

Tentative Chem 36 (CRN 10112) Syllabus using Atkins, Jones, and Laverman (AJL), Seventh Edition.

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Office hours in Room 109A Cook; MWF 9-10:30 AM and 1-2 PM, others by appointment.

Lectures: MWF 10:50-11:40 AM in Room 514 Dewey Hall; exams Tuesday 6 PM, 403 Lafayette.

Laboratories: W 1:10-3:55 PM, R 1:10-3:55 PM, and R 6:00-8:45 PM, all in Room A141 Cook.

Assigned tutorials and problem sets may be found on the course website at saplinglearning.com

A tentative schedule covering the timing of lecture topics, readings, Sapling tasks, lab schedule, review sessions, and exam dates is included at the end of this syllabus.

This is a fun course. In it, you will encounter many subjects that play key roles in your daily lives, including chemical equilibrium, acids and bases (and solution chemistry in general), oxidation and reduction, kinetics, main group chemistry, nuclear chemistry, and organic chemistry. In discussing these subjects, I ask you (the student) to play the leading role, by acquainting yourself with the main ideas using the tutorials and labs as a guide, and then working with me to master the details in lectures and on the problem sets. Occasional exams will keep all of us on track.

Blackboard will be set up for this class. There you will find occasional announcements, worked out example problems from class, laboratory instructions, review sheets, old exams, and whatever else you might find useful. You are encouraged to send me items for posting, especially readings and/or news about chemical topics that you think your classmates might enjoy.

Course details are pretty much the same as in the first term of the course. I will post a grading scheme on Blackboard in a couple of weeks. Please email me if you have any other questions.

ENJOY THE COURSE!

1/18, 1/19. **Week 1 Lab.** K_{eq} of $Fe(SCN)_x$.

1/18. CHEMICAL EQUILIBRIUM. AJL Topics 5A, 5B. Equilibria in chemical systems.

1/20. Topics 5D, 5E, 5G. Solubility, and measures of concentration. The equilibrium constant.

1/23. Topics 5G, 5I, 5J. Equilibrium constants and calculations. Hess' Law.

Sapling Tutorials for each set of topics, due before lectures on the cited dates.

Sapling Problem Set 1, to include a total of 10 problems on the topics listed above, due before lecture on 1/27.

1/25, 1/26. **Week 2 Lab.** Acid Neutralizing Potential of Antacids.

1/25. ACIDS AND BASES. Topics 6A, 6B. Reactions. Acids and bases. pH.

1/27. Topic 6C. Weak acids and bases.

1/30. Topic 6D. pH of aqueous solutions.

Sapling tasks as before, Problem Set 2 due 2/3. Topics 6A, B, C, D.

2/1, 2/2. **Week 3 Lab.** Acid-Base Equilibria and Buffers.

2/1. ACIDS AND BASES. Topic 6E. Polyprotic acids and bases.

2/3. Topic 6G. Buffers.

2/6. Topic 6H. Titrations.

Sapling tasks as before, Problem Set 3 due 2/10. Topics 6E, G, H.

2/8, 2/9. **Week 4 Lab.** Electrolysis and Electroplating.

2/8. SOLUBILITY. Topics 6I, 6J. Solubility equilibria and calculations.

2/10. OXIDATION AND REDUCTION. Topics 6K, 6L. Redox reactions and galvanic cells.

2/13. Topics 6M, 6N, 6O. Standard potentials, and applications (inc electrolytic cells).

Sapling tasks as before, Problem Set 4 due 2/17. Topics 6I, J, K, L, M, N, O.

2/15, 2/16. **Week 5 Lab.** Avogadro's Number?

2/15. "Catch-up".

2/17. "Catch-up".

2/20. Review for exam (Holiday?).

2/21. **Exam 1** Will cover the assigned topics in Chapters ("Foci") 5 and 6.

No Tutorials or Problem Sets this week.

2/22, 2/23. **Week 6 Lab.** Chemical Kinetics. Iodination of Acetone.

2/22. KINETICS. Topic 7A. Reaction rate.

2/24. Topic 7B. Integrated rate laws. Half-lives.

2/27. Topic 7C. Elementary steps. Reaction mechanisms.

Sapling tasks, as before. Problem Set 5 due 3/3. Topics 7A, B, C

3/1, 3/2. **Week 7 Lab.** Chemical Kinetics. Dimerization of NO_2 ?

3/1. KINETICS. Topic 7D. Models of reactions.

3/3. Topic 7E. Catalysis.

3/6. "Catch-up".

Sapling tasks, as before. Problem Set 6 due 3/10. Topics 7D, E

3/8, 3/9. **Week 8 Lab.** Activation Energy of a Chemical Reaction? Clock Reactions???

3/8. MAIN GROUP CHEMISTRY. Topics 8A, 8B, 8C, and 8D. Periodic trends, alkalis and alkaline earths.

3/10. Topics 8E, 8F, and 8G. The boron, carbon, and nitrogen families.

3/20. Topics 8H, 8I, and 8J. The oxygen, halogen, and noble gas families.

Sapling tasks, as before. Problem Set 7 due 3/24. All Chapter 8 Topics.

Spring Break 3/13-3/17.

3/22, 3/23. **Week 9 Lab.** Qualitative Analysis???

3/22. MAIN GROUP CHEMISTRY. Topics 9A and 9B. d-Block Elements. The Rare Earths.

3/24. "Catch-up".

3/27. Review for Exam.

3/28. **Exam 2.** Will cover assigned topics in Foci 7 and 8.

3/29, 3/30. **Week 10 Lab.** Coordination Compounds. Synthesis and Properties of $[\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}](\text{NO}_3)_3$.

3/29. TM COMPLEXES. Topic 9C. Coordination Cpd. Nomenclature and reactions (also see Topic 6I).

3/31. Topic 9C. Geometries of Complex Ions. Shapes and isomers.

4/3. Topic 9D. Electronic Structure of Complex Ions. Colors and magnetic properties.

Problem Set 8 due 4/7. All topics in Focus 9.

4/5, 4/6. **Week 11 Lab.** Colors of Transition Metal Complex Ions.

4/5. NUCLEAR CHEMISTRY. Topic 10A. Nuclei and their properties.

4/7. Topic 10B. Radioactivity. Applications.

4/10. Topic 10C. Nuclear Energy.

Problem Set 9 due 4/14. All topics in Focus 10.

4/12, 4/13. **Week 12 Lab.** Building Organic Molecules.

4/12. ORGANIC CHEMISTRY. Topics 11A and 11C. Aliphatic and aromatic hydrocarbons.

4/14. Topics 11B and 11D. Reactions of hydrocarbons, functional groups.

4/17. Topics.... Structural patterns, isomers, chirality.

Problem Set 10 due 4/22. Topics 11A, B, C, and D.

4/19, 4/20. **Week 13 Lab.** Review for exam.

4/19. Topics.... Resonance in organic molecules. A bit about MO theory.

4/21. Topics.... Arrow pushing conventions, reaction patterns. Mechanisms.

4/24. Topic 11E. Introduction to polymers. History, nomenclature.

4/25. **Exam 3.** Will cover assigned topics in Foci 9, 10, and 11.

4/26, 4/27. **Week 14 Lab.** Making Polymers.

4/26. Topics.... Macromolecular architecture, shapes, and properties.

4/28. Topics.... Physical and mechanical properties of polymers.

Problem Set 11 due 4/28. Reaction mechanisms and polymers.

5/3, 5/4. **Week 15 Lab.** ACS Standardized Exam.

5/1. Topics.... Biopolymers. Sugars and Carbohydrates. Lipids.

5/3. Topics.... Amino acids and Proteins.

5/5. Topics.... Nucleic acids and the Genetic Code. Recombinant technology.

Problem Set 12 due 5/5. Biochemistry.

Final Exam date, time, and location to be determined.