CHEM 421 Polymer Synthesis (An International Collaboration in Teaching)

Instructor: Professor Wei You
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Three more professors from UNC, and four more professors from USTC (China)

Time and Location: MWF 9:00-9:50AM Peabody 008 (UNC)
MWF 9:00-9:50PM 二教七楼 (10-10:50PM after Nov 7) (USTC)

Office Hours:
No formal office hours; you can request appointments via email.

Blackboard:
The class documents, such as lecture notes, homework and solution keys will be posted regularly in Blackboard. Please log into Blackboard regularly to keep updated.

Textbook:
No formal textbook.
Recommended reference book:
A. "Principles of Polymerization" by George Odian (4th Edition) (a comprehensive book; might be hard for undergraduates)
B. "Polymer Chemistry" by Malcolm P. Stevens (3rd Edition) (an entry level book)

Lecture Notes:
I will upload the lecture notes before each lecture, so you can print them out if you like. Make additional notes if necessary. These lectures slides & notes (and the problem sets) will be serving as the core materials for you to prepare for the exams.

Problem Sets:
There will be approximately three problem sets, usually assigned one week before the exams. Solutions will be provided shortly after. You should try to solve all the problems first, then refer to the solutions. These problem sets will well serve as practice exams.

Exams and Final:
There will be three exams and a final exam. Only the material presented in class will be covered. You will not be allowed to bring any notes or books to the exams or the final.

Grading:
You will receive 3 credit units for completing the course. Grades will be based on three exams (60%) and a final (40%).

Note: Highlighted in Yellow are lectures to be taught by USTC Professors; highlighted in blue are these lectures to be taught by UNC Professors. Professor Wei You will teach the rest, and serve as the coordinator.

Tentative Course Schedule:

Date	Day	Topic
Section I. Polymer parameters		
08/24/2011	Wed	I will be a SPIE so I merged lecture 1 with lecture 2
08/26/2011	Fri	1. Introduction 2. Overview of polymers and polymerizations, nomenclature
08/29/2011	Mon	3. Polymer parameters: MW, isomers
08/31/2011	Wed	4. Polymer parameters: chain isomerism
09/02/2011	Fri	5. Polymer parameters: morphology, Tg
LABOR DAY		
09/07/2011	Wed	6. Polymer parameters: LC (**Ed Samulski**)
09/09/2011	Fri	7. Polymer parameters: morphology, topology
Section II. Polymerizations and polymers (& their applications)		
Step growth polymerization		
09/12/2011	Mon	8. Step growth polymerization
09/14/2011	Wed	9. Step growth: polyester and polyamide
09/16/2011	Fri	10. Step growth: polycarbonate
09/19/2011	Mon	**EXAM 1**
09/21/2011	Wed	**Go over Exam 1**
09/23/2011	Fri	11. Step growth: poly(arylene ether)
09/26/2011	Mon	12. Step growth: PPS, polyimide
09/28/2011	Wed	13. Step growth: MW control
09/30/2011	Fri	14. Step growth: thermoset, epoxy, etc.
10/03/2011	Mon	15. *Special topic*: Michael Addition **(Yezi You**)
10/05/2011	Wed	16. *Special topic*: conjugated polymers/conducting polymers**(Wei You)**
10/07/2011	Fri	17. Free radical polymerization
10/10/2011	Mon	18. Oligomer: chain transfer
10/12/2011	Wed	19. Thermodynamics and solution polymerization

Heterogeneous polymerization

10/14/2011	Fri	20. Heterogeneous polymerization: precipitation, suspension, and dispersion polymerization
10/17/2011	Mon	**EXAM 2**
10/19/2011	Wed	**Go over Exam 2**

FALL BREAK

10/24/2011	Mon	21. Heterogeneous polymerization: emulsion (1)
10/26/2011	Wed	22. Heterogeneous polymerization: emulsion (2) (**Shiyong Liu**)
10/28/2011	Fri	23. Copolymer and copolymerization

Stereochemistry control

10/31/2011	Mon	24. Ziegler Natta catalysts
11/02/2011	Wed	25. Metallocene catalysts: stereo control
11/04/2011	Fri	26. Early metal metallocene catalysts and Late metal catalysis (**Maurice Brookhart**

Polymers used in semiconductor industry

11/07/2011	Mon	27. *Special topic*: Polymers used in MEMS (**Joe DeSimone)**
11/09/2011	Wed	28. *Special topic*: Photoresist and photolithography

Ionic polymerizations

11/11/2011	Fri	29. Living polymerization (1)
11/14/2011	Mon	30. Living polymerization (2) (**Ruke Bai)**
11/16/2011	Wed	31. Block coplymer basics
11/18/2011	Fri	32. Cationic polymerization (**Guoqing Zhang**)
11/21/2011	Mon	**EXAM 3**

THANKSGIVING HOLIDAY

Ring opening polymerization

11/28/2011	Mon	**Go over Exam 3**
11/30/2011	Wed	33. Ring opening polymerization (1)
12/02/2011	Fri	34. Ring opening polymerization (2)
12/05/2011	Mon	35. *Special topic*: Basic silicone chemistry
12/07/2011	Wed	36. *Special topic*: Basic silicone chemistry (2)

Final Dec 16th, Friday, 8 to 10AM