

**CH 451/651 Frontiers in Polymer Chemistry
Syllabus - Fall 2008**

Lectures: TTh 9:30 – 10:45 am – Hunter 470

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Office hours: TTh 8:30-9:30 am (or by appointment)

This 3-credit course is targeted for senior undergraduates and graduate students in science or engineering who wish to improve their appreciation for contemporary polymeric materials research. The course will provide a brief overview of the basic principles of polymer science including: synthesis, mechanism, structure/property relationships, characterization, modeling, and applications; followed by a survey of selected topics of current research. A basic knowledge of undergraduate organic chemistry and thermodynamics will be assumed.

Attendance: Attendance is strongly encouraged. Students having difficulty attending class should consult with me.

Resource Material: A text book is not required. However, much of the fundamental overview will come from George Odian's, "Principles of Polymerization", 3rd Ed., Wiley. Although some important sections will be copied and handed out in class, access to this text is suggested. Other resource material includes: Seymour and Carraher's "Polymer Chemistry: An Introduction", Dekker; Brandrup and Immergut's "Polymer Handbook", Wiley; and Mark's "Physical Properties of Polymers Handbook", AIP Press. Web based resources include: The Alfred Nobel Foundation: <http://www.nobel.se/index.html> and the Polymer Science Learning Center or "Macrogalleria" -- USM <http://www.psrc.usm.edu/macrog/pslc/index.html>

Grade Criteria: Grades will be based on in class exams, written literature reports, oral literature presentations, and group participation. There will be two one-hour exams and a cumulative final exam. The exams will take place during regularly scheduled lecture periods unless otherwise changed in advance. **One page** literature reviews of a current polymer research paper of your choice (from: *Macromol.*, *Polymer*, *Polymer Bulletin*, *JPS*, *JAPS*, *JACS*, *Science*, *Nature*, *Polym. Int.*, *High Perf. Polym.*, *Chem. Mater.*, *Adv. Mater.*, *Langmuir*, *J. Mater. Chem.* or other approved journal) will be collected every Tuesday that we meet starting with 9/2/08. Reviews should include: 1) Summary, 2) Strengths, 3) Weaknesses, 4) Suggested Results/discussion needed for improvement. Selected reviews will be discussed in class every Thursday. A review paper (7-10 pages) on an approved topic will be due on or near 11/30. Topics will be due 9/15. Oral presentations (15-20 min) on the review topic or other approved topic will begin on or near 11/1.

Tentative Exam/Report Schedule:

		<u>Grade %</u>
Exam I	Thursday, October 9	20
Exam II	Thursday, November 13	20
Review Paper Due	Thursday, December 5	20
Final Exam	Wednesday, December 10 (8:00-10:30 am)	20
1-page Literature Reviews	Weekly starting Sept. 2	10
Oral Presentations	Begin by lottery October 28	10

Other Important Dates:

Sept. 2, last day to drop without a W grade.

Oct. 10, last day to withdraw without a final grade.

Course Outline: There are some 31 lecture periods, 3 of which will be replaced by exams and ca. 5 will be consumed by oral presentations. The remaining 24 sessions will be divided into the following tentative topics:

Topic (approx. number of lectures)

Fundamentals of Polymer Chemistry

Polymer Characterization

Large Scale Commercial Polymers: Polyolefins, Polyurethanes, Epoxies, and more

Ring-Opening and Ring Forming Polymers

Polymers from Renewable Resources

Fluoropolymers: Enabling materials for Information and Energy

Branched and Dendritic Polymers

Liquid Crystalline Polymers

Self Assembled Polymers