

CHEM 3520, Quantitative Analysis, CRN 30827

Spring 2020, University of Central Arkansas

General Information

Professor: Dr. Robert Mauldin

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

Office Hours: MW 9-11 AM or by appointment

Lecture: MWF 8:00-8:50 AM, Laney-Manion Hall 105

Laboratory: TTh 10:50 AM – 1:30 PM AM, Laney-Manion 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/graphing 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

21 labs @ 15 points each = 315 points

3 exams* @ 100 points each = 300 points

1 comprehensive final exam* = 200 points

*Cover both lecture and lab content.

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 a solution prep lab, you may complete the analysis portion of the lab for full credit provided you show me your completed calculations for solution preparation at the beginning of the lab period. If you miss three or more lab periods prior to the W deadline, you may be dropped from the course for non-attendance. There are no makeup labs (note that repeat days are not makeup days). ***You will not be allowed to complete the lab (and will be counted absent) if: a) you are more than five minutes late to lab, b) you do not have safety glasses, c) you do not have a printed copy of the lab handout, d) you do not have a scientific/graphing calculator, e) you are not wearing close-toed shoes and long pants, or f) you do not have your lab notebook.***

5. Academic Misconduct Policy: In the first instance of academic dishonesty (including smart phone use during an exam or falsifying lab results), 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 0/15 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 15/15 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 0/15 will be assigned for that lab. Note that repeat days are for repeating labs only and not for the makeup of a missed 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

Monday	Tuesday	Wednesday	Thursday	Friday
			1/9 Lab 1 Safety and Check-In	1/10 Ch. 0 The Analytical Process
1/13 Ch. 1 Chemical Measurements	1/14 Lab 2 Calibration of a Buret	1/15 Ch. 1, Ch. 2 Tools of the Trade	1/16 Lab 3 Fewest Number of Blue #1 Molecules	1/17 Ch. 3 Experimental Error
1/20 No Class: MLK Jr. Day	1/21 Lab 3 continued	1/22 Ch. 3	1/23 Repeat Day #1	1/24 Ch. 3, Ch. 4 Statistics

1/27 Ch. 4	1/28 Lab 4 Penny Lab: An Exercise in Statistics	1/29 Ch. 4	1/30 Lab 5 Solution Prep: Standard 0.1 M HCl and 0.1 M NaOH	1/31 Ch. 5 Quality Assurance and Calibration Methods
2/3 Ch. 5	2/4 Lab 6 Standardization of 0.1 M NaOH with KHP	2/5 Ch. 5	2/6 Lab 7 Standardization of 0.1 M HCl with Na ₂ CO ₃	2/7 Exam 1 Ch. 0-5
2/10 Ch. 6 Equilibrium	2/11 <i>Repeat Day #2</i>	2/12 Ch. 6	2/13 Lab 8 Determination of Mass Percent of KHP	2/14 Ch. 7 Let the Titrations Begin
2/17 Ch. 8 Activity and the Systematic Treatment of Equilibrium	2/18 Lab 9 Determination of Mass Percent of Na ₂ CO ₃	2/19 Ch. 8	2/20 Lab 10 Total Alkalinity of Natural Water Sample	2/21 Ch. 8
2/24 Ch. 9 Acid/Base Equilibrium	2/25 Lab 11 Back Titration of a Commercial Antacid	2/26 Ch. 9	2/27 <i>Repeat Day #3</i>	2/28 Ch. 9
3/2 Ch. 11 Acid/Base Titrations	3/3 Lab 12 Potentiometric Titration of KHP & Lab 13 Solution Prep: EDTA and CaCO ₃ Solutions	3/4 Chapter 11	3/5 Labs 12 & 13 (switch from previous lab period)	3/6 Exam 2, Ch. 6-9, 11
3/9 Ch. 12 EDTA Titrations	3/10 Lab 14 Concentration of CaCO ₃ by EDTA Titration	3/11 Ch. 12	3/12 Lab 15 Water Hardness by EDTA Titration	3/13 Ch. 12
3/16 Ch. 14 Fundamentals of Electrochemistry	3/17 <i>Repeat Day #4</i>	3/18 Ch. 14	3/19 Lab 16 Solution Prep: Fluoride and Phosphate	3/20 Ch. 14
3/23 Spring Break	3/24 Spring Break	3/25 Spring Break	3/26 Spring Break	3/27 Spring Break
3/30 Ch. 14 Note: Drop (W) Deadline	3/31 Lab 17 Fluoride Ion-Selective Electrode & Lab 18 Spectrophotometric Analysis of Phosphate	4/1 Ch. 18 Fundamentals of Spectrophotometry	4/2 Labs 16, 17 & 18 continued (switch from previous lab)	4/3 Ch. 18
4/6 Ch. 18	4/7 Lab 16, 17 & 18 continued	4/8 Ch. 18	4/9 <i>Repeat Day #5</i>	4/10 Exam 3, Ch. 12, 14, 18
4/13 Ch. 23 Introduction to Analytical Separations	4/14 Lab 19 Treatment of Phosphate Lab Waste	4/15 Ch. 23	4/16 Lab 20 The Nernst Equation, Lab 19 Continued	4/17 Ch. 23

4/20 Ch. 23	4/21 Lab 21 FD&C Dye Separation, Lab 19 Continued	4/22 Ch. 23	4/23 Check-Out & Repeat Day #6	4/24 No class: <u>Study Day</u>
4/27 No class: <u>Final Exam Week</u>	4/28 No lab: <u>Final Exam Week</u>	4/29 Final 8-10 AM	4/30 No lab: <u>Final Exam Week</u>	5/1 No class: <u>Final Exam Week</u>

Chapter **Assigned Problems**

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	17, 18, 19, 20, 23, 25, 26, 28, 32, 33, 35, 36, 37, 38, 39, 44, 46