

CHEM 112 General Chemistry II (with Lab)

Spring 2025

Instructor: Dr. Adharsh Raghavan (*pronounced Ah-the-ersh Rah-guv-un*)

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If you have an emergency, text me at 765-637-3026

Lecture: Tues & Thurs 11:00 am – 12:15 pm, JEPS 100

Lab: Thursdays 12:30–3:15 pm, JEPS 214 (Section 5, Dr. Raghavan)

Tuesdays 3:30–6:15 pm, JEPS 214 (Section 6, Dr. Nguyen)

Office Hours: M 12:00 – 1:00 pm ([Zoom; click here for link](#)), 3:00 – 5:00 pm ([Zoom; click here for link](#))

T 4:00 – 5:00 pm, JEPS 433

W 10:00 am – 12:00 pm, JEPS 433

Required Materials: Openstax Chemistry (2nd ed., Flowers), subscription to Aktiv, lab Coursepack, lab notebook with carbonless duplicate pages, laboratory goggles and lab coat, calculator with scientific notation and exponential functions (you will only be able to use non-graphing calculators on all quizzes and exams. TI-30X calculators are available in the bookstore).

Web Site: This course will make use of the Canvas course management system. Please check here frequently as materials posted will include course announcements, assignments, supplementary videos, and other course materials as necessary. Adjust your notification settings in order to remain up-to-date with the course.

General Education Learning Objectives: This course satisfies the Natural Science General Education requirement. After completing the course, a student should

- Demonstrate understanding of scientific methods that advance scientific knowledge
- Be able to develop explanatory hypotheses for observations, report and display scientific data, and interpret data in a scientifically sound manner
- Use theories and models as unifying principles to understand natural phenomena
- Demonstrate understanding of how scientific methods and resultant knowledge are applied to address specific technological and/or societal challenges

Course-Specific Learning Objectives: After completing this course, a student should

- Understand the chemical principles governing chemical equilibrium, kinetics, and thermodynamics
- Be able to solve problems related to chemical equilibrium, kinetics, and thermodynamics
- Have gained hands-on experience in the lab and learned how to conduct scientific experiments

In-Class Behavior: You are expected to act respectfully towards others in the class. This includes turning your cell phone, tablet, etc. to silent during class time, using electronic devices only for note taking purposes or for teamwork, and arriving at class on time. You are expected to be engaged and participate in all activities. I reserve the right to dismiss you from class or lab if I feel you are acting disrespectfully, dangerously, or are disrupting the class.

Academic Honesty: In accordance with the University's Honor Code, all work submitted for grading must be your own and be pledged as such by signing the complete honor pledge at the top of the assignment. I value the community of trust that adherence to the Honor Code affords, and I expect that you will uphold the Honor Code in this course. Therefore, academic dishonesty in any shape or form will not be tolerated.

Suspected violations of the Honor Code *****including the use of websites/services such as reddit, CourseHero, Chegg, etc., in the completion of any assignments submitted for a grade***** will be addressed according to the policy established by the Honor Council. Academic dishonesty can result in loss of credit for an assignment, a failing grade in the course, suspension or expulsion from the university, and a notation of an Honor Code violation on your transcript. Please familiarize yourself with the University's policies on academic dishonesty and ask if you need clarification on the expectations for an assignment: ignorance is not an excuse!

Disability Resources: The Office of Disability Resources (Seacobeck 005) has been designated by the University as the primary office to guide, counsel, and assist students with disabilities. You will need to request appropriate accommodations through this office as soon as possible and then make an appointment with me to discuss your approved accommodation needs. I will hold any information you share with me in the strictest confidence unless you give me permission otherwise. If you have allergies to any chemicals or other emergency medical information, please notify me as soon as possible.

How to Succeed in Chem 112:

- Spend at least 1 hour per day on chemistry (reading the textbook, watching supplemental videos, reviewing notes, doing problems)
- Attend all lectures, take ample notes, and review them outside of class hours
- Attend all labs and complete the required lab assignments
- I'm here to help you! (office hours, before/after class, email, open door policy)
- Seek tutoring through Academic Services or the American Chemical Society tutors
- Review the appropriate sections of the text before class or after class and organize your notes
- Do the practice problems alone and in groups
- Most importantly, spend time thinking critically about the course material, and put in your 100% to achieve conceptual clarity.

Grading:

	Points	Total
Aktiv Problem Sets (14)	5	70
Quizzes (best 9 out of 10)	20	180
In-Class Exams (4)	75	300
Laboratory	250	250
Final Exam	200	200
Total course points		1000

Students with a C average or lower will receive a Mid-Semester Deficiency Report.

****A course grade of C or better in CHEM 112 is required to enroll in most upper level CHEM courses. Please check requirements for other majors****

Resources: I want to support you in your overall wellness and in reaching your goals this semester. I know that students sometimes face challenges that can impact academic performance (examples include mental health

concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact me or the Dean of Students (mjones6@umw.edu) for support and referrals to campus and/or community resources.

Aktiv: Aktiv is an online learning system that provides an efficient, effective, and engaging learning experience. Each week, you will be responsible for completing a problem set that contains problems on concepts that have been covered in lecture. The number of problems may vary from week to week depending on the topics covered.

You are allowed to work on these problems with other students, but you may not copy or plagiarize. You are not to use internet resources in the completion of these assignments. Remember that you must work alone on quizzes and exams, so it is in your best interest to ensure that **you** understand the material.

Quizzes: A total of ten quizzes will be given throughout the semester. Quiz questions will be based on the assigned reading or lecture material. The lowest quiz grade will be dropped. There will be no make-up quizzes without prior arrangements with me. Quizzes will either be conducted in person or as timed online quizzes on Canvas; the specific format of each quiz will be at the instructor's discretion.

Exams: There will be four exams during the semester which will emphasize material introduced since the last exam. You must complete the exam during the designated class period, so be sure to make note of these dates from the course schedule. There will be no make-up exams without prior arrangements with me.

The final exam will be a comprehensive, standardized final written by the American Chemical Society (ACS) that must be taken at the time scheduled by the University: . According to University policy, any student who does not take the final exam will fail the course. According to ACS policy, there is a 2-hour time limit for the exam, only non-programmable calculators are to be used, and nothing is to be written in the exam booklet (only on the scantron and scratch paper).

Quiz and Exam Policies: No cell phones or other personal electronic communication devices may be used in the completion of quizzes or exams. *All quizzes and exams are closed notes, closed book, and closed internet unless otherwise specified; personal communication of any type to anyone either in the course or not is **not** permitted.* You may only use approved non-graphing calculators for ALL quizzes and examinations.

If you feel a mistake has been made in the grading of your exam, you must submit what you wish to be re-graded and why (your reasoning is critical). This must be turned in to me no later than one week after the graded exam is returned. If you feel there has been a numerical error in calculating your quiz or exam score, please bring this to my attention no later than one week after the graded assignment is returned.

Laboratory: Detailed information regarding the laboratory component of this course can be found in the lab coursepack. It is important to note that due to the hands-on nature of the laboratory, ***if a student misses three (3) or more lab periods, and / or fails to turn in three (3) or more lab reports, they will fail the course.*** A laboratory practical will be given as the last lab; **any student who does not take the laboratory practical will fail the course.**

Group work in the laboratory may require a team effort to gather data, **but all calculations, data analysis, and post-lab questions must be completed independently**. You are responsible for your own lab reports. You must be able to personally justify anything you turn in. All sources used in the completion of lab reports must be appropriately cited using the ACS citation format (examples provided in lab coursepack).

Course format and reading: I will teach in a traditional lecture setting using ppt slides, which will be uploaded to Canvas after the corresponding lecture period. You are expected to read the appropriate sections in the textbook on your own to better understand and follow along with the lecture material. It is STRONGLY recommended that you read the book within 24 hours of the lecture (either before or after, doesn't matter). This really helps!

Attendance: Attendance in lab is mandatory. Attendance in lecture is highly recommended. Regardless of attendance, all assignments are due on the scheduled date. ***No late assignments will be accepted without my prior consent.***

Absences: You should notify me of an expected absence as early as possible. Make-up exams will not be given except in the event of EXTREMELY extenuating circumstances. If you must miss a quiz, see me as soon as possible *prior* to the quiz to arrange a time for a make-up quiz. If you must miss a lab, a make-up session may be possible, depending on vacancies in other sections. Please see me as soon as possible *prior* to the lab you will need to miss to make these arrangements. Team assignments and other extra credit assignments handed out during class cannot be made up.

Course Schedule: The weekly modules in Canvas will adhere to this schedule as closely as possible. The quiz and exam dates are set and are unlikely to change; any changes to these dates (again, unlikely, but may happen due to unforeseen circumstances, unexpected pace of the course, etc.) will come with at least 3 days' notice.

CHEM 112 Lecture Schedule

Date	Topic	Chapter	Assignment / Quiz
Jan 14	Chemical kinetics	12	
Jan 16	Chemical kinetics	12	A1
Jan 21	Chemical kinetics	12	Q1
Jan 23	Fundamental equilibrium concepts	13	A2
Jan 28	Fundamental equilibrium concepts	13	Q2
Jan 30	Exam 1	12, 13	A3
Feb 4	Acid-base equilibria	14	
Feb 6	Acid-base equilibria	14	A4, Q3
Feb 11	Acid-base equilibria	14	
Feb 13	Acid-base equilibria	14	A5
Feb 18	Acid-base equilibria	14	Q4
Feb 20	Acid-base equilibria	14	A6
Feb 25	Exam 2	14	
Feb 27	Equilibria of other reaction classes	15	A7
Mar 4	Spring break		
Mar 6	Spring break		
Mar 11	Equilibria of other reaction classes	15	Q5
Mar 13	Solutions and colloids	11	A8
Mar 18	Solutions and colloids	11	Q6
Mar 20	Exam 3	15, 11	A9
Mar 25	Thermodynamics	16	
Mar 27	Thermodynamics	16	A10, Q7
Apr 1	Thermodynamics	16	
Apr 3	Thermodynamics / Electrochemistry	17	A11, Q8
Apr 8	Electrochemistry	17	
Apr 10	Electrochemistry	17	A12, Q9
Apr 15	Electrochemistry	17	
Apr 17	Nuclear Chemistry	21	A13, Q10
Apr 22	Nuclear Chemistry	21	
Apr 24	Exam 4	16, 17, 21	A14
Apr 29	Final exam: 12 pm – 2:30 pm		

Legend: A = Aktiv HW
Q = Quiz

Chem 112 Lab Schedule

Date	Lab Activity	Assignments Due
16-Jan	Safety, Policies Volumetric Measurements	Volumetric Measurement Pre-Lab Notebook
23-Jan	Kinetics	Volumetric Measurements Report, Kinetics Pre-Lab Notebook
30-Jan	Equilibrium	Kinetics Report, Equilibrium Pre-Lab Notebook
6-Feb	Titrations	Equilibrium Report, Titrations Pre-Lab Notebook
13-Feb	Determination of K_a	Titrations Report, Determination of K_a Pre-Lab Notebook
20-Feb	Skills Lab 1	Determination of K_a Report, Skills Assignment
27-Feb	Titration Curve	Titration Curve Assignment
6-Mar	Spring Break	Spring Break
13-Mar	Determination of K_{sp}	Determination of K_{sp} Pre-Lab Notebook
20-Mar	Colligative Properties	Determination of K_{sp} Report, Colligative Properties Pre-Lab Notebook
27-Mar	Skills Lab 2	Colligative Properties Report, Skills Assignment
3-Apr	Project	Project Report
10-Apr	Redox	Redox Pre-Lab Notebook
17-Apr	TBD	Redox Report
24-Apr	Lab Practical	Lab Practical

Important dates:

Drop deadline: Jan 31

Mid-semester grades due: Mar 14

Withdraw deadline: Mar 21

Final grades due: May 6

Title IX Statement

University of Mary Washington faculty are committed to supporting students and upholding the University's *Policy on Sexual and Gender Based Harassment and Other Forms of Interpersonal Violence*. Under Title IX and this Policy, discrimination based upon sex or gender is prohibited. If you experience an incident of sex or gender based discrimination, we encourage you to report it. ***While you may talk to me, understand that as a "Responsible Employee" of the University, I MUST report to UMW's Title IX Coordinator what you share.*** If you wish to speak to someone confidentially, please contact the below confidential resources. They can connect you with support services and help you explore your options. You may also seek assistance from UMW's Title IX Coordinator. Please visit [UMW's Title IX website](#) to view UMW's policy and to find further information on support and resources.

Ruth Davison
Title IX Coordinator
Fairfax House

Confidential Resources

On-Campus

Talley Center for Counselling Services
Lee Hall 106
540-654-1053

Student Health Center
Lee Hall 112
540-654-1040

Off-Campus

Empowerhouse
24-hr hotline: 540-373-9373

Rappahannock Council Against Sexual Assault (RCASA)
24-hr hotline: 540-371-1666

Policy on Recording Class and Distribution of Course Materials

Classroom activities in this course may be recorded by students enrolled in the course for the personal, educational use of that student only, and may not be further copied, distributed, published, or otherwise used for any other purpose without the express written consent of the course instructor.

All students are advised that classroom activities may be recorded by students for this purpose.

Distribution or sale of class recordings or recorded lecture videos is prohibited without the written permission of the instructor and other students who are recorded.

Any class materials (any document or other item provided by or made available by the instructor to students enrolled, including but not limited to coursepacks, lecture videos, annotated lectures, handouts, laboratory experiments, quizzes, exams, review sheets or past exams) provided for this course (in the coursepack, during class or lab, or posted on Canvas or YouTube) are for the personal, educational use of that student only, and may not be further copied, distributed, published, or otherwise used for any other purpose without the express written consent of the course instructor.

Distribution or sale of any and all class materials (any document or other item provided by or made available by the instructor to students enrolled, including but not limited to coursepacks, lecture videos, annotated lectures, handouts, laboratory experiments, quizzes, exams, review sheets or past exams) provided for this course (in the coursepack, during class or lab, or posted on Canvas or YouTube) is prohibited without the express written permission of the instructor.

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****Students in violation of any part of this policy are subject to disciplinary action through the Office of Student Conduct and Responsibility.****

This policy is consistent with UMW's Policy on Recording Class and Distribution of Course Materials.