CHEM 561 section 001 Syllabus

Physical Chemistry

COURSE INFORMATION

Physical Chemistry

CHEM 561 001 (3 Credits)

2020 Spring (1204) [1204]

Description

Macroscopic theory: equilibrium thermodynamics, chemical kinetics and transport properties. Enroll Info: Chem 327 or 329; Math 222; Physics 201 or 207. Not for credit for those who have taken Chem 565

Prerequisite(s)

(CHEM 327 or CHEM 329), MATH 222, and (PHYSICS 201 or PHYSICS 207)

Breadths

P - Physical Science

Instruction Mode

Classroom Instruction

Section Level Com B

False

Department: CHEMISTRY
College: Letters and Science

Canvas Course URL

https://canvas.wisc.edu/

2020 Spring (1204) [1204]

Term Start Date: Tuesday, 21-Jan-2020 **Term End Date:** Monday, 1-Jun-2020

Location and Schedule: Chemistry Building 1315 MWF 9:55 AM-10:45 AM
CRN: 224002780

How the Credit Hours are Met

The credit standard for this course is met by an expectation of a total of 135 hours of student engagement with the courses learning activities (45 hours per credit), which include regularly scheduled instructor: student meeting times [insert meeting time expectations], reading, writing, problem sets, studio time, labs, field trips, and other student work as described in the syllabus.

INSTRUCTORS AND TEACHING ASSISTANTS

Instructor

EDWIN SIBERT

SIBERT@CHEM.WISC.EDU

Instructor Availability

Office Hours: Wed & Thurs. 2:30-3:30, 8305c Chemistry

GRADING AND COURSE MATERIALS

Course Learning Outcomes (CLOs)

1. Understand how to derive important thermodynamic relationships from the three laws of thermodynamics.
   [S18072]

2. Be able to apply the three laws of thermodynamics to physical and chemical systems.
   [S18073]

3. understand the connection between microscopic and macroscopic descriptions of chemical kinetics
   [S18074]

Grading

Course Grade: My goal is for everyone to learn to the material and to earn a good grade. I do not grade on a curve. Everyone who earns at least 83% of the points in the course will get an A or an AB; 71% will earn a B or a BC. I will not set the cutoff for earning a C until the end of the course, but based upon student performance in recent years, I expect it to be 55%. In past years, the average grade in the class has been a B.
Approximate point breakdown: Mid-term exams (300 points total), final exam (140 points), and problem sets (160 points). Regrade requests must be turned in within 3 days after the graded exam or problem set has been returned to the class.

Discussion Sessions

Participation in discussion section is highly recommended; much of this time will be spent solving problems. In a previous semester, students who did not come to discussion section regularly on average earned 68% of the points in the course while students who did come to discussion regularly earned 80%.

Laboratory Sessions

none

Required Textbook, Software, & Other Course Materials

Textbook: Silbey, Alberty, and Bawendi, "Physical Chemistry," 4th Edition, Wiley, 2005.

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

Exams, Quizzes, Papers & Other Major Graded Work

The overall course plan (with Exam dates) is indicated below, with the appropriate sections of Silbey, Alberty, and Bawendi indicated. It may be modified somewhat as the course progresses. You may assume that the textbook material will be covered in order, about 3 sections per class meeting. READ AHEAD! **Course Outline:**

1. Zeroth Law of Thermodynamics, Equations of state for real gases (1.1-1.9)

2. First Law of Thermodynamics and Applications (2.1-2.13)

Exam 1 (Wed, Feb 19)

3. Second/Thirds Laws of Thermodynamics (3.1-3.8)

4. Fundamental equations of thermodynamics (4.1-4.9)

Exam 2 (Friday, March 27)

5. Chemical equilibrium (5.1-5.9)

6. Phase equilibria of ideal and non-ideal systems (6.1-6.8)

Exam 3 (Wednesday, April 22)

7. Kinetic theory of gases (17.1-17.5, 17.7, 19.1)

Final exam (Wednesday, May 6, 10:05AM - 12:05PM)

Homework & Other Assignments

Problems Sets: In physical chemistry, mastery of a concept is exhibited by the ability to solve problems. Mathematics is an integral part of physical chemistry and you need to understand the math well enough to solve the problems. I expect that you will work and understand all of the assigned problems. Problem sets will be due approximately once per week, usually on Friday. They will be due at the beginning of class on the due date. Late problem sets will not be accepted. Graded problem sets will be returned in class or they can be picked up during the TA's office hours; a subset of the problems may be graded. In previous years, there has been a high correlation between problem set scores and exam scores. In recent years, nearly all students who failed to hand in 4 or more problem sets received a D or F in the course.

You are encouraged to work on your problem sets in a study group. Each person should hand in their own solutions to the problem set and should fully understand the solutions.

OTHER COURSE INFORMATION

Other Course Information

Why you should learn this material: Physical chemistry utilizes both macroscopic and microscopic viewpoints. Thermodynamics is the most powerful *macroscopic*description available to chemists; it is the foundation for much of modern science. The kinetic theory of gases, in contrast, introduces a rigorous *microscopic*view of the collisions that underpin gas laws and chemical reactivity in the gas phase. The course material allows important insights into problems facing our society and our planet. To illustrate this, we will make several connections between the course material and issues concerning energy production and rising levels of carbon dioxide in the atmosphere.
Class Participation: Active participation in class discussions and in the discussion sections will help you learn and can help you earn a good grade. In a previous semester, students who did not come to class regularly on average earned 58% of the points in the course while students who did come to class regularly earned 78%. During our regular class periods, I will ask questions and you should be prepared to answer.
Participation in discussion section is highly recommended; much of this time will be spent solving problems. In a previous semester, students who did not come to discussion section regularly on average earned 68% of the points in the course while students who did come to discussion regularly earned 80%.

Comments and Questions: I will provide opportunities for you to ask questions in class and I will linger after class to answer questions on most days. Office hours are another chance to ask questions and discuss the course material; recently, a student who regularly came to office hours started the course with a C but ended with an AB. Another way to ask a question or make a comment is to write it down and put it my mailbox. You are welcome to comment on any aspect of the course, anonymously if you wish. Your questions and comments are an important way for me to learn what parts of the course material are not being clearly presented.

Alternate textbooks are entitled â€œPhysical Chemistryâ€□. The authors of these books are Engel/Reid, Levine, McQuarie, and Atkins/de Paula. You should try reading one of these texts if you have trouble understanding a particular section in Silbeyâ€™s book.

Errors in Silbey, Alberty, and Bawendi (4th edition):
Page 61, equations 2.95 and 2.96, all four â€œ CP â€□ symbols should be â€œ CP0 â€□ Page 68, point 5, â€œdifferentialâ€□ should replace â€œvariableâ€□ Page 186, Figure 6.6, part a, x-axis label should read â€œx1â€□, i.e., â€œy1â€□ should not appear Page 187, text just after equation 6.31, replace â€œ6.23â€□ with â€œ6.27â€□ Page 192, Figures 6.11, x-axis label should be â€œx1, y1â€□ in both panels Page 193, Figures 6.12, x-

axis label should be â€œx1, y1â€□ in both panels Page 687, text 3 lines after equation 19.4, replace â€œ2â€□ by â€œ1/2â€□

ACADEMIC POLICIES

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madisonâ€™s community of scholars in which everyoneâ€™s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: â€œThe University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.â€□

DIVERSITY & INCLUSION

Institutional statement on diversity: â€œDiversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background â€“ people who as students, faculty, and staff serve Wisconsin and the world.â€□

RELIGIOUS OBSERVANCES

UW faculty policy states that mandatory academic requirements should not be scheduled on days when religious observances may cause substantial numbers of students to be absent. Refer to the university's Academic Calendar for specific information.