

CHEM 3520, Quantitative Analysis

Spring 2021, University of Central Arkansas

General Information

Instructor: Dr. Ahmad Zaman Qamar

Contact Information: Manion Hall 303D, aqamar@uca.edu

Office Hours: MW 9:00 to 10:00 am, MW 11:00 am to noon

Lecture: MWF 8:00-8:50 AM (online via zoom => <https://uca-edu.zoom.us/j/96808751011>)

Laboratory: Tuesdays and Thursdays 10:50 AM – 1:30 PM, Manion 302 (face-to-face)

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 3 hours of laboratory per lab group (A and B) in a week. Prerequisite: Grade of C or better in CHEM 1451.

Grading Policies

1. Grading Composition

10 labs @ 30 points for each lab = 30 %

11 Quizzes @ 30 points for each quiz = 30 %

1 Midterm exam* = 150 points = 15%

1 Final exam* = 250 points = 25 %

*Covers both lecture and lab content.

2. Dropped Grades: Lowest graded quiz will be dropped from the final grade.

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

4. Attendance and Missed Work Policy: If you miss a quiz or any part of a lab, the prorated grade on your final exam will be used in place of the missed quiz 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 two 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 5 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 calculator, e) you are not wearing close-toed shoes and long pants, f) you do not have your lab notebook, g) you don't have a face mask, h) you don't have a natural water sample for the total alkalinity lab or the phosphate lab, or i) you don't sign the safety agreement prior to Lab #1.*

5. Academic Misconduct Policy: In the first instance of academic dishonesty (including 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 associated with each lab.

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 the quizzes and the final exam.

8. Grading Policy for the Lab: If you get acceptable results and your lab notebook has been approved as is or corrected as directed and then approved, maximum 30 points will be assigned. If you don't get acceptable results, there are three 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 0/30 will be assigned for that lab. A late penalty of 10 points per day will be enforced for late submissions of original or revised lab notebook entries. Note that repeat days are for repeating labs only and not for the makeup of a missed lab.

Expectations

- Always respect your classmates and instructor.
- Be on time to class and lab.
- Come to class prepared with the assigned reading completed and ready to answer questions or work on problems in class.
- Spend time outside of class learning course material.
- Take responsibility for your own work, learning, and grades.
- Have academic integrity.
- Finish laboratory work in the assigned laboratory time.
- Be excited about learning and doing chemistry.
- It is expected to keep your zoom camera ON and be attentive during the online class.

Lecture Topics

First formal lecture will be starting from Jan 20th and quizzes will be taken every Friday during class time.

Chapter 0	The 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 Equilibria
Chapter 11	Acid-Base Titrations
Chapter 12	EDTA Titrations
Chapter 14	Fundamentals of Electrochemistry
Chapter 18	Fundamentals of Spectrophotometry
Chapter 23	Introduction to Analytical Separations

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	22, 23, 29, 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

Schedule for Quizzes and Exams

(All quizzes will be on Fridays during class time via blackboard)

Practice Quiz Jan 22 (Non graded)

Quiz 1: Jan 29

Quiz 2: Feb 5

Quiz 3: Feb 12

Quiz 4: Feb 19

Quiz 5: Feb 26

Quiz 6: March 5

Quiz 7: March 12 **Midterm exam on Monday, March 15 via blackboard 8:00 am – 3 pm**

Quiz 8: April 2

Quiz 9: April 9

Quiz 10: April 16

Quiz 11: April 23

No Quiz on April 30

Final exam on Monday, May 3rd via blackboard 8:00 am – 3 pm

Lab Schedule: Group A: Tuesdays and Group B: Thursdays

Group A: Alphabetically by first names **A to J** and **Group B:** **L to Z**

Date	Name of Experiment (Lab reports are due every Saturday at 4 pm)
Jan 19 and 21	No Labs, Sign and submit safety agreement using following link. https://www.uca.edu/web/forms/view.php?id=1553
Jan 26 and 28	Lab 1: Solution Preparation Standard 0.1 M HCl and 0.1 M NaOH Practice Burette Calibration
Feb 2 and 4	Lab 2: Standardization of 0.1 M NaOH with KHP
Feb 9 and 11	Lab 3: Standardization of 0.1 M HCl with Sodium Carbonate
Feb 16 and 18	Repeat Day
Feb 23 and 25	Lab 4: Total Alkalinity of Natural Water Sample
March 2 and 4	Lab 5: Back Titration of a Commercial Antacid
March 9 and 11	Lab 6: Water Hardness by EDTA Titration
March 16 and 18	Repeat Day
March 23 and 25	Spring Break
March 30, April 1	Lab 7: Potentiometric Titration of KHP
April 6 and 8	Lab 8: Solution Preparation - Fluoride and Phosphate
April 13 and 15	Lab 9: Spectrophotometric Analysis of Phosphate
April 20 and 22	Lab 10: Fluoride Ion Selective Electrode
April 27 and 29	Repeat Day

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 my UCA 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.