

CHEMISTRY 325 (Section A and Section B) - CHEMICAL THERMODYNAMICS Fall 2023

GENERAL INFORMATION

Instructor: **Dr. Aaron Rossini**, 0205 Hach Hall (Basement), Phone: 515-294-8952

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Section A Class: **M W F 8:50 am - 9:40 am Gilman 1810**

Section B Class: **M W F 1:10 am - 2:00 pm Gilman 1051**

Office Hours: M W 9:50 am-11:00 am, or e-mail to schedule another time.

Teaching Assistant: **Joseph Bequette** - bequejoe@iastate.edu TA Office Hours by appointment.

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.*

GRADING

Problem Sets – 10%

4 In-Class Exams – 70% (17.5% each)

Final Exam – 20%

There will be 4 tests taken during class time (see schedule below). Each test typically covers 2-3 chapters worth of material. 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 may receive a score of 0.

Weekly assignments/problem sets will be posted on Canvas with due dates. Scans/pictures of completed problem sets must be uploaded to Canvas prior to the deadline. *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, your final exam score will be used to replace your missing test score for calculation of 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. 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, August 21

Chapter 2

(Monday September 4th – No class, University Holiday)

Chapter 5

Test 1 – Friday, September 8th – Lecture 8

Chapter 1

Chapter 3

Chapter 4

Test 2 – Wednesday, October 4th– Lecture 19

Chapter 6

Chapter 7

Thanksgiving Break – No Classes – November 20th-24th

Test 3 – Wednesday October 25th – Lecture 28

Chapter 8

Chapter 9

Test 4 – Wednesday November 15th – Lecture 37

Chapter 10

Chapter 11

Chapter 12 – Final lecture, Friday, December 8th

FINAL EXAM –

Section A, Tuesday December 12th, 7:30 am to 9:30 am.

Section B, Tuesday December 12th, 12:00 pm to 2:00 pm.

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/Fall%20Semester%202023%20Details.pdf>

ACADEMIC DISHONESTY

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(<https://www.studentconduct.dso.iastate.edu/academic-misconduct>).

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 carry on extended conversations during class, or engage in other distracting behavior, will be asked to leave.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Your comments to others should be factual, constructive, and free from harassing statements. You are encouraged to disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). It is the instructor's goal to promote an atmosphere of mutual respect in the classroom. Please contact the instructor if you have suggestions for improving the classroom environment.

FACE MASKS ENCOURAGED

Because of the continuing COVID-19 pandemic, all students are encouraged—but not required—to wear face masks, consistent with current recommendations from the Centers for Disease Control and Prevention. Further information on the proper use of face masks is available on the CDC website (<https://www.cdc.gov/coronavirus/2019-ncov/your-health/effective-masks.html>).

VACCINATIONS ENCOURAGED

All students are encouraged to receive a vaccination against COVID-19. Multiple locations are available on campus for free, convenient vaccination. Further information is available on ISU's Covid-19 Vaccinations (<https://web.iastate.edu/safety/updates/covid19/vaccinations>). Vaccinations may also be obtained from health care providers and pharmacies.

PHYSICAL DISTANCING ENCOURAGED FOR UNVACCINATED INDIVIDUALS

Classrooms and other campus spaces are operating at normal capacities, and physical distancing by faculty, staff, students, and visitors to campus is not required. However, unvaccinated individuals are encouraged to continue to physically distance themselves from others when possible.

REGARDING A STUDENT'S NAME, GENDER IDENTITY AND/OR GENDER EXPRESSION

Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me accordingly early in the semester so that I may make appropriate changes to my records.

DISCLAIMER ABOUT FREEDOM OF SPEECH AND ACADEMIC FREEDOM

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.

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.

PREP WEEK

This class follows the Iowa State University Prep 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, 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 TA or instructor or online from the Canvas grade book. The instructor and the TAs are prohibited from giving grades over the phone or e-mail.