

CHEM 3520, Quantitative Analysis, CRN 21789 & 17888

Fall 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: CRN 21789 TTh 9:25 AM - 12:05 PM, LM 302

CRN 17888 TTh 2:40 - 5:20 PM, LM 302

Required Course Materials

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

Labs: Electronic copies of the laboratories will be posted on our BlackBoard site. A laboratory notebook is required (carbon copy is not necessary, a composition notebook is OK).

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

16 labs @ 20 points each = 320 points

3 exams @ 100 points each = 300 points*

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

**All exams cover content in both lecture and lab*

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 portion 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 makeup labs.

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. Grading Policy for the Lab: Lab notebook entries must be approved for full credit in the lab, preferably the same day that you complete the lab, but at the latest during the next lab period (after which a 0/20 will be assigned for the lab as a late penalty). If you get acceptable results and your lab notebook has been approved as is or corrected as directed and then approved, a grade of 20/20 will be assigned. If you don't get acceptable results, there are six lab periods set aside to repeat experiments. If, after repeating an experiment one or more times during the allotted repeat days and you still don't get acceptable results, a grade of 0/20 will be assigned for that 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>
8/24-8/25	Chapter 0, The Analytical Process	Safety and Orientation
8/28-9/1	Chapter 1, Chemical Measurements	Lab #1 Calibration of a Buret; Lab #2 Fewest Number of Blue #1 Molecules Detectable by the Human Eye and a Spectronic 20
9/4-9/8	Chapter 2, Tools of the Trade; Chapter 3, Experimental Error.	Lab # 2; Lab #3 Penny Lab: An Exercise in Statistics

	Note: No lecture on Monday (Labor Day)	
9/11-9/15	Chapter 4, Statistics	Lab #3; <i>Repeat Day #1</i>
9/18-9/22	Chapter 5, Quality Assurance and Calibration Methods	Lab #4 Preparation of Standard 0.1 M NaOH and 0.1 M HCl Solutions for Acid-Base Titrations; Lab #5 Standardization of 0.1 M NaOH with KHP
9/25-9/29	Exam 1 on Monday, 9/25 Chapter 6, Chemical Equilibrium	Lab #6 Standardization of 0.1 M HCl with Sodium Carbonate; <i>Repeat Day #2</i>
10/2-10/6	Chapter 7, Let the Titrations Begin; Chapter 8, Activity and the Systematic Treatment of Equilibrium	Lab #7 Determination of Mass Percent of KHP in an Unknown Sample; Lab #8 Determination of the Mass Percent of Sodium Carbonate in an Unknown Sample
10/9-10/13	Chapter 9, Acid/Base Equilibrium	Lab #9 Determination of the Total Alkalinity of a Natural Water Sample; <i>Repeat Day #3</i>
10/16-10/18	Chapter 9, continued. Note: No class on Wednesday (Dr. Mauldin out of town) nor Thursday and Friday (Fall Break)	Lab #10 Determination of the Molar Mass of KHP via Potentiometric Titration with NaOH; Lab #11 Water Hardness by EDTA Titration
10/23-10/27	Chap. 11, Acid-Base Titrations, Exam 2, Friday, 10/27	Lab # 10, 11

10/30-11/3	Chapter 12, EDTA Titrations	Lab #10, 11; <i>Repeat Day #4</i>
11/6-11/10	Chapter 14, Fundamentals of Electrochemistry	Lab #12 Quantification of Fluoride in Tap Water with a Fluoride Ion Selective Electrode; Lab #13 Spectrophotometric Analysis of Phosphate in a Natural Water Sample
11/13-11/17	Chapter 18, Fundamentals of Spectrophotometry	Lab #12, 13
11/20-11/21	Exam 3 on Monday, 11/20. (no class 11/22-11/24, Thanksgiving Break)	<i>Repeat Day #5</i>
11/27-12/1	Chapter 23, Introduction to Analytical Separations	Lab #14 Treatment of Molybdate-Containing Waste from the Phosphate Lab; Lab #15 The Role of a Salt Bridge in a Galvanic Electrochemical Cell
12/4-12/8	Chapter 23, continued	Lab #16 Quantification of FD&C Dyes in Grape Kool-Aid Jammers Using C-18 Liquid Chromatography and UV-Visible Absorption Spectrophotometry; <i>Repeat Day #6</i>
12/11-12/15	Final Exam (comprehensive) on Wednesday, 12/13, 8-10 AM	No lab due to final exam week.

***Note: An important date is 11/10, final date to officially withdraw unless already dropped for non-attendance. After this date, only grades of A, B, C, D and F will be assigned.**

<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 (correct answer is 4.3×10^{-13})
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, 44, 46