Chemistry 9225–001 Introductory Polymer Chemistry Spring 2005

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Office hours: MW 4:30–6:00 pm and by appointment

Text: *Contemporary Polymer Chemistry*, 3rd Edition, H. Allcock; F. Lampe; J. Mark, Prentice Hall, 2003.
Lectures: MW 6:00–7:15 pm, 154 Mendel Hall

Contents:
Polymer science is a highly interdisciplinary field that is of interest to chemists, chemical engineers, and materials scientists alike. In this course, we will focus on the preparation and characterization of synthetic polymers (manmade polymers). With over $250 billion dollars per year (about 4% of the gross domestic product of the United States) dedicated to synthetic polymers, the industrial importance of these materials is indisputable. While biopolymers (naturally occurring polymers, such as DNA and proteins) are equally significant, they will not our major focus. In this course we will study the fundamentals of polymer chemistry so that we may gain insight into current research efforts. We will discuss topics such as step- and chain-type polymerizations, polymerization kinetics, copolymerization, molecular weight determination, morphology, polymer testing and characterization, and current advances in polymer chemistry (as time permits).

Grading:

In-class examinations:	60%
Take-home final examination:	20%
Final paper and presentation:	20%

General Policies:
1. There will be two in-class 75-minute exams (Exam I and II) and a take-home final exam. The dates for the exams are tentatively listed below. If there is a date change for an in-class exam, it will be announced in class and via email. Exam I will focus on polymer synthesis and Exam II will focus on polymer characterization. Exam II will be cumulative, but will concentrate on the material following Exam I. The take-home final exam will also be cumulative, but will concentrate on the latter third of the course (special topics). More details regarding the take-home final exam will be given later in the course.
2. An excused absence for an exam will require a make-up exam, which may be more challenging than the original exam. Requests for make-up exams should be submitted *as soon as possible* and must be submitted *prior to* the regularly scheduled exam.
3. Problem sets will be distributed periodically throughout the course. While problem sets will not be collected and graded, they are intended to reinforce concepts from class so I suggest that you give them your best effort. These problems will be similar in difficulty and content to the problems on the exams. Answer keys will be posted outside of my office as indicated on the assignments.

General Policies:

4. Near the end of the semester, you will choose a current research area in polymer chemistry to be the subject of your final paper and presentation (note the important dates below). Your final paper should be 5 pages long. The presentations will each be approximately 15 minutes in length and given during the last week of class and as part of our scheduled final exam period. Attendance is required for all of the presentations. The paper must provide pertinent background information for the topic and highlight findings from (at least) one recent journal article. Information from several sources is to be combined into a summary that would explain the current research to someone with no prior knowledge in the specific research area. The papers and presentations are to be succinct and to the point. The use of ChemDraw™ for figures is required. I will provide further details regarding this paper and presentation as the course progresses.

Important dates:

- Classes Begin: Wednesday, January 19
- Exam I: Wednesday, February 23 (tentative)
- Semester Recess (no class): Monday, March 7 and Wednesday, March 9
- Easter Recess (no class): Monday, March 28
- Exam II: Monday, April 11 (tentative)
- Submit topic for final paper: Wednesday, April 13
- In-class presentations: Monday, May 2 and Wednesday, May 4
- In-class presentations, continued: Monday, May 9, 7:00–9:30 pm
- Final paper due: Monday, May 9, 7:00 pm
- Take home exam distributed: to be announced
- Take home exam due: Thursday, May 12, 7:00 pm

Journals where you'll find polymer manuscripts:

- Journal of the American Chemical Society (ACS)
- Angewandte Chemie International Edition
- Accounts of Chemical Research (ACS)
- Chemical Reviews (ACS)
- Chemical Communications
- Chemical and Engineering News (ACS)
- Macromolecules (ACS)
- Polymer Engineering and Science
- Journal of Polymers and the Environment
- There are many others…not held by the Villanova University library

A couple of textbooks that I find useful:

- *Seymour/Carraher's Polymer Chemistry*, 5th Edition, C. E. Carraher, Jr., Marcel Dekker, 2000.
- *Principles of Polymerization*, 4th Edition, G. Odian, John Wiley and Sons, 2004.

The Villanova University library has many books that discuss various aspects of polymer chemistry. You might want to keep this in mind for your special topic paper and presentation.