

CHEM 3520, Quantitative Analysis, CRN 20443

Spring 2017, University of Central Arkansas

General Information

Professor: Dr. Robert Mauldin

Contact Information: Laney-Manion Hall 303B, rmauldin@uca.edu

Office Hours: MW 9-11 AM

Lecture: MWF 8:00-8:50 AM, Laney-Manion Hall 103

Laboratory: TTh 2:40-5:20 PM, Laney-Manion Hall 302

Required Course Materials

Textbook: "Quantitative Chemical Analysis" by Daniel C. Harris, 9th edition.

Labs: Electronic copies will be posted on BlackBoard; you will need to bring a printed copy to each lab. A laboratory notebook is required.

Calculator: A scientific calculator.

Safety Glasses: A pair of safety glasses with side-shields, ANSI Z87 certified.

Course Description and Objectives

Course Description: Theory and practice of gravimetric, volumetric, and instrumental methods of quantitative analysis. The laboratory develops problem-solving and analytical techniques for the proper analysis of a variety of analytes. Three hours of lecture and 6 hours of laboratory per week. Prerequisite: Grade of C or better in CHEM 1451.

Grading Policies

1. Grading Composition

17 participation-based labs @ 20 points each = 340 points

3 exams @ 100 points each = 300 points

1 comprehensive final exam (covers lecture and lab material) = 200 points

2. Grading scale: 90-100%=A; 80-89%=B; 70-79%=C; 60-69%=D; <60%=F

3. Extra Credit, Dropped Grades: No extra credit will be offered and no grades will be dropped.

4. Attendance and Missed Work Policy: If you miss an exam or any part of a lab, the prorated grade on your final exam will be used in place of the missed exam or lab grade. If you miss more than 3 lab periods, you may be dropped from the course for non-attendance. There are no make-up labs. You may not be allowed to complete the lab if you are late.

5. Academic Misconduct Policy: In the first instance of academic dishonesty (including smart phone use during an exam), a zero will be assigned for the assignment. In the second instance, a failing grade will be assigned for the class.

6. Laboratory Safety Policy: You are responsible for abiding by general safety and waste disposal procedures covered at the beginning of the semester and specific procedures addressed at the start of each lab period.

7. Assigned End-of-Chapter Problems: Although assigned problems are not formally a part of the grade for the course, it is your responsibility to work and study them in preparation for exams. Assigned problems will be distributed as we cover each chapter.

8. Participation Grade for Labs: Lab notebook entries must be approved, preferably the same day that you complete the lab. Also, you must get acceptable results for full credit. You may repeat a lab only once to get acceptable results. Once a lab is repeated and if results are still not acceptable, a zero will be assigned for the lab.

UCA/State/Federal Policies

1. Academic Misconduct Policy: The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy. See the current Student Handbook for the procedure to appeal accusations of academic misconduct.

2. Americans with Disabilities Act Policy: The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this act due to a disability, please contact the UCA Office of Disability Services, 450-3613. If you are pregnant, allergic to any chemicals, color-blind, or have any other condition that might impact work in a chemistry lab, tell me immediately so that we can make accommodations.

3. Title IX Disclosure Policy: If a student discloses an act of sexual harassment, discrimination, assault, or other sexual misconduct to a faculty member (as it relates to "student-on-student" or "employee-on-student"), the faculty member cannot maintain complete confidentiality and is required to report the act and may be required to reveal the names of the parties involved.

Any allegations made by a student may or may not trigger an investigation. Each situation differs and the obligation to conduct an investigation will depend on the specific set of circumstances. The determination to conduct an investigation will be made by the Title IX Coordinator. For further information, please visit: <https://uca.edu/titleix>. **Disclosure of sexual misconduct by a third party who is not a student and/or employee is also required if the misconduct occurs when the third party is a participant in a university-sponsored program, event, or activity.*

4. Student Evaluations of Teaching Effectiveness Policy: Student evaluations of a course and its professor are crucial elements in helping faculty achieve excellence in the classroom and the institution in demonstrating that students are gaining knowledge. Students may evaluate courses they are taking starting on the Monday of the twelfth week of instruction through the end of finals week by logging in to myUCA and clicking on the Evals button on the top right.

5. Emergency Matters Policy: An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

Course Schedule*

<u>Dates</u>	<u>MWF Lecture</u>	<u>TTh Lab</u>
1/12-1/13	Chapter 0, The Analytical Process	Lab #1 Safety and Orientation
1/16-1/20	Chapter 1, Chemical Measurements. Note: No class on Monday due to Martin Luther King, Jr. Holiday	Lab #2 Calibration of a Buret
1/23-1/27	Chapter 2, Tools of the Trade and Chapter 3, Experimental Error	Lab #3 Fewest Number of Blue 1 Molecules Detectable by the Human Eye versus a Spectronic 20
1/30-2/3	Chapter 4, Statistics	Lab #4 Penny Lab: An Exercise in Statistics
2/6-2/10	Chapter 5 Quality Assurance and	Lab #5 Preparation of Standard 0.1 M

	Calibration Methods	NaOH and 0.1 M HCl Solutions for Acid-Base Titrations (Tuesday) and Lab #6 Standardization of 0.1 M HCl Solution with Sodium Carbonate (Thursday)
2/13-2/17	Exam 1, Chapters 0-5, on Monday, 2/13. Chapter 6, Chemical Equilibrium	Lab #7 Standardization of 0.1 M NaOH with KHP (Tuesday) and Lab #8 Determination of the Mass Percent of KHP in an Unknown Sample (Thursday)
2/20-2/24	Chapter 7, Let the Titrations Begin and Chapter 8, Activity and the Systematic Treatment of Equilibrium	Lab #9 Determination of Mass Percent Sodium Carbonate in an Unknown Sample (Tuesday) and Lab #10 Determination of the Total Alkalinity of a Natural Water Sample (Thursday)
2/27-3/3	Chapter 9 Acid/Base Equilibrium	Repeat Experiments with Poor Results
3/6-3/10	Chapter 9, continued and Chapter 11, Acid-Base Titrations	Lab #11 Determination of the Molar Mass of KHP via Potentiometric Titration with NaOH and Lab #12 Water Hardness by EDTA Titration
3/13-3/17	Chapter 11, continued. Exam 2, Chapters 6-9, 11 on Friday, 3/17.	Potentiometric Titration and EDTA Titration Labs
3/20-3/24	Spring Break Week	Spring Break Week

3/27-3/31	Chapter 12, EDTA Titrations. Chapter 14, Fundamentals of Electrochemistry.	Lab #13 Quantification of Fluoride in Tap Water with a Fluoride Ion Selective Electrode and Lab #14 Spectrophotometric Analysis of Phosphate in a Natural Water Sample
4/3-4/7	Chapter 14, continued.	Fluoride and Phosphate Labs, continued
4/10-4/14	Chapter 18, Fundamentals of Spectrophotometry.	Lab #15 Treatment of Molybdate-Containing Waste from the Phosphate Lab (Tuesday) and Lab #16 The Role of a Salt Bridge in a Galvanic Electrochemical Cell (Thursday)
4/17-4/21	Chapter 18, continued. Exam 3, Chapters 12, 14, 18 on Wednesday, 4/19. Chapter 23, Introduction to Analytical Separations	Lab #17 Quantification of FD&C Dyes in Grape Kool-Aid Jammers Using C-18 Liquid Chromatography and UV-Visible Absorption Spectrophotometry
4/24-4/28	Chapter 23, continued. Note: No class on Friday due to Study Day.	Repeat Experiments with Poor Results
5/1-5/5	Final Exam on Wednesday, 5/3, 8-10 AM. Final covers both lecture and lab content.	No lab this week since it is final exam week.

***Note: Important dates are 3/27, drop deadline (W) and 4/14, drop deadline (WP/WF).**

<u>Chapter</u>	<u>Assigned Problems</u>
0	1, 2, 3, 4
1	1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 36, 38
2	1, 2, 3, 4, 5, 16, 17, 18, 19, 20, 21, 22, 24
3	1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15
4	1, 2, 3 a, b, c, e, 5 a, b, 9, 10, 12, 13, 14, 18, 22
5	23, 30
6	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15, 21, 22, 23, 24, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51
7	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
8	1, 2, 3, 4, 5, 10, 11, 12
9	2, 5, 6, 7, 8, 11, 18, 19, 20, 21, 23, 26, 29, 30, 32, 33, 34, 35, 36, 38
11	1, 2, 4, 5, 6, 9, 10, 12, 13, 14, 15, 16, 18, 60, 61, 62, 63
12	1, 3, 6, 7, 14, 23, 25, 27, 32
14	1, 2, 3, 4a-c, 5, 6, 7, 8, 10, 12, 13, 14, 15, 16, 17, 28, 29, 30
18	1, 2, 3, 4, 7, 8, 9, 11, 12, 13, 17, 18, 31, 32, 33, 35, 36
23	1, 3, 4, 5, 6, 8, 9, 17, 18, 19, 20, 23, 25, 26, 28, 32, 33, 35, 36, 37, 38, 39, 40, 41, 44, 46