Section 001: Lecture: MWF 9:20 AM – 10:27AM; Recitation: T 12:00PM – 12:55 PM  
Location: 378 SEB (Science and Engineering Building).

Instructor: Dr. Xiangqun Zeng, Associate Professor of Chemistry
Office Location: 231 Science and Engineering Building (SEB); Office phone: (248) 370-2881;  
E-mail: zeng@oakland.edu; web: www.oakland.edu/~zeng

Office Hours: Before and after class or by appointment (contact by phone or e-mail)

Textbook: General Chemistry by Ebbing and Gammon, 7th Edition
Optional Material: Study Guide (available in book store)

Tuesday recitation: These periods are an integral part of the course. This session will be used mainly for problem solving, reviewing, and questions and answers.

Course format: CHM 168 is an integrated lecture-laboratory course involving classroom periods MWF 9:20 – 10:27AM, recitation T, 12:00-12:55PM in 376 SEB and laboratory sections.

Learning Objectives:
Chapter 14
After completing the chapter, you should be able to
• Relate the different ways of expressing reaction rates
• Calculate the order of reaction from the rate law
• Determine the rate law from initial rates
• Use the concentration-time equation for a first-order reaction
• Relate half-life of a reaction to the rate constant
• Use the Arrhenius equation
• Write the overall chemical equation from a mechanism
• Determine the molecularity of an elementary reaction
• Determine the rate law from a mechanism

Chapter 15
After completing the chapter, you should be able to
• Apply stoichiometry to an equilibrium mixture
• Write equilibrium constant from reaction composition
• Use the reaction quotient
• Obtain one equilibrium concentration given the others
• Solve equilibrium problems
• Apply Le Chatelier’s principle

Chapter 16
After completing the chapter, you should be able to
• Identify acid and base species
• Identify Lewis acid and base species
• Decide whether reactants or products are favored in an acid-base reaction
• Calculate concentrations of $\text{H}_3\text{O}^+$ and $\text{OH}^-$ in solutions of a strong acid or base
• Calculate the pH from the hydronium-ion concentration, or vice versa
Chapter 17
After completing the chapter, you should be able to
• Determine $K_a$ (or $K_b$) from the solution pH
• Calculate concentration of species in a weak acid solution using $K_a$
• Calculate concentration of species in a weak base solution using $K_b$
• Predict whether a salt solution is acidic, basic, or neutral
• Obtain $K_a$ from $K_b$ or $K_b$ from $K_a$
• Calculate concentrations of species in a salt solution
• Calculate the common-ion effect on acid ionization
• Calculate the pH or a buffer when a strong acid or base is added
• Calculate the pH of a solution of a strong acid and a strong base
• Calculate the pH at the equivalence point in the titration of aqueous weak acid by a strong base

Chapter 18
After completing the chapter, you should be able to
• Write solubility product expressions
• Calculate $K_{sp}$ from the solubility, or vice versa
• Calculate the solubility of a slightly soluble salt in a solution of a common ion
• Predict whether precipitation will occur
• Determine the qualitative effect of a pH on solubility
• Calculate the concentration of a metal ion in equilibrium with a complex ion
• Calculate solubility of a slightly soluble ionic compound in a solution of the complex ion

Chapter 19
After completing the chapter, you should be able to
• Calculate the entropy change for a phase transition
• Predict the sign of the entropy change of a reaction
• Calculate $\Delta S^\circ$ for a reaction
• Calculate $\Delta G^\circ$ from $\Delta H^\circ$ and $\Delta S^\circ$
• Calculate $\Delta G^\circ$ from standard free energies of formation
• Interpret the sign of $\Delta G^\circ$
• Write the expression for a thermodynamic equilibrium constant
• Calculate $K$ from the standard free–energy change
• Calculate $\Delta G^\circ$ and $K$ at various temperatures

Chapter 20
After completing the chapter, you should be able to
• Balance equations in acidic and basic solutions by the half–reaction mechanism
• Sketch and label a voltaic cell
• Write the cell reaction from cell notation
• Calculate the quantity of work from a given amount of cell reactant
• Determine the relative strengths of oxidizing and reducing reagents
• Determine the direction of spontaneity from electrode potentials
• Calculate the emf from standard potentials
• Calculate the free-energy change from electrode potentials
• Calculate the equilibrium constant from cell emf
• Calculate cell emf for nonstandard conditions
• Predict the half-reactions in an aqueous electrolysis
• Relate the amounts of charge and product in an electrolysis

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Winter break Feb. 24-Mar. 3

| March | | |
| 5 Chapter 17 | 6 recitation | 7 TEST 2 | 8 | 9 Chapter 18 |
| 12 Chapter 18 | 13 recitation | 14 Chapter 18 | 15 | 16 Chapter 18 |
| 19 Chapter 18 | 20 recitation | 21 QUIZ 3 Chapters 6+19 | 22 | 23 Chapter 19 |
| 26 Chapter 19 | 27 recitation | 28 Chapter 19 | 29 | 30 TEST 3 |

| April | | |
| 2 Chapter 20 | 3 recitation | 4 Chapter 20 | 5 | 6 Chapter 20 |
| 9 Chapter 20 | 10 recitation | 11 Practice Quiz for Chapter 20 | 12 | 13 Review for Final |
| 16 Review for Final | 17 recitation | 18 Review for Final | 19 | 20 |
| 23 Final Exam 8:00-11:00AM | 24 | 25 | 26 | 27 |

GRADING  • The lecture portion of this course will account for 80% of your final grade and the lab 20%. Grading in lecture on a modified curve
≈ 95% = 4.0  ≈ 85% = 3.6  ≈ 75% = 3.0  ≈ 68% = 2.5
≈ 60% = 2.0  ≈ 53% = 1.5  ≈ 53% = 1.5  < 45% = 0.0
• Homework will be assigned but not collected or graded. Success on exams is related to completing homework.
• Quizzes:  3 x 50 points each = 150 points
• Tests (Cumulative):  3 x 100 points each = 300 points (25% from the chapter which has been tested in the quiz)
• Final exam (Cumulative):  1 x 200 points each = 200 points (100 points Scantron and 100 points short answers, 25% for chapter 20, 75% from all chapters except chapter 20)
NO make-up quizzes, tests, or final exam will be given.
NO lowest grades will be dropped.
NO extra credit is available.

CLASS ATTENDANCE: Attendance is strongly encouraged although not mandatory and you are responsible for all material presented in the lectures including changes made in class to the tentative schedule above.

IF YOU ARE REPEATING THIS COURSE, you may be able to waive the laboratory portion of the current course. You may choose to use the laboratory scores from the first course if: (1) your average in the laboratory portion of that course was at least 75% and (2) you were enrolled in that course no more than three years ago. If you wish to apply for a laboratory waiver, you must complete a General Chemistry Laboratory Waiver form. These forms are available in the Department of Chemistry office, 260 Science and Engineering Building (SEB). This laboratory waiver form must be completed and returned to your current lecture instructor during the first week of the current semester. You must attend the laboratory portion of the course until the waiver is approved.

CHEATING: A student will be referred to the Academic Conduct Committee for review if suspected of cheating. Examples of cheating include copying on exams, changing answers on exams after they are scored (scored answer forms are photocopied before being returned), having another person take an exam, or obtaining exam questions prior to the exam time. Students found guilty of academic misconduct face suspension or permanent dismissal from the university. For further details see the 2003/2004 Undergraduate Catalog, pages 70 and 71.