

CHEM 352 – SYLLABUS, SPRING 2020

COURSE DESCRIPTION: Physical Chemistry II, 4 semester hours (3 lecture, 4 lab)
A continuation of Chemistry 351 including a detailed study of chemical kinetics, atomic structure, and quantum mechanics.

CLASS TIME AND LOCATION: Lecture: MW 2:00-3:15pm; SCI # 313.
Lab: M 3:30-7:20pm; SCI #313.

INSTRUCTOR: Dr. Ben Jang; SCI 335, x5383, ben.jang@tamuc.edu

OFFICE HOUR: MW 10:00-11:00am, TW 3:15-4:45pm or by appointment. Messages can be left in the mailbox in the Department office.

GOALS OF THE COURSE: Introduce the students into the fields of chemical kinetics, quantum chemistry and surface chemistry, with the emphasis on reaction rate and order, activation energy, steady state hypothesis, Schrodinger equation, the application of quantum mechanics in chemical bonds and spectroscopy, adsorption, and Langmuir isotherm. Understanding the concepts and problem solving skills are keys to success in the class.

COURSE REQUIREMENTS, ASSIGNMENTS AND GRADING:

Textbook: Physical Chemistry: A Guided Inquiry, Thermodynamics (Kinetics) by James Spencer et al.; Published by Houghton Mifflin

Physical Chemistry: A Guided Inquiry Atoms, Molecules, and Spectroscopy (AMS), by Moog, Spencer and Farrell

References: Physical Chemistry, 3rd Ed., Laidler/Meiser
Experiments in Physical Chemistry, 6th Ed. Shoemaker, David P.

Grading Procedure:

Quizzes 15%

Lab: 15%

3 Tests: 50%

1 Final Exam: 15%

1 ACS comprehensive exam: 5%

A: >85.0; **B:** 75.0 ~ 84.9; **C:** 65.0 ~ 74.9; **D:** 55.0 ~64.9; **F:** <54.9

LEARNING OUTCOMES / COURSE OBJECTIVES

1. Capable of determining the rate law and rate constant based on experimental data
2. Capable of identifying the reaction order based on how reaction changes with time.
3. Capable of deriving the rate law based on the reaction mechanism.
4. Understand the impact of activation energy on reaction rates and activation energy calculation.
5. Understand the various energies of molecules and the differentiation.

6. Understand the basic principle of quantum mechanics and to obtain various operators
7. Capable of recognizing various wavefunctions and calculating numerical values at different locations.
8. Know how to calculate the energy of particle in a box
9. Know how to write the wavefunction of hydrogen atom
10. Based on the wavefunction to determine the sign of the function in different regions.
11. Know how to write the trial function for simple molecules according to MOPAC/AM1 Model,
12. Know how to calculate the π electron charge on atoms for a simple π system.
13. Apply knowledge and skills to safely operate instrumentations in the lab.
14. Apply the conclusions drawn from experiments to strengthen the concepts learned from lectures.
15. Work cooperatively with your team members in lectures and labs.

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

YouSeeU Virtual Classroom Requirements:

<https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements>

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>

COURSE AND UNIVERSITY PROCEDURES/POLICIES

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.

Class Attendance Policy

All students are expected to attend class on a regular basis and attendance will be recorded. The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Undergraduate Catalog. You must be on time in order to take an exam. Excessive absence is defined as missing more than 10% of the laboratory sessions without excusable reasons. Good class attendance will be necessary in order to pass the course.

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>

Student Conduct Policy

Students are required to turn off all cell phones, MP3 players, PDA's, Pagers, computers and any other electronic devices before entering the class or in the laboratory that might disrupt class or disturb others.

If the student is failed to comply with the code of conduct and being disrespectful, disruptive to the instructor or the students of the class, the instructor reserves the right to dismiss the student

from the class on the first offense. A second offense may constitute dismissal from the course with a failing grade.

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: [Netiquette](#)

<http://www.albion.com/netiquette/corerules.html>

Academic Integrity and Dishonesty Policy

Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University. 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](#)

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

[Graduate Student Academic Dishonesty 13.99.99.R0.10](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

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

Gee Library- Room 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 Statement

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 expression will be maintained

Campus Concealed Carry

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.

How to be Successful in Physical Chemistry

- This is probably the hardest course you have taken or will ever take, and hard work is required; expect to spend 10 to 20 hours per week outside of class studying. Learning requires practice that can only be done by the student alone, by careful reading and working on exercises; it is as true in learning physical chemistry as it is in any pursuit.
- Attend class regularly; *do not fall behind*.
- Preview lecture/activities content *before* next lecture/activity; reread them afterwards.
- Study all *examples* carefully, filling in the missing steps and checking units at all stages.
- Do problems! Each assigned problem illustrates an important concept -- careful rereading and study of the text is usually required to work problems. Do all the problems assigned; then work some of your own choosing from the others in the chapter!
- Timing is important. Attempt exercises and problems immediately after covering the material; if you can't do them, reread the material. If you still can't do a problem, seek help immediately. This is a time-consuming process, but is important for the learning process. You CANNOT learn physical chemistry the night before an examination.

Class Schedule: (Tentative)

Week	Lecture/Activities	Lab
WK 1	Introduction Chemical Kinetics	Check in/Safety
WK 2	Integrated Rate Laws and Method of Isolation	Lab 1
WK 3	Reaction Mechanism & Activation Energy	Lab 2
WK 4	Enzyme Kinetics & Gas Phase reactions	Lab 3
WK 5	Transition State Theory, The Energies of Molecules & Quantum Mechanics	No Lab/Test I
WK 6	Translational & Vibrational Energies	Lab 4
WK 7	Rotational Energy & Electronic Structure of Atoms	Lab 5
WK 8	Multielectron Atoms & Photoelectron Spectroscopy	Lab 4/5
WK 9	Spring Break	
WK 10	Electronic Configurations & Term Symbols	No Lab/Test II
WK 11	Huckel Molecular Orbitals & Conjugated π Systems	Lab 6
WK 12	Molecular Orbitals & Energies for Diatomic Molecules	Lab 7
WK 13	Selection Rules & Spectra of Molecules	Lab 6/7

WK 14
WK 15
WK 16

Electronic Spectra of Atoms and Molecules
Review
Final Exam

No lab/Test III
Check out