CHEMISTRY 4431
Physical Chemistry I
Fall 2022

Instructor: Dr. Renée Cole
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Email: renee-cole@uiowa.edu

Course: CHEM 4431, 3 Credit Hours
Lecture: MWF 8:30-9:20 am 1140 LIB
Discussion: T 8:30-9:20 am or W 5:30-6:20 pm C139 PC

Student Drop-In Hours

<table>
<thead>
<tr>
<th>Individual</th>
<th>Location</th>
<th>Time</th>
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<tbody>
<tr>
<td>Dr. Cole</td>
<td>W331 CB</td>
<td>Tuesday 5-6 PM</td>
</tr>
<tr>
<td></td>
<td>Zoom</td>
<td>Thursday 7-8 PM</td>
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<td></td>
<td>W331 CB</td>
<td>Friday 4-5 PM</td>
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<tr>
<td>Caleb Dewitt</td>
<td>E208 CB</td>
<td>Monday 2:30-3:30 PM</td>
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<td></td>
<td></td>
<td>Thursday 8:30-9:30 AM</td>
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I welcome you to contact me outside of class and student drop-in hours. You may email me or call my office number.

Texts:


These activities guide students through a wide variety of topics found in a typical undergraduate treatment of Thermodynamics, Statistical Mechanics, and Kinetics. When feasible, the activities incorporate a molecular point of view, supported by very simple models to help chemistry students grapple with the abstract, formal, and mathematical structure of thermodynamics. The activities introduce entropy prior to concepts of work and enthalpy, which enables deep connections between molecular properties and macroscopic properties. The activities have been tested both in settings that teach quantum first and those that teach thermodynamics first, and they serve students well in both contexts.

Optional Text:
**Course Description:**
Physical chemistry is the study of the interaction of energy and matter. Topics covered typically include kinetic theory of gases, intermolecular forces, thermodynamics (i.e., the application of enthalpy, entropy, and free energy to chemical equilibrium, phase equilibria, and electrochemistry), and statistical mechanics. The course is intended primarily for chemistry, biochemistry, environmental science, and chemical and biochemical engineering majors. The course requires use of differential and integral calculus and skill in mathematical problem solving.

**How to succeed in this course**
This course has been designed and organized to help you learn physical chemistry. If you can put in the effort there is no reason you cannot be successful in this course.

Lectures will be conducted in a guided inquiry format. Virtually all of the activities in class will involve teamwork. All of us in the class, you, me, your peers, have a responsibility to create an environment in which we can all learn from each other. I expect everyone to participate in class so that we can all benefit from the insights and experiences that each person brings. Class discussion and student questions also help me determine areas where I need to provide additional support for your learning.

Homework problems and problem solving are a very important aspect of this course. They provide an opportunity for you to practice applying your knowledge and help you determine which material you do not understand well to identify areas where you need assistance or more practice. Homework problems to be turned in and assessed will be assigned weekly throughout the semester.

There will be three hourly exams and a cumulative final for this course. Exams provide an opportunity for you to demonstrate your knowledge of the material and let me know what students have mastered and where the problem areas are.

**Grading:**
Grades will be determined by performance on three midterm exams, a cumulative final exam, problem sets, quizzes, and class participation. Final grades will include +/− grades. Those grades will not necessarily be evenly split among the three categories (for example, # B⁺ ≠ # B ≠ # B⁻). The grade of A⁺ is assigned to reward exceptional achievement. The College and EPC recommends that the A+ grade be used only to indicate rare and extraordinary academic achievement or that the A+ grade be omitted altogether.

The course is designed to reflect the importance of high-quality work. Each assignment is graded in terms of the level of proficiency. Expectations for grades are based on degree of mastery of course content. For assignments that are not successfully completed on the first attempt, there will be additional opportunities to demonstrate proficiency. Each student begins with 3 tokens to access a second opportunity on an assignment. Additional tokens can be earned by actively participating in discussion each week.
## Grade Requirements

<table>
<thead>
<tr>
<th>Grade</th>
<th>Requirements</th>
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| A     | - Successfully complete 12 Problem sets  
       | - Successfully complete 10 Quizzes         
       | - Participate in >90% class sessions       
       | - Demonstrate proficiency on at least 90% on exams |
| B     | - Successfully complete 11 Problem sets   
       | - Successfully complete 9 Quizzes          
       | - Participate in >80% class sessions       
       | - Demonstrate proficiency on at least 80% on exams |
| C     | - Successfully complete 10 Problem sets   
       | - Successfully complete 8 Quizzes          
       | - Participate in >70% class sessions       
       | - Demonstrate proficiency on at least 70% on exams |
| D     | - Successfully complete 9 Problem sets    
       | - Successfully complete 7 Quizzes          
       | - Participate in >60% class sessions       
       | - Demonstrate proficiency on at least 60% of LOs on exams |

### Attendance Policy:
You should attend every class, but I recognize that extenuating circumstances arise that can make this difficult. If you cannot attend a class, please let me know. If you regularly miss class, you may be overextended. I ask that you come see me to discuss your options.

### Prerequisites and Required Background Material
The prerequisites for this course include calculus and elementary physics. I will make every effort to introduce important mathematical and physical concepts before we need them, but these elements are an essential part of physical chemistry. *You will be expected to master and apply the necessary mathematical methods including multivariable calculus to be successful in this course.*

### Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the [CLAS Code of Academic Honesty](#). Undergraduate academic misconduct must be reported by instructors to CLAS according to [these procedures](#). Graduate academic misconduct must be reported to the Graduate College according to Section F of the [Graduate College Manual](#).

**Examinations:** You are expected to work alone. **Cheating will not be tolerated.** The instructor believes strongly in fairness for all students and objective appraisal of individual performance and understanding of material.

**Problem Sets:** The homework for this course is designed to help you master your knowledge related to the topics covered during lecture. As such, you may work on the homework problems
with others or use online resources; however, please be aware that to master the skills needed for this class, practice is required and that to do well on exams you will need to work many of these problems multiple times without help. Be sure to test your knowledge by doing much of the homework on your own.

**Student Complaints**
Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact [CLAS Undergraduate Programs](https://clas-uw.engr.wisc.edu/) for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS [Associate Dean for Graduate Education and Outreach and Engagement](https://clas.wisc.edu/graduate) when additional support is needed.

**Drop Deadline for this Course**
You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course [here](https:// registrar.wisc.edu/). When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. **Directions** for adding or dropping a course and other registration changes can be found on the [Registrar’s website](https://registrar.wisc.edu/). Undergraduate students can find policies on dropping and withdrawing [here](https://clas.wisc.edu/undergraduate). Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

**College of Liberal Arts and Sciences (CLAS): Policies and Procedures**
Accommodations for Students with Disabilities
Basic Needs and Support for Students
Classroom Expectations
Exam Make-up Owing to Absence
Free Speech and Expression
Mental Health
Military Service Obligations
Non-discrimination
Religious Holy Days
Sexual Harassment/Misconduct and Supportive Measures
Sharing of Class Recordings