664: Physical Chemistry of Macromolecules

Spring 2019 Syllabus

2-3 credits (MWF at 11 am, 8335 Chemistry)

Mark Ediger, 7303 Chemistry, 262-7273, ediger@chem.wisc.edu;

Office hours: W 2:25 pm and by appointment

Learning Outcomes/Course description: Students will master the most important models for understanding the physical chemistry of macromolecules. The structure, thermodynamics, and dynamics of polymers in solution and in the melt are described. In each area, relevant theory and experiments will be presented. Important concepts/models described in the course include: molecular weight averages, scattering experiments, random walks, excluded volume, Flory-Huggins theory, entropic elasticity, viscoelasticity, the Rouse model, and the reptation model. Methods of polymer characterization are explained in light of these principles.

Textbook: "Polymer Chemistry", 2nd Edition, by Hiemenz and Lodge (CRC Press). I will indicate what material we will cover in the next class period. You need to read the book before class as I will call on students to answer questions.

Prerequisite: Undergraduate physical chemistry or permission of instructor.

COURSE OUTLINE (keyed to Chapters in Hiemenz/Lodge)

- I. Introduction/Molecular Weight Distributions (2 periods)
- VI. Polymer Conformations (4 periods)
- VII. Thermodynamics of Polymer Solutions (4 periods)
plus material on polymer blends and block copolymers
(Exam I)
- VIII. Light Scattering by Polymer Solutions (4 periods)
plus material on neutron scattering of polymer blends
- IX. Dynamics of Dilute Polymer Solutions (3 periods)
- X. Networks and Rubber Elasticity (3 periods)
(Exam II)
- XI. Linear Viscoelasticity (5 periods)

Exams: There will be two mid-term exams plus a final. The mid-term exams will be given in the evening. A final oral exam will be given individually to each student. Exams will account for approximately 70% of the course grade.

Problem Sets: There will be problem sets due about every two weeks. You are encouraged to discuss the problem sets with other students in the course. However each student must hand in their own solution set and understand all of the material. If you are having trouble getting started on a question, please come talk to me. I like to give hints. Problems sets will account for approximately 30% of the course grade.

Class meeting time: Lectures will be held MWF at 11 am. We will not meet every MWF. The schedule below tells you when we meet – some changes to the schedule may be announced later. For the 2 credit portion of the course, there will be ~26 class meetings plus evening exams

Third credit: On days marked “3” on the schedule below, it is very important to show up if you registered for the third credit. For these seven periods, we will discuss material on the glass transition and polymer crystallization; these are Chapters 12 and 13 in the Heimenz and Lodge text. Students will be assigned to lead the discussion on particular days. In addition, there may be an extra question on each exam only for those taking the third credit.

Class Schedule:

Week	Monday	Wednesday	Friday
Jan 21,23,25	MLK Jr Day	2	2
Jan 28,30;Feb 1	2	2	3
Feb 4,6,8	2	X	2
Feb 11,13,15	2	2	3
Feb 18,20,22	X	2	2
Feb 25,27;Mar 1	2	2	3
Mar 4,6,8	X	X	X
Mar 11,13,15	2	2	3
Mar 18,20,22	Spring Break	Spring Break	Spring Break
Mar 25,27,29	2	2	3
Apr 1,3,5	2	X	X
Apr 8,10,12	2	2	3
Apr 15,17,19	2	X	2
Apr 22,24,26	2	2	3
Apr 29;May 1,3	2	2	X

KEY: 2 = 2 credit 3 = 3 credit X = no class