

Chem 521 Chemical Thermodynamics—Syllabus, Fall 2023

Course Description: Three semester hours. A study of the theories and applications of chemical thermodynamic principles and functions. 3.0 Credit Hours & 3.0 Lecture hours.

Class Time and Location: Online MW 6:00-7:15pm

Instructor: Dr. Ben Jang; Sci 335, x5383, ben.jang@tamuc.edu

Office Hour: MW 9-10am & MT 3:00-4:30pm

Goals of the Course: Develop an advanced understanding of the laws of thermodynamics and their various applications, with emphasis on classical thermodynamics.

LEARNING OUTCOMES / COURSE OBJECTIVES

1. Advanced understanding of the concepts and applications of the kinetic molecular theory
2. Advanced understanding of the laws of thermodynamics and their applications
3. Capable of calculating various thermodynamic properties based on the laws of thermodynamics
4. Advanced understanding of the principles of Carnot cycle.
5. Capable of deriving various thermodynamic equations based on the laws of thermodynamics
6. Capable of applying the properties obtained from phase diagrams in designing experiments to solve specific problems.

Course Requirements and Assignments:

Required: *Physical Chemistry: A Guided Inquiry Thermodynamics*
Spencer, J. et al. Lancaster, PA: The POGIL Project.
&
Physical Chemistry, 3rd Ed., Laidler/Meiser; Houghton Mifflin
ISBN: 0-395-91848-0 (or the 4th edition)

Contents: Kinetic molecular Theory
The First Law of Thermodynamics
Thermochemistry
The Second Law of Thermodynamics
The Third Law of Thermodynamics
Applications of the Entropy Concept
Chemical Equilibrium
The Ideal Solution
Colligative Properties
Phase Equilibria
Thermal Analysis

Assignments: Selective problems at the end of chapter will be assigned. The assignment is due normally a week later.

Grading:

Project: 15%

Quizzes: 20%

Exams: 40%

One comprehensive final Exam: 25%

A: ≥ 90.0 ; **B:** 80.0 ~ 89.9; **C:** 70.0 ~ 79.9; **D:** 60.0 ~ 69.9; **F:** < 60.0

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Zoom Requirements:

<https://support.zoom.us/hc/en-us/articles/201362023-Zoom-system-requirements-Windows-macOS-Linux>

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the [Student Guidebook](#).

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: <https://www.britannica.com/topic/netiquette>

TAMUC Attendance

For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedure 13.99.99.R0.01](#).

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

[Undergraduate Student Academic Dishonesty Form](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf>

Graduate Student Academic Dishonesty Form

<http://www.tamuc.edu/academics/graduateschool/faculty/GraduateStudentAcademicDishonestyFormold.pdf>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce

Velma K. Waters Library Rm 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: studentdisabilityservices@tamuc.edu

Website: [Office of Student Disability Resources and Services](#)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

A&M-Commerce Supports Students' Mental Health

The Counseling Center at A&M-Commerce, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit

www.tamuc.edu/counsel

Project Topics:

Kinetic Molecular Theory

Bomb Calorimetry

Maxwell-Boltzmann Distribution Law

1st Law of Thermodynamics

Enthalpy

Heat Capacity & Enthalpy of Reaction

Entropy

Law of Thermodynamics

3rd Law of Thermodynamics

Gibbs and Helmholtz Energies

Equilibrium and Equilibrium Constant

Phase Equilibria for Pure Phases & Phase Diagram

Ideal Solution

Partial Molecular Quantities & Colligative Properties

The Phase Rule & Phase Equilibria for Solid-Liquid System

Liquid-Vapor Phase Equilibria

Class Schedule: (Tentative)

Week	Lecture/Activities	Quiz/Exam
WK 1	Gases (I), Kinetic Molecular Theory	
WK 2	Maxwell-Boltzmann Distribution Law, Gases (II)	Quiz1
WK 3	Work, 1st Law of Thermodynamics	
WK 4	Enthalpy	Quiz2
WK 5	Heat Capacity & Enthalpy of Reaction	
WK 6	Entropy & 2 nd Law of Thermodynamics	Exam1
WK 7	3 rd Law of Thermodynamics	

WK 8	Gibbs and Helmholtz Energies	Quiz3
WK 9	Equilibrium and Equilibrium Constant	
WK 10	Phase Equilibria for Pure Phases & Phase Diagram	Quiz4
WK 11	Ideal Solution & Chemical Potential	
WK 12	Partial Molecular Quantities & Colligative Properties	Exam2
WK 13	The Phase Rule & Phase Equilibria for Solid-Liquid System	
WK 14	Liquid-Vapor Phase Equilibria	Quiz5
WK 15	Project presentation	
WK 16		Final Exam