

# Physical Chemistry I: CHEM 383

## Fall 2024

**Instructor:** Leanna Giancarlo  
**Office:** Jepson Science Center 436  
**Contact:** lgiancar@umw.edu, (540) 654-1407  
**Lecture:** MWF 9:00 – 9:50 am, Jepson Science Center 219

**Office Hours:** M 12:30 – 1:30 pm, W 1:30 – 2:30 pm; T 1 – 2 pm; F 1:30 – 2:30 or by appointment; there are another 2 office hours for 100-level students on MW at the opposite times listed above that you can attend; however, 100-level students will be assisted first.

**PASS (Peer Assisted Study Skills):** F 12 – 1 pm, Jepson Science Center 217B

### Required Materials:

- Thermodynamics, Statistical Thermodynamics & Kinetics (4th ed., Engel and Reid)
- Coursepack for CHEM 383
- calculator with scientific notation and exponential functions – you will only be able to use non-graphing calculators on all exams. TI-30X calculators are available in the Bookstore.

### Recommended Materials:

- Mathematics for Physical Chemistry (3rd ed., Mortimer)
- small white board (8.5" x 11"), dry erase markers and eraser

### Course Description:

This course is designed to provide the fundamental concepts of physical chemistry, stressing thermodynamics and kinetics. Physical chemistry expands upon the elementary notions of interactions, equilibrium, bonding, heat, entropy and energy. This area of chemistry uses extensive mathematical tools (differential and integral calculus) to probe the intricate interactions involved in chemical systems. In order to succeed in this course, problem-solving skills must be practiced and developed. Physical chemists are employed in such disparate fields as financial consultants, corporation executives, professors, etc. due to their well-developed problem-solving skills.

### Course-Specific Learning Objectives:

After completing this course, a student should be able to

- describe the mathematical and physical foundations behind thermodynamics and chemical equilibria
- demonstrate an understanding of the use of ideal chemical systems and build up to real systems
- apply mathematics to chemical problems

**Grading:** Grades will be based on the following

	<b>Points</b>	<b>Total</b>
Hourly Examinations (3)	200	600
Team Activities (best 11)		100
Online PrePs		50
Cumulative Final Exam	250	<u>250</u>
		1000

Students with an exam grade of 72 or less will receive a midsemester report of unsatisfactory.

Points to overall grade conversions:

<b>Points accumulated</b>	<b>Letter Grade</b>	<b>Points accumulated</b>	<b>Letter Grade</b>
≥ 930 points	A	929 – 900 points	A-
899 – 870 points	B+	869 – 830 points	B
829 – 800 points	B-	799 – 770 points	C+
769 – 730 points	C	729 – 700 points	C-
699 – 650 points	D+	649 – 600 points	D
below 600 points	F		

### **Honor System:**

**All** graded work (hourly exams, online exercises, team activities, extra credit assignments, *graded* assignments, final exam) must be your own. You are not permitted to use any online homework aids or artificial intelligences to assist in any graded work. Online PrePs (general chemistry and mathematics reviews) and any other online work are deemed pledged by your submission. All written work must have the Honor Pledge written in full and your signature. You must use **these** words and sign the pledge: I hereby declare upon my word of honor that I have neither given nor received any unauthorized help on this work.

It is recommended that the *suggested* problems (i.e., not submitted for a grade) be done individually and then with a study group when questions arise. **No late assignments will be accepted.** Please, discuss difficulties with the homework problems or lecture material with me.

### **Class Attendance:**

Class attendance is highly recommended. The material discussed in lecture frequently has a different emphasis from that provided by the textbook. Also, time has been set aside in the course schedule to discuss example problems and practice problem-solving with your peers with instructor guidance. Students are responsible for all covered materials during a missed class. Missed exams **will not** be made up except in the event of an excused absence due to an emergency. (Immediate notification of the instructor is mandatory). Lateness to lecture is

distracting, and students should attempt to be on time. Lateness to an exam will result in less time allowed for completion of the exam.

### **Team Activities:**

Team activities in this course will take two different formats: First, at the end of each chapter (or topic), there will be 5 to 10 assigned problems to be completed by students in teams of 3 or 4. Teams will be chosen at the beginning of the semester for the entire term. Individual students are strongly encouraged to attempt the problems alone and then meet with the team to discuss a final solution. (This also enables you to check each other's work.) These problems are due to the instructor for a grade 2 lectures after the lecture material on that topic has been completed (e.g. if chapter 1 is completed on Monday, then the problems are due on Friday of the same week). No late assignments will be accepted. Only one submission is required per team; however, all members of the team must sign the submission in order to receive a grade. (A student who does not sign the handed-in work will receive a grade of zero.) You must also individually complete an evaluation of team work for you and your teammates. Failure to do so (or complete the assignment as a team) will result in a grade reduction of up to 3 points per assignment.

Second, specific topics in lecture will be flipped: outside of the classroom, students will watch a video, read the textbook material, and complete recommended practice problems (posted on Canvas). If a student needs more information on a given topic, they can either re-view the lecture or view other online lectures and/or re-read the material in the textbook. Students will be encouraged to practice the concepts with problems but will not be completing graded individual homework; however, students must bring their practiced problems with them to class or submit them via email in advance of class. During class, students' knowledge will be assessed with in-class team activities. These exercises are designed to prompt critical thinking (and discussion) about the key concepts learned outside of the classroom in the lectures and textbook. I will move around the classroom during this problem-solving process and address any misconceptions or challenges students experience. The assigned class problems will be completed by the team and submitted by the end of the period.

### **Online PrePs:**

At the beginning of each chapter, approximately 5 questions (generally, multiple choice or fill-in-the-blank format) will be posted on Canvas. These questions review topics that were covered in prerequisite courses, such as Calculus I and II, Physics, and General Chemistry. The answers must be submitted through Canvas by the assigned date and time (usually, before the next lecture). You may use textbooks and notes from these courses or others to complete the quizzes; however, you may not

consult with anyone other than your instructor about them. Electronic submission constitutes your abiding by the Mary Washington Honor Code.

### **PASS (Peer Assisted Study Skills)/ Extra Credit:**

Extra credit in this course can be earned through attendance at Peer Assisted Study Skills sessions held by the instructor. These hour-long sessions are meant to bolster your study, math and/or chemistry skills. There will be one session per week (as noted above); for each weekly attendance you will receive 2.5 points toward your final grade up to 35 points total. At these sessions, you will work out suggested problems individually or with a partner with the instructor present to assist you. For you to receive credit (the 2.5 points), you must be present for the entire PASS session. Students who are disruptive will lose credit for that session; continual disruptions will result in your removal from PASS for the rest of the semester and the denial of any extra credit points associated with your attendance.

### **Disability Resources:**

The Office of Disability Resources has been designated by the university as the primary office to guide, counsel, and assist students with disabilities. If you receive services through the Office of Disability Resources and require accommodations for this class, please provide me a copy of your accommodation letter via email or during a meeting. I encourage you to follow-up with me about your accommodations and needs within this class. I will hold any information you share with me in the strictest confidence unless you give me permission to do otherwise. If you have not made contact with the Office of Disability Resources and have reasonable accommodation needs, their office is located in Seacobeck 005, phone number is (540) 654-1266 and email is [odr@umw.edu](mailto:odr@umw.edu). The office will require appropriate documentation of disability.

### **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.

**Class Recordings and 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 taped 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 written permission of the instructor. Distribution without permission is a violation of copyright law.

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

**Basic Needs Security:**

Learning effectively and engaging wholly in class is dependent upon our basic security and having our fundamental needs met: having a safe place to sleep at night, regular access to nutritious food, and some assurance of safety. If you have difficulty affording groceries or accessing sufficient food to eat every day, or if you lack a safe and stable place to live, please contact Chris Porter, Assistant Dean of Students, at [cjporter@umw.edu](mailto:cjporter@umw.edu). Additionally, the Gwen Hale Resource Center is a free resource on campus, providing food, toiletries and clothing to any member of our community. It is open Monday, Tuesday and Friday from 1pm-6pm, on the 5<sup>th</sup> floor (floor A for Attic) of Lee Hall, or [resource@umw.edu](mailto:resource@umw.edu). Finally, you are always welcome to talk with me

about needs, if you are comfortable doing so. This will enable me to provide any resources I may possess.

### Other “Helpful” Information:

The tentative schedule below is how I see the course arranged. It is not set in concrete. If there is material that you, as a class, find confusing, we will spend more time on that topic. The exam dates will remain set according to the schedule. If all of the “scheduled” material has not been presented prior to the exam, the exam will include only what has been covered.

Success in chemistry requires work on your part. Successful students typically spend a minimum of 1 hour per day on chemistry. This time is devoted to reviewing notes, attempting the suggested/assigned problems and reading ahead for the next lecture. Some of their “secrets” include (but are not limited to)

- reading the material prior to class.
- attending the lectures.
- taking good notes.
- asking questions. (The only “stupid” question is the one that goes unasked.)
- solving the suggested problems for each chapter. (Attempting extra problems is also a great idea. “Practice makes permanent.”)
- consulting your peers when you are struggling with the solution to a suggested problem. (First, they may have a different slant or see the problem in a different light. Second, scientists typically work in teams. Each member of the team is responsible for a particular aspect of the problem; therefore, each scientist must understand what each of the other members of the team does and have requisite background knowledge.)
- enlisting the aid of the instructor (office hours or appointments, before/after class).
- reviewing the appropriate sections of the text and all notes after class.
- attempting all suggested and assigned problems (team activities) by yourself
- reviewing topics from prerequisite courses

### Course Outline:

Topic	Chapters
Ideal Gases	Chapter 1
Thermodynamics (First Law)	Chapters 2 through 4
Thermodynamics (Second Law)	Chapter 5
Thermodynamics and Equilibrium	Chapter 6
Real Gases	Chapter 7
Phase Diagrams	Chapter 8
Solutions (Ideal, Real, Electrolytes)	Chapters 9 and 10
Electrochemistry	Chapter 11
Kinetics Molecular Theory	Chapter 16

Course Schedule:

8/26 Introduction/Chapter 1	8/28 Chapter 1	8/30 Chapter 1/2
9/2 NO CLASS	9/4 Chapter 2	9/6 Chapter 2
9/9 Chapter 2	9/11 Chapter 2	9/13 Chapter 3
9/16 Chapter 3	9/18 Chapter 3	9/20 Chapter 4
9/23 Chapter 5	9/25 Chapter 5	9/27 <b>EXAM 1</b>
9/30 Chapter 6	10/2 Chapter 6	10/4 Chapter 6
10/7 Chapter 6	10/9 Chapter 6	10/11 Chapter 6
10/14 FALL BREAK	10/16 Chapter 6	10/18 Chapter 7
10/21 Chapter 7	10/23 Chapter 8	10/25 <b>EXAM 2</b>
10/28 Chapter 8	10/30 Chapter 9	11/1 Chapter 9
11/4 Chapter 9	11/6 Chapter 9	11/8 Chapter 10
11/11 Chapter 10	11/13 Chapter 11	11/15 Chapter 11
11/18 Chapter 16	11/20 Chapter 16	11/22 <b>EXAM 3</b>
11/25 Chapter 16	11/27 THANKSGIVING BREAK	11/29 THANKSGIVING BREAK
12/2 Chapter 16	12/4 Chapter 16	12/6 Chapter 16 and Review

**Cumulative ACS Final Exam: Wednesday, Dec. 11, 2024, 8:30 – 11:00 am**