CHEM 421 Polymer Synthesis

Instructor: Professor Wei You
            wyou@unc.edu
            Office: Kenan C 540

Time and Location: MWF 9:00-9:50AM Kenan B121

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

Sakai:
The class documents, such as lecture notes, homework and solution keys will be posted regularly in Sakai. Please log into Sakai 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 a bit more difficult 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 midterm exams (60%) and a final (40%).
### Tentative Course Schedule:

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<th>Day</th>
<th>Topic</th>
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<tr>
<td>08/21/2013</td>
<td>Wed</td>
<td>1. Introduction</td>
</tr>
<tr>
<td>08/23/2013</td>
<td>Fri</td>
<td>2. Overview of polymers and polymerizations, nomenclature</td>
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<tr>
<td>08/26/2013</td>
<td>Mon</td>
<td>3. Polymer parameters: MW, isomers</td>
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<tr>
<td>08/28/2013</td>
<td>Wed</td>
<td>4. Polymer parameters: chain isomerism</td>
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<td>08/30/2013</td>
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<td>5. Polymer parameters: morphology, Tg</td>
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<td><strong>LABOR DAY</strong></td>
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<tr>
<td>09/04/2013</td>
<td>Wed</td>
<td>6. Polymer parameters: morphology, topology</td>
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<td><strong>Section II. Polymerizations and polymers (&amp; their applications)</strong></td>
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<td></td>
<td><strong>Step growth polymerization</strong></td>
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<tr>
<td>09/06/2013</td>
<td>Fri</td>
<td>7. Step growth polymerization</td>
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<tr>
<td>09/09/2013</td>
<td>Mon</td>
<td>8. Step growth: polyester and polyamide</td>
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<td>09/13/2013</td>
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<td>10. Step growth: polycarbonate</td>
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<td>09/16/2013</td>
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<td><strong>EXAM 1</strong></td>
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<td>Go over Exam 1</td>
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<td>09/20/2013</td>
<td>Fri</td>
<td>11. Step growth: poly(arylene ether)</td>
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<tr>
<td>09/23/2013</td>
<td>Mon</td>
<td>12. Step growth: PPS, polyimide</td>
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<td>09/27/2013</td>
<td>Fri</td>
<td>14. Step growth: thermoset, epoxy, etc.</td>
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<td>09/30/2013</td>
<td>Mon</td>
<td>15. <em>Special topic</em>: Michael Addition</td>
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<tr>
<td>10/02/2013</td>
<td>Wed</td>
<td>16. <em>Special topic</em>: conjugated polymers/conducting polymers</td>
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<td><strong>Chain growth polymerization</strong></td>
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<td>10/04/2013</td>
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<td>17. Free radical polymerization</td>
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<td>10/07/2013</td>
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<td>18. Oligomer: chain transfer</td>
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<td>10/09/2013</td>
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<td>19. Thermodynamics and solution polymerization</td>
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<td><strong>Heterogeneous polymerization</strong></td>
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<tr>
<td>10/11/2013</td>
<td>Fri</td>
<td>20. Heterogeneous polymerization: precipitation, suspension, and</td>
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<td>dispersion polymerization</td>
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<td>Wed</td>
<td>No Class</td>
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<td>10/21/2013</td>
<td>Mon</td>
<td>21. Heterogeneous polymerization: emulsion (1)</td>
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<td>10/25/2013</td>
<td>Fri</td>
<td>23. Copolymer and copolymerization</td>
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<td>10/28/2013</td>
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<td>24. Ziegler Natta catalysts</td>
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<td>25. Metallocene catalysts: stereo control</td>
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<td>11/01/2013</td>
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<td>26. Early metal metallocene catalysts and Late metal catalysis</td>
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<td>11/04/2013</td>
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<td>27. <strong>Special topic</strong>: Polymers used in microelectronics</td>
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<td>11/06/2013</td>
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<td>28. <strong>Special topic</strong>: Photoresist and photolithography</td>
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<td>11/08/2013</td>
<td>Fri</td>
<td>29. Living polymerization (1)</td>
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<td>11/11/2013</td>
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<td>30. Living polymerization (2)</td>
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<td>11/13/2013</td>
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<td>31. Block copolymer basics</td>
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<td>11/15/2013</td>
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<td>32. Cationic polymerization</td>
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<td>11/22/2013</td>
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<td>33. Ring opening polymerization (1)</td>
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<td>11/25/2013</td>
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<td>34. Ring opening polymerization (2)</td>
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<tr>
<td>12/02/2013</td>
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<td>35. <strong>Special topic</strong>: Basic silicone chemistry</td>
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<tr>
<td>12/04/2013</td>
<td>Wed</td>
<td>36. <strong>Special topic</strong>: Basic silicone chemistry (2)</td>
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**Final Dec 7th, Saturday, 8 to 10AM**