

MSE 151 Polymeric Materials

Class will meet on Monday and Wednesday from 9:30-11:00 am

Location: 348 HMMB

Instructor: Ting Xu (381 HMMB)

TA: Katherien Evans, Benson Jung (MSE student bay)

Office Hour (Instructor): Monday 2:00-3:00 pm at 381 HMMB

Office Hour (TA): Monday 4:00-6:00 pm and Thursday 3:00-5:00 pm at 314 HMMB

Course Description:

This 3-unit course is designed for undergraduate students to gain a fundamental understanding of the science of polymeric materials. It introduces several types of polymerizations for polymer synthesis, glass transition temperature, polymer crystallization, polymer chain conformation in solution and in melt, thermodynamics of polymer blends and polymer solution, rubber, network and gels. Throughout the course, how this knowledge can be applied in the nanosciences, nanotechnology and biotechnology will also be briefly discussed.

Course Prerequisites:

Chem 1A or E 5 required, MSE 103 recommended. Please review basics covered in General Chemistry and Chem 1A.

Recommended Textbook:

Polymer Chemistry, 2nd edition, by Paul C. Hiemenz and Timothy P. Lodge, CRC press.

Supplementary reading materials:

1. P.J. Flory, *Principles of Polymer Chemistry*; Cornell University Press: Ithaca, 1953.
2. R. J. Young and P.A. Lovell, *Introduction to Polymers*, 1991.
3. Michael Rubinstein and Ralph H. Colby, *Polymer Physics*; Oxford, New York: Oxford University Press, 2003.
4. Charles E. Carraher Jr., *Carraher's Polymer Chemistry*, 10th Edition.

Assessment of Student Progress:

Homework: 35%

Mid-terms: 30% (15% each)

Final: 30%

Quizzes: 5%

A set of homework will be given for each chapter. The homework schedule is listed on the page. Please make sure you follow the schedule. Only hard copy will be collected in class and no late submission will be accepted. There will be two mid-term exams and one final, in addition to a few quizzes randomly given throughout the course.

Polymeric Materials MSE 151 - Course Schedule

	Date	Content	Note
1	1/17	Introduction to chain molecules	HW1 assigned
2	1/22	Introduction to chain molecules	
3	1/24	Step-growth polymerization	HW2 assigned
4	1/29	Step-growth polymerization	HW1 due
5	1/31	Chain-growth polymerization	HW3 assigned
6	2/5	Chain-growth polymerization	HW2 due
7	2/7	Chain-growth polymerization	
8	2/12	Controlled polymerization and application	
9	2/14	Mid-term I	*HW3 due
10	2/19	Academic holiday	
11	2/21	Polymer conformation	HW4 assigned
12	2/26	Polymer conformation	
13	2/28	Thermodynamics of polymer solutions	HW5 assigned
14	3/5	Thermodynamics of polymer solutions	HW4 due
15	3/7	Thermodynamics of polymer solutions	
16	3/12	Network, gels and rubber elasticity	HW6 assigned
17	3/14	Network, gels and rubber elasticity	HW5 due
18	3/19	Network, gels and rubber elasticity	
19	3/21	Mid-term II	*HW6 due
20	3/26	Spring break! Have Fun!	
21	3/28	Spring break! Have Fun!	
22	4/2	Linear viscoelasticity	HW7 assigned
23	4/4	Linear viscoelasticity	
24	4/9	Glass transition	HW8 assigned
25	4/11	Glass transition	HW7 due
26	4/16	Crystalline polymers	HW9 assigned
27	4/18	Crystalline polymers	
28	4/23	Crystalline polymers	HW8 due
29	4/25	Review session	*HW9 due
	TBD	Final exam	

*Please note:

- HW3 will be collected but NOT graded
- HW6 will be collected but NOT graded.
- HW9 will be collected but NOT graded.