

CHEMISTRY 325 (Section 3) - CHEMICAL THERMODYNAMICS
Spring 2021

GENERAL INFORMATION

Instructor: **Aaron Rossini**, 0205 Hach Hall (Basement), Phone: 515-294-8952
arossini@iastate.edu

Class: **M W F 9:55am – 10:45 am Lagomarcino 1155**

Office Hours: M W 11:00am-12:00pm by Webex, or e-mail to schedule another time.

Teaching Assistant: **Chang Oh** - johnoh@iastate.edu

TA Office Hours by appointment.

Additional office hours and help sessions will be scheduled in advance of exams.

LEARNING OUTCOMES

By the end of this course students can apply thermodynamics and chemical equilibrium concepts in their professional lives.

LEARNING OBJECTIVES

- Understanding the concepts of 1st, 2nd, and 3rd law of thermodynamics, and applying them to solve problems that may be encountered in their professional lives.
- Understanding the concepts of chemical equilibrium, and applying them to solve problems related to chemical reactions and phase transformations of materials.

COURSE DESCRIPTION

In Chemistry 325 you will learn fundamental thermodynamic principles including properties of gases, partition functions, the first law of thermodynamics, the second law of thermodynamics, the third law of thermodynamics, Helmholtz and Gibbs energies, phase equilibria and solutions. By the end of the course, you should have a firm grasp on these concepts and how they apply to the world around you. You are responsible for learning, understanding, and applying all subjects and concepts presented throughout the course. Success in Chemistry 325 should prepare you well for Chemical Engineering 381 (Chemical Engineering Thermodynamics). Prerequisites for Chemistry 325 include Chem 178 and Math 166. Phys 222 recommended. Chemistry 325 is a 3 credit course (*attendance is highly recommended*).

TEXT BOOK

McQuarrie & Simon, *Molecular Thermodynamics*, 1999, University Science Books, in bookstore.

Class notes will be posted on the course Canvas site prior to lectures. Students are encouraged to download the class notes and/or print them out ahead of time for use during lectures.

CONTENT DELIVERY AND TEST TAKING

- The course can be completed without in-person attendance.
- 15 – 25 minute video lectures primarily covering concepts and theoretical aspects of thermodynamics will be posted to Canvas ahead of the normally scheduled lecture times. *The video lectures are meant to be watched before classroom lectures.* During classroom lectures I will briefly review the content of the video lectures. Class lectures will mainly focus on example problems and problem solving. In-class lectures will also be recorded and posted to Canvas.
- Problem sets will be submitted online via Canvas (preferably as .pdf). Submission deadlines will be indicated on Canvas.
- All tests and exams will be administered via Canvas during regularly scheduled class times. Students will upload their completed written portions of exams to Canvas as pictures or .pdf documents for grading.

GRADING

Problem Sets – 10%

6 In-Class Exams – 72% (12% each)

Final Exam – 18%

There will be 6 tests (ca. 25 minutes to 30 minutes in duration), taken during class time. The in class tests will take place every other Friday. A *comprehensive* final exam will take place at the end of the year during the time scheduled by the registrar (1 to 2 hours in duration). A scientific calculator is required for the exams. The \pm grading system will be used. Tentative dates for the in class exams are provided below. In class exam times may be changed provided that a minimum of one-week notice is given. The final exam will be given in the scheduled period during finals week (see below). Graduating seniors must take the final exam. All data needed to complete problems will be provided with the exams.

Illegible tests or problem sets will NOT be graded. All work must be presented reasonably neatly and logically; all work MUST be shown. A correct answer without supporting work will receive a score of 0.

Weekly assignments/problem sets will be posted on Canvas with due dates. *No credit will be received for homework sets handed in late.* Each problem within the assignment will get a score of 0 (no reasonable attempt), 1 (reasonable attempt, but incorrect answer), or 2 (correct). Feel free to work with other students on the homework, but you must turn in your own individual set of solutions; collaboration is encouraged. The assignments will account for 10% of the grade.

The following approximate grading scale will be used:

100% - 93% • A, 93% - 88% • A-, 88% - 83% • B+, 83% - 79% • B, 79% - 75% • B-, 75% - 71% • C+, 71% - 68% • C, 68% - 65% • C-, 65% - 62% • D+, 62% - 59% • D, 59% - 55% • D-, 55% and below • F

COURSE POLICIES

Late assignments. Problems are due at the start of class on the due date - no exceptions, no excuses, unless the Dean of Students notifies me that you have a personal emergency.

There will be no make up tests or exams. If you miss an in-class test for a valid medical reason, the average of your other test scores will be used to calculate your final grade at the end of the semester. An excuse signed by a doctor is required for such grace. Otherwise you will receive a zero for the exam or quiz missed.

Plagiarism and Academic Misconduct. A The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office (<https://www.studentconduct.dso.iastate.edu/academic-misconduct>).

Academic Misconduct in any form is in violation of Iowa State University Student Disciplinary Regulations and will not be tolerated. This includes, but is not limited to: copying or sharing answers on tests, using unauthorized electronic devices on tests or quizzes, plagiarism, and having someone else do your academic work. Depending on the act, a student could receive an F grade on the test/assignment, F grade for the course, and could be suspended or expelled from the University.

TENTATIVE CLASS SCHEDULE

First day of class - Monday January 25, 2021

Ch. 2

Test 1 – Friday February 5th

Ch. 5

Ch. 1

Test 2 – Friday February 19th

Ch. 3

Ch. 4

Test 3 – Friday March 5th

Ch. 6

Ch. 7

Test 4 – Friday March 19th

Ch. 8

Ch. 9

Test 5 – Friday April 2nd

Ch. 10

Ch. 11

Test 6 – Friday April 16th

Ch. 12

FINAL EXAM – Wednesday, May 5th, 2021, 9:45 - 11:45 am.

The ISU final examinations policy will be followed absolutely:

<http://www.registrar.iastate.edu/students/exams>.

OTHER IMPORTANT DATES

https://www.registrar.iastate.edu/sites/default/files/uploads/Cals/Spring%20Term%202021%20Details_revised.pdf

January 29 - Last day to drop course without add/drop sheet.

April 2 - Last day to drop course without extenuating circumstances.

Monday, April 26 – Last day to request alternative final exam time

Friday, April 30 – Last lecture.

COVID-19 HEALTH AND SAFETY REQUIREMENTS

Students are responsible for abiding by the university's COVID-19 health and safety expectations. All students attending this class in-person are required to follow university policy regarding health, safety, and face coverings:

- wear a cloth face covering in all university classrooms, laboratories, studios, and other in-person instructional settings and learning spaces. Cloth face coverings are additionally required to be worn indoors in all university buildings, and outdoors when other people are or may be present where physical distancing of at least 6 feet from others is not possible. Students with a documented health or medical condition that prevents them from wearing a cloth covering should consult with Student Accessibility Services in the Dean of Students Office;
- ensure that the cloth face covering completely covers the nose and mouth and fits snugly against the side of the face;
- practice physical distancing to the extent possible;
- assist in maintaining a clean and sanitary environment;
- not attend class if you are sick or experiencing symptoms of COVID-19;
- not attend class if you have been told to self-isolate or quarantine by a health official;
- follow the instructor's guidance with respect to these requirements.

Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space.

ACCESSIBILITY STATEMENT

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

CLASSROOM ETIQUETTE

It is expected that you will respect your fellow students and the instructor during the class. Cell phone and other electronic communication device use during lecture is strictly forbidden. In class cell-phone and communication device use will result in a zero grade for any assignment associated with that class including exams and may impact your grade significantly. People who read newspapers, carry on extended conversations during class, or engage in other distracting behavior, will be asked to leave.

ILLNESS OR OTHER EMERGENCIES

If you have a health issue or other emergency that requires you to miss multiple classes, you are advised to contact the Dean of Students Office (<http://www.dso.iastate.edu/sa>) who can contact all of your instructors on your behalf. You also should contact your academic adviser to keep them informed of your situation.

DEAD WEEK

This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook.

HARASSMENT AND DISCRIMINATION

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity (<https://www.eoc.iastate.edu/>), 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu.

RELIGIOUS ACCOMMODATION

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office (<https://www.studentassistance.dso.iastate.edu/>) at 515-294-1020 or the Office of Equal Opportunity (<https://www.eoc.iastate.edu/>) at 515-294-7612.

CONTACT INFORMATION

If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

RIGHT TO PRIVACY

The Federal Right-to-Privacy Act prohibits the instructor from public disclosure of exam scores. You may obtain your exam scores in person from your TAs or the Canvas grade book. The instructor and the TAs are prohibited from giving grades over the phone or e-mail.

FREEDOM OF EXPRESSION

Iowa State University supports and upholds the First Amendment protection of freedom of speech and the principle of academic freedom in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.