

CHM 4411 – Physical Chemistry, Thermodynamics and Kinetics  
Spring2020

Instructor: Coray Colina

Office Hours: 354 Leigh Hall (LEI), [use CANVAS for email communication](#), 352-294-3488  
TBD.

Lecture: T R Periods 2 – 3 (8:30 AM – 10:25 AM), FLI 0050

TA: Moneesha Ravi, [use CANVAS for email communication](#)  
Office Hours: TBD

Course Objective: To provide students with a solid understanding of the concepts of physical chemistry and their application to chemical systems.

Course Website: This course has a Canvas page for notes and announcements.

Textbook: There are a number of Physical Chemistry books on the market. For example, “Physical Chemistry, 10th Ed.” By: Atkins and de Paula. This book is a suggestion, but any book should be sufficient. Please let me know if you have any questions about possible textbooks.

Midterm Exams: There will be 3 midterm in-class exams. The tentative dates for the midterms are **February 6<sup>th</sup>**, **March 17<sup>th</sup>** and **April 21<sup>st</sup>**. Doing well on midterm exams requires mastery of qualitative, conceptual material.

The exams will cover **homework problems and quizzes** and will emphasize understanding of the lecture materials and problem solving. All exams will be closed book. You can bring one **hand-written** letter-size sheet with your own notes with formula, *etc.* that aid understanding of the course.

Final Exam: The final exam is **cumulative**.

Grading:

Exam Grade: Your exam grade will be a combination of the three highest scores from the midterm and final exams. Examples:

Midterm 1	Midterm 2	Midterm 3	Final	Average
80	90	85	75	85
80	90	85	95	90
80	90	85	0	85

Homework:

There will be 3 homework assignments throughout the semester. Homework assignments will be worth 7 points each. *Please write your name and UFID clearly on each page.*

The assignments should be presented in a professional manner, with the work, any assumptions and explanations presented clearly. Several of the homework assignments involve interpretation of computational and experimental data. When preparing graphs, you must use Excel or a comparable graphing program. If you are doing a curve fit you must justify the choice of fitting function. While you might work in groups, you must turn in your own work to receive any credit! You must also reference the other members of your study group. Failure to adhere to these requirements will result in zero credit for the assignment.

*Assignments should be hand-written or printed and turned in before class on the due date. Late submission won't be accepted.*

Quizzes:

There will be 3 quizzes assignments throughout the semester. Quizzes will be worth 10 points each. The quizzes should be presented in a professional manner, with the work, any assumptions and explanations presented clearly.

Grading: Your final grade will be determined from the following  
**Homeworks = 20% ; Quizzes= 30% ; Exams = 50%**

Approximate Grade Ranges:			
> 90	A	69 - 72.99	C+
86 - 89.9	A-	64 - 68.9	C
82 - 85.9	B+	60 - 63.9	C-
77 - 81.9	B	56 - 59.9	D+
73 - 76.9	B-	50 - 55.9	D
		< 50	E

Makeups: There will be no makeup exams unless prior arrangements are made. If an exam is missed for an excused reason, the final exam score will be used in the exam calculation. Homework assignments that are turned in late will not be accepted unless prior arrangements have been made.

Re-grades: Any requests for re-grading an exam, quiz or homework assignment must be made within one week of the assignment/quiz/exam grade being posted on Canvas and handed back during TA office hours.

Philosophy: Physical chemistry is concerned with the quantitative description of natural phenomena. The homework and quizzes are designed to have you interpret experimental and computational data – if you were going to go into the laboratory, what would you measure and how would you treat the data? The midterm exams are intended to gauge mastery of basic concepts and elementary calculations or derivations. It is not a good idea to leave studying until the night before the exam. It takes time to grasp some of the concepts of physical chemistry and to work through the problems. ‘Cramming’ is not the way to be successful in this course. Working in groups is encouraged, but copying another student’s work will not be tolerated.

Attendance: Lecture attendance is essential for your success in this class. However, we will not take roll. Repeated absence in class will make it very difficult to earn full participation points.

Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center) by providing appropriate documentation. Once registered, students will receive an accommodation letter, which must be presented to the instructor when requesting accommodations. Students with disabilities should follow this procedure as early as possible in the semester.

Counseling: The University of Florida provides counseling services for students, staff, and faculty. See <https://counseling.ufl.edu> or call (352) 392 1575 during regular service hours (8 am– 5 pm). For other hours or on weekends call the Alachua County Crisis Center (352) 264 6789.

Cell Phones: Please put all cell phones and other digital devices on “silent mode” during all class periods. During exams, your cell phone must be placed on the table in front of you, face down, for the entire test period.

Honor Code: This class will operate under the policies of the student honor code, which can be found at: <https://sccr.dso.ufl.edu/process/honor-code/>

The students, instructor, and TAs are honor-bound to comply with the Honors Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:

#### THE PLEDGE

*“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”*

#### Objectives:

By the end of this course you should be able to:

- Analyze, graph, fit and interpret experimental and computational data.
- Perform elementary derivations and manipulations on equations of state.
- Understand the relationships between different thermodynamic functions.
- Understand the criteria for equilibrium or spontaneity for chemical processes under different sets of conditions.
- Calculate thermodynamic and equilibrium quantities for a variety of chemical processes and reactions.
- Analyze and interpret phase diagrams for 2 and 3 component mixtures.
- Derive rate laws for complex reaction mechanisms.
- Understand how microscopic properties of matter translate to macroscopic thermodynamic properties

#### Tentative Lecture Schedule Spring 2020

<b>January</b>			
Tuesday	7 <sup>th</sup>		Introduction and the Ideal Gas
Thursday	9 <sup>th</sup>	<b>NO CLASS</b>	

Tuesday	14 <sup>th</sup>		Real Gases
Thursday	16 <sup>th</sup>		Real Gases
Tuesday	21 <sup>st</sup>	<b>HW1</b>	First law of Thermodynamics: Work and Heat
Thursday	23 <sup>rd</sup>		Heat Capacity and gas expansion
Tuesday	28 <sup>th</sup>	<b>Q1</b>	
Thursday	30 <sup>th</sup>		Calorimetry
<b>February</b>			
Tuesday	4 <sup>th</sup>		Second Law of Thermodynamics
Thursday	6 <sup>th</sup>	<b>First Exam</b>	
Tuesday	11		Carnot engine, entropy change
Thursday	13 <sup>th</sup>		Third Law of thermodynamics
Tuesday	18 <sup>th</sup>		Phase diagrams
Thursday	20	<b>HW2</b>	Phase diagrams
Tuesday	25		Phase Equilibrium
Thursday	27	<b>Q2</b>	
<b>March</b>			
Tuesday	3	<b>Spring Break</b>	
Thursday	5	<b>Spring Break</b>	
Tuesday	10		Chemical Potential
Thursday	12		Thermodynamics of mixing real solutions
Tuesday	17	<b>Second Exam</b>	
Thursday	19		Chemical Equilibrium
Tuesday	24		Chemical Equilibrium
Thursday	26		Chemical Kinetics
Tuesday	31	<b>HW3</b>	Effect of temperature and PES
<b>April</b>			
Thursday	2		Reaction rate theories
Tuesday	7		Reactions in solutions
Thursday	9		Reactions mechanism
Tuesday	14	<b>Q3</b>	
Thursday	16		Catalysis, Adsorption
Tuesday	21	<b>Third Exam</b>	
		<b>FINAL</b>	