

# Physical Chemistry I

**CHEM 4450, CRN 18114, 17042, 22666**

Course Syllabus, Fall 2019

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<b>Instructor:</b>	Kristin Dooley
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<b>Website:</b>	<a href="http://faculty.uca.edu/kdooley">http://faculty.uca.edu/kdooley</a>
<b>Office Hours:</b>	M: 10:00am-12:00pm, T: 2:40pm-3:30pm, R: 8:30am- 10:00am <i>other times by appointment</i>
<b>Lecture:</b>	MWF 9:00-9:50 am (Laney 103)
<b>Lab:</b>	CRN#17042: M 2:00-4:50 pm (Laney 305) CRN# 18114: T 8:00-10:40 am (Laney 305) CRN# 22666: T 12:15-1:30 pm (Laney 305)
<b>Required Material:</b>	<i>Physical Chemistry</i> (10 <sup>th</sup> Ed.) by Atkins and de Paula Calculator, goggles, bound composition notebook with numbered pages

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**Course Description** This course will introduce and develop the principles of quantum mechanics. These concepts will then be applied to both atomic and molecular structure and spectra. The kinetics and dynamics of reaction mechanisms will also be studied. This course also includes a laboratory component that will complement the topics covered in the lecture.

**Prerequisites** You must have completed the following courses with a "C" or better:  
College Chemistry II (CHEM1451)  
University Physics II (PHYS1442) (or College Physics II if approved)  
Calculus II (MATH 1497)

**Course Objectives** One of the main objectives for this course is to provide the student with a firm foundation in quantum theory which will be used to describe our current ideas of electronic structure in both atoms and molecules, chemical bonding, and vibrational and rotational spectroscopy. Another goal of this course is to describe a reaction on the molecular level through reaction dynamics and describe the rate of reaction with chemical kinetics.

A main objective of this course is the development of effective problem solving skills and the ability to apply calculus to solve chemical problems. This course will draw on skills and concepts learned from all of your chemistry and math courses taken prior to this course. The laboratory portion of this course will introduce the student to instrumentation and techniques used in a typical physical chemistry laboratory. In the laboratory, students will also be introduced to computer simulations and computational programs.

## Grading

- Your overall grade in this course is calculated based on your points accumulated in the following categories: Exams, Labs, Assignments, and Final Exam. I will post the grades that I have recorded for you on Blackboard. The course will have a total of 1000 points. I don't include bonus points in my courses. You should be working hard from Day 1 and not relying on bonus to get by.
- Three **Exams** will be given throughout this course. The dates of these exams can be found on the Lecture Schedule. Date changes for exams will be announced in class and will be posted on the course webpage. No exam scores will be dropped. Instead, your lowest exam score (a zero if the exam was missed) may be replaced by your final exam grade provided that your final exam score is higher.

You will be allowed a single 3" x 5" notecard on each exam. (Both sides of the card may be used.) Although its content is up to you, the card must be hand written by the student using the card. Three cards will be allowed on the final exam.

- The course's **final exam** will be comprehensive, and no portion of the final exam will be dropped. Your score on the final exam scaled to 125 points will replace your lowest exam grade.
- There will be 3-4 graded **assignments** given before each exam. They will commonly be problems assigned from your textbook or problem sets provided on my website or given in class. You will have at least 10 assignment scores.

*Firm due dates will be provided at the time that assignments are made. Assignments are due by 9:05 AM on the due date. After that, the assignment is considered late. Late assignments will be accepted for half-credit up to 24 hours after the assignment was due. This means that you may need to submit a late assignment electronically.*

- Your **lab** grades will consist of 5 or more informal lab write-ups or assignments, and 1 formal lab report. Your lab notebook will constitute a portion of the lab report grade. The formal lab report should be written in the style of the Journal of Physical Chemistry.
- Grade disputes concerning scores on specific assignments or exams should be addressed promptly. After the assignment has been returned, the student has 1 week to bring the question to my attention. After that time, the grade on the assignment or exam will not be changed. Please make sure that you check the grades I have posted for you, and confirm that they match the grades you see on your returned work. Mistakes happen, and I will be glad to fix the grade I have recorded for you as long as you provide the original graded assignment that does not appear altered.
- *Please understand that while I expect that some work will be done collaboratively throughout this course, all of the assignments you turn in should be your own work. If any portion of an assignment appears copied from any source, including a classmate's work, you can expect a zero grade on the assignment. You will not be allowed to drop this score as part of your course grade calculation. If the cheating or plagiarism occurs on an exam, you will receive a failing grade for the course.*

Point Distribution	Category:	Total Points Possible:
	Exams	3 @ 125 Points Each 375 Points
	Informal Lab Reports/Assignments	5 @ 30 Points Each 150 Points
	Formal Lab Reports	1 @ 100 Points Each 100 Points
	Assignments	10 @ 20 Points Each 200 Points
	Final Exam	150 Points 175 Points
		<b>TOTAL: 1000 Points</b>

**Grading Scale**    **Grades: A: 90-100 %    B: 80-90    C: 70-80    D: 60-70    F: <60**

**Grade Calculation**    I will return all graded assignments, so you should be able to know where you stand in the course. However, if you do have any grade concerns, please see me promptly to clear the matter up.

**Website**    The majority of the content of this course will be located on my faculty web page at <http://faculty.uca.edu/kdooley>. This site has a course page where you will find announcements for the course, lecture slides, and lab materials. Please see me if you have any issues regarding the website.

- Tips for Being Successful**
- Read the Sections of the text that we will cover BEFORE coming to class. Even if you do not understand it all, attending lecture will be more effective if you have been introduced to the material previously.
  - Be willing to spend the time necessary to *master* the material as it is introduced. Note that this is probably much more time intensive than the time it takes to “get by” the next assignment, exam, etc. Simply “getting by” usually haunts you later on.
  - Do not hesitate to contact me for help! If you cannot make my office hours, set up a time when you can come.
  - Do more homework than I have assigned for a grade. The graded assignments represent a minimum workload for mastery in this course.

**Classroom Policies**

Attendance:    Students who regularly miss class are rarely successful. It is the student’s responsibility to obtain the information/assignments/handouts covered during an absence. An outline of the course schedule is attached to this syllabus. You should obtain specific notes of from missed lectures from a classmate.

Academic Honesty:    Cheating and plagiarism are not tolerated! The penalties for cheating will be severe with the most minor being a failing grade on the assignment/exam which will not be able to be dropped. More severe penalties will be issued when deemed appropriate by the instructor. (See University Policies, below.)

Makeup Policy:    Missed exams/assignments will be dropped as your lowest score. There will be no makeup assignments offered; however, missed labs may be made up at my discretion (dependent on type of lab and reason for absence). Makeup exams will not be offered barring an extreme circumstance (short-term, minor illnesses do not qualify as extreme).

Disruptions:    Electronic devices should be silenced during class. Texting and other social interactions during class are disrespectful to your classmates and will not be tolerated. Students engaged in these activities will be asked to leave the lecture.

## University Policies

Americans with Disabilities Act	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 Support Services, 450-3613.
Academic Integrity	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.
Course Evaluations	Student evaluations of a course and its professor are a crucial element 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.
Emergency Procedures	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 <a href="http://uca.edu/mysafety/bep/">http://uca.edu/mysafety/bep/</a> . Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.
Title IX Disclosure	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 those specific set of circumstances. The determination to conduct an investigation will be made by the Title IX Coordinator. For further information, please visit: <a href="https://uca.edu/titleix">https://uca.edu/titleix</a> . *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.
Other Policies	Students are encouraged to familiarize themselves with all policies included in the Student Handbook, particularly the Sexual Harassment Policy, and all Academic Policies.

## Lecture Schedule

\*This is a tentative schedule. Exam dates and content are subject to change.

Aug	23	F	Syllabus/Ch 20
	26	M	Chapter 20: Chemical Kinetics
	28	W	
	30	F	
Sep	2	M	<b>No Class: Labor Day</b>
	4	W	Chapter 21: Reaction Dynamics
	6	F	
	9	M	
	11	W	
	13	F	Chapter 7: Introduction to Quantum Theory
	16	M	
	18	W	
	20	F	
	23	M	
	25	W	<b>Exam 1: Chapters 20, 21, 7</b>
	27	F	Chapter 8: The Quantum Theory of Motion (8A Translation)
	30	M	Finish 8A Translation
Oct	2	W	8B Vibrational Motion
	4	F	
	7	M	8C Rotational Motion
	9	W	
	11	F	
	14	M	Chapter 9: Atomic Structure and Spectra (9A)
	16	W	
	18	F	<b>No Class: Fall Break</b>
	21	M	
	23	W	Chapter 9B
	25	F	
	28	M	
	30	W	<b>Exam 2: Chapters 8, 9A and B</b>
Nov	1	F	Chapter 9C: Atomic Spectroscopy
	4	M	
	6	W	
	8	F	Chapter 10: Molecular Structure
	11	M	
	13	W	
	15	F	Chapter 12: Rotational and Vibrational Spectra
	18	M	
	20	W	
	22	F	Chapter 13: Electronic Spectra
	25	M	
	27	W	<b>No Class: Thanksgiving Break</b>
	29	F	<b>No Class: Thanksgiving Break</b>
Dec	2	M	
	4	W	<b>Exam 3: Chapters 9C, 10, 12, 13</b>
	6	F	<b>No Class: Study Day</b>
<b>Wednesday, December 11, 2:00-4:00 PM COMPREHENSIVE FINAL EXAM</b>			