Chemistry 212

Professor: Dr. Jay (Jiyeon) Kim

Office: Beaupre Center 374D, (T) 412-874-2143
Email: jkim25@uri.edu
Office hours: visit in 374D after making an appointment with email.

Text: Harris, Quantitative Chemical Analysis, **9th ed.** WH Freeman. (**Chapters 0-11**)

Chapter 0: Analytical Process
Chapter 1: Chemical Measurements
Chapter 2: Tools of the Trade
Chapter 3: Experimental Error
Chapter 4: Statistics
Chapter 5: Quality Assurance and Calibration Methods
Chapter 6: Chemical Equilibrium
Chapter 7: Let the Titrations Begin
Chapter 8: Activity and the Systematic Treatment of Equilibrium
Chapter 9: Monoprotic Acid-Base Equilibrium
Chapter 10: Polyprotic Acid-Base Equilibrium
Chapter 11: Acid-Base Titrations

Other resources: Skoog, Fundamentals of Analytical Chemistry, Thomson-Brooks/Cole
Chang, General Chemistry: the Essential Concepts, McGraw-Hill

Course objectives:

- To understand the goals of analytical chemistry, i.e., the questions analytical chemists seek to answer, and the steps required to perform quantitative analysis.
- To understand how chemical reactions may be utilized for the quantitative measurement of one or more compounds (analytes) in a sample.
- To develop critical reasoning skills so that a student can calculate ***the concentration of analyte in an unknown sample*** *(and the associated uncertainty, when applicable), given an appropriate set of data.*
- To develop a greater understanding of relevant chemical equilibria (solubility, acid-base, complexation, and oxidation/reduction), and to apply this knowledge in solving different types of equilibrium-based problems (pH, principal species, fractional composition, etc.).
- To understand how the underlying methods of calibration (external standards, standard addition, and internal standardization) may be utilized for quantitative measurements in each.
- To understand the difference between accuracy and precision and the figures of merit used to quantify them (relative error and relative standard deviation).
- To be able to perform basic statistical tests such as the Grubbs-test, the t-test, and the F-test on one or more sets of data.

Studying:

This course moves quickly. We will cover each chapter approximately in one - two weeks, so it is important that you keep up with the workload. The material learned in each chapter will be used in subsequent chapters, so if you fall behind in the first few weeks, it would be hard for you to catch up again. You are also expected to retain the material you learned in freshman chemistry, especially error, moles/molarity calculations from the first semester of general chemistry and equilibrium calculations that were performed in the second semester.

Exercises and problems from your textbook:

Exercises and problems from your textbook are ***strictly optional***, but will frequently be used in a slightly modified way on quizzes and exams as a reward to the students who work them in a faithful manner.

Materials for Experiments

Experiments will be posted in the Resources section of Sakai.

Office Hours:

Email with subject CHM212 for an appointment. Visiting in group is also welcome. If you have questions related with the lab, see **Surendra Puri (Beaupre 395, (T) 412-874-5081, puri-51@my.uri.edu)**.

Disability Accommodations:

Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. Early notice at least one week ahead is necessary to set up an alternate location or time for exams or quizzes. Documentation from Disabilities Services is required, so contact first at 330 Memorial Union, 401-874-2098.

Sports or Other University Sponsored Events:

Please let me know the first week of classes if you need any accommodations. Any time conflict with lab session should be informed as early as possible.

Course Grades:

The course is graded strictly based on the quizzes, lab grades and exams. **There is no extra credit!** Any errors in grading must be brought to my attention within one week of the material being handed back. No changes in any grades will be made after that point.

Scaling:

The scale for the course will be posted on the Sakai after each exam. 60% of the grade based on lecture material and 40% on the lab. All grades will be posted on Sakai with a letter grade as you proceed through the course.

Lecture Grade: 60% of Grade

Weekly Quiz: You will have a 15 min-long quiz after each chapter almost every week. We will have a recitation session (**Oct 17 and Dec 10**) to review the quizzes right before the Midterm and the final exams.

Exams: Each exam will have tentatively 5~7 questions. There will be several parts per question. All work must be shown to get credit. The final will be cumulative. Your Midterm and final are worth 40% of the overall grade. **You cannot drop the final**, so if you miss it, you need to be in touch immediately to get it made up.

Attendance: TA will check the attendance in every class. Absence more than 5 times will have a zero point for the attendance. Unavoidable absence due to illness or accident etc. will need an official letter. Any personal excuse won't be acceptable.

Grading: Your course grade will be determined as outlined below. The percentages are approximate (± 5%).

In-class quiz 15 %

Attendance 5 %

Midterm (October 22, 2019, in class) 20 %

Final (December 12, 2019, in class, 8 am) 20 %

Grading scale: The standard grading scale is employed, i.e., "A" ≥ 91, 86-90 = "A-", 81-85 = "B+ ", etc.

Lab: 40% of Grade

Lab Reports: Each lab is graded according to the rubric in the instructions given out in lab. Lab reports constitute 25 % of the overall grade

Lab Notebook: You will be expected to maintain a lab notebook throughout the course. Explicit instructions and a rubric will be provided as to the grading of this document at the end of the semester. The lab notebook grade will be 5 % of your overall grade.

Lab Final: You will be expected to do quantitative lab work for your final that will be based on the techniques you learn in the lab. You will be expected to do out all calculations during the lab that you need to support your results. Your grade on the final will be based on the accuracy of the results and is worth 10% of your overall grade in the course.

Note: You need C^- to move on to upper courses of Chemistry in the chemistry department!