MSE452 – Polymer Characterization Laboratory
Fall 2014

Course Description:
The main goals of the course are 1) to introduce and provide hands-on experience with the various lab techniques involved in polymer synthesis and characterization, 2) to hone your scientific writing skills, and 3) to make connections between textbook learning and experiment.

Instructor:
Dr. Nathan Gabrielson
Phone: 217-300-3906
Email: gabrilsn@illinois.edu
Office: 207 Ceramics

Teaching Assistants:
TBA
Email: TBA

Course Text:
There is no required textbook for the class. Instead, the lab experiments will be described on separate handouts. Electronic copies of readings and book chapters will be provided throughout the semester. Supplementary information can also be found online:

Saldivar-Guerra, E.; Vivaldo-Lima, E. Handbook of Polymer Synthesis, Characterization, and Processing. Wiley, 2013. (http://onlinelibrary.wiley.com/book/10.1002/9781118480793)

Sperling, L. H. Introduction to Physical Polymer Science. Wiley, 2005. (http://onlinelibrary.wiley.com/book/10.1002/0471757128)

Rudin, A.; Choi, P. The Elements of Polymer Science & Engineering. Academic Press, 2012. (http://www.sciencedirect.com/science/book/9780123821782)

Website:
http://compass2g.illinois.edu

Class Meetings:

Activity	Section	Time	Location
Lecture/Discussion	AL1	2:00 – 3:50 PM, Mon	4101 MSEB
Laboratory	AB3	2:00 – 5:50 PM, Tues	123/124 Kiln House
	AB1	1:00 – 4:50 PM, Wed	123/124 Kiln House
	AB2	1:00 – 4:50 PM, Thurs	123/124 Kiln House
Office Hours	11:00-11:50 AM, T TH or by appointment		

Exams:
Take-Home Midterm: October 31 (tentative)
Take-Home Final: December 19 (tentative)

Grading:
Lab Reports & Homework: 65%
Weekly Lab Quizzes: 10%
Midterm Exam: 10%
Final Exam: 10%
Attendance 5%

Grading Notes:

1. This course consists of 12 experiments to be completed in groups of 3-4 people. Generally, a lab report or homework assignment will be required for each experiment, although some labs will be combined and only one report will be due for the two experiments. Early in the semester, incomplete reports consisting of only two specified sections will be submitted individually to provide personalized feedback on scientific writing style. Later, full lab reports will be submitted as a group, with all members receiving the same score. Homework assignments will be completed individually.
2. Lab reports are to be submitted online on the course website. Adobe PDF is the preferred format, but MS Word (or similar) will also be accepted. If you are uncomfortable with online submission, paper copies will also be accepted but you must coordinate a time with me to deliver the report.
3. Reports that are received late are docked 5 points each day until they are submitted. Reports that are not received with 20 days of the due date receive no points.
4. You are required to read the lab procedures before attending the lab session. A brief quiz will be given at the beginning of each lab session. The quiz is intended to focus on the fundamental concepts of each lab and not on minute experimental details.
5. Everyone is required to keep a lab notebook which will be inspected periodically.
6. If lecture attendance slips below acceptable levels (as determined by me), a sign in sheet will be distributed before class and more than 3 unexcused absences will result in a point deduction (15 points off lab during week of absence).

Safety and Lab Rules:

This lab involves several potentially hazardous procedures. As in all labs, safety glasses/goggles must be worn at all times. The use of fume hoods will be necessary in several parts of the lab. Extreme care should be taken with the solvents that we will use, as in most cases they are toxic and flammable.

1. No food or beverages are allowed in the lab. Chewing gum is discouraged.
2. Long pants (covers the legs to the ankle) and closed-toed shoes are required for entry into the lab.
3. Avoid wearing your “best” clothes and consider purchasing/wearing a lab coat.
4. Confine long hair, loose clothing and dangling jewelry.
5. Cover any cuts or scrapes with a bandage before attending lab.
6. Safety glasses/goggles are available and must be worn at all times.
7. Wear disposable gloves at all times.
8. Never pipet by mouth.
9. Do not pick up broken glass with your hands, use a dust pan and broom.
10. Clean your lab space and equipment before departing.
11. Please exit the lab when making personal calls or sending texts or email messages. Abuse of this rule will result in cell phones being banned from the lab. Smartphones may be used during the lab exercises as references, calculators and other similar tools.
12. Thoroughly wash hands with soap prior to leaving the laboratory.

Tentative Schedule:

Week	Date	Topic
1	Week of Aug. 25	Introduction, Lecture – Preliminary Evaluation of Polymers Report to assigned lab to form groups
2	Week of Sept. 1	Lab only – Preliminary Evaluation of Polymers (Lab 1)
3	Week of Sept. 8	Lecture, Lab – Free Radical Synthesis (Lab 2) **Lab 1 Report Due Sept. 14 (Results and Discussion Sections Only, Individual Submission)**
4	Week of Sept. 15	Lecture, Lab – Molecular Weight, GPC (Lab 3) **Sample preparation needed the day prior to scheduled lab session** **Lab 2 Report Due Sept. 21 (Intro and Methods Sections Only, Individual Submission)**
5	Week of Sept. 22	Lecture, Lab – Melt Rheology / Melt Index (Lab 4) **Lab 3 Report Due Sept. 28 (Results and Discussion Section Only, Individual Submission)**
6	Week of Sept. 29	Lecture, Lab – Copolymerization (Lab 5) **Lab 4 Report Due Oct. 5 (Full Report, Group Submission)**
7	Week of Oct. 6	Lecture, Lab – Infrared Spectroscopy (Lab 6)
8	Week of Oct. 13	Lecture, Lab – Optical Microscopy and X-Ray Diffraction (Lab 7) **Lab 5+6 Report Due Oct. 19 (Full Report, Group Submission)**
9	Week of Oct. 20	Lecture, Lab – Compression Molding and DSC (Lab 8) **Sample preparation needed the day prior to scheduled lab session** **Lab 7 Homework Due Oct. 26 (Individual Submission)**
10	Week of Oct. 27	No Lecture or Lab – Take-Home Midterm Distributed **Take-Home Midterm Due Oct. 31 (Individual Submission)**
11	Week of Nov. 3	Lecture, Lab – Polymer Viscoelasticity (Lab 9) **Sample preparation needed the day prior to scheduled lab session** **Lab 8 Report Due Nov. 9 (Full Report, Group Submission—only if not presenting)**
12	Week of Nov. 10	Lecture, Lab – Organic Light Emitting Diodes (Lab 10) **Lab 8 Presentations in Class Nov. 10** **Lab 9 Report Due Nov. 16 (Full Report, Group Submission—only if not presenting)**
13	Week of Nov. 17	Lecture, Lab – Polymer Microspheres for Drug Delivery (Lab 11) **Lab 9 Presentations in Class Nov. 17** **Lab 10 Report Due Nov. 30 (Full Report, Group Submission—only if not presenting)**
14	Week of Nov. 24	No Lecture or Lab – Thanksgiving Break
15	Week of Dec. 1	Lecture, Lab – Gel Electrophoresis (Lab 12) **Lab 10 Presentations in Class Dec. 1** **Lab 11 Report Due Dec. 7 (Full Report, Group Submission—only if not presenting)**
16	Week of Dec. 8	**Lab 11 Presentations in Class Dec. 8** **Lab 12 Homework Due Dec. 11 (Individual Submission)**
17	Week of Dec. 15	Final Exam Week – Take-Home Final Distributed **Take-Home Final Due Dec. 19 (Individual Submission)**