

San José State University
College of Science, Dept. of Chemistry
Chem 160.01, Physical Chemistry, Fall 2019

Course and Contact Information

Instructor:	Nicholas Esker PhD.
Office Location:	Duncan Hall 501
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Email:	nicholas.esker@sjsu.edu
Office Hours:	
Class Days/Time:	Tuesdays and Thursdays, 12:00 – 1:15pm Fridays, 12:00 – 12:50pm
Classroom:	Duncan Hall, Room 415
Prerequisites:	Chem 55, Phys 2B, Math 30 and Chem 120S (with grades of “C” or better, “C-“ not accepted)
Credit:	4 units

Course Web Page

Course materials such as syllabus, handouts, notes, assignment instructions, and any other materials can be found on [CANVAS](#). You are responsible for regularly checking CANVAS to learn any updates.

Course Description

Introduction to the fundamental principles of physical chemistry. This includes thermodynamics, kinetics, quantum mechanics and spectroscopy.

Course Learning Outcomes (CLOs)

The main learning outcomes for CHEM 160 students are as follows:

1. Explain and apply the concepts of thermodynamics, kinetics, quantum mechanics, and spectroscopy to chemical, physical, and biochemical systems.
2. Derive essential mathematical relationships in thermodynamics, kinetics, quantum mechanics, and spectroscopy.
3. Students will apply essential mathematical relationships to chemical, physical, and biochemical problems, including chemical and biochemical reactions and phase equilibria.
4. Students will evaluate physical and chemical systems to determine how to control these systems.

Program Learning Objectives

This course addresses the following [BS/BA Chemistry Program Learning Objectives](#)

4. Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in physical chemistry.

Required Texts

Textbooks

Required: "Physical Chemistry for the Life Sciences", 2nd Edition, Peter Atkins and Julio De Paula, W.H. Freeman and Company (2011). ISBN: 9781429231145.

This is a low-cost class and book purchases/rentals are ~\$30. By keeping this text the cost of the course was reduced from \$200 to \$30. This is in compliance with California bill SB-1359; Low-cost course material bill (The Donahoe Higher Education Act).

Not required: "Solutions manual to accompany Physical Chemistry for the Life Sciences", 2nd Edition, Charles Trapp and Marshall Cady, W.H. Freeman and Company (2011)
ISBN:9780109600328

Emergencies and Building Evacuations

If you hear a continuously sounding alarm, or are told to evacuate the building by an Emergency Coordinator, walk quickly to the nearest exit. Take your personal belongings as you may not be allowed to return. Follow the instructions of the Emergency Coordinators. Be quiet so you can hear instructions. Once outside, move away from the building. Do not return to the building unless the Police or the Emergency Coordinator announces that this is permissible.

Library Liaison

Yen Tran, yen.tran@sjsu.edu

Course Requirements and Assignments

Reading

The course schedule indicates the lecture topics and the chapters in Atkins and De Paula that are relevant to these topics for each week. You are expected to read these chapters *before* each lecture. It is very important to read the material in the text! It may require multiple readings of the text to absorb the concepts and mathematical descriptions. Not everything in the text will be covered in the lecture. Likewise, some material covered in lecture may not be found in the text. The text is intended to be a primary reference for the material covered in the course.

Homework / Problem Sets

Homework problems will be posted to Canvas with problems relevant to the lectures that are important, interesting and challenging. Homework problems will reflect similar questions on the exams. You are encouraged to work with others on homework assignments, but be sure that you are able to solve the problems on your own for exams. Homework keys will be posted on the CHEM 160 Canvas page. Homework problems include both text book problems and the supplemental problems

assigned for oral presentations. You will be responsible for any problems in Atkins and De Paula with respect to exams.

It is difficult to learn physical chemistry by simply attending lectures and reading the book. Lectures are, by their nature a supplement to the text and will help introduce you to the concepts that are necessary for **problem solving**, which is **the key** to learning physical chemistry. Therefore, this requires that you take on the responsibility of working through problem sets. You need to spend at least 4-5 hours weekly practicing problems.

Evaluation of homework sets will be done on a “spot-check” basis, with students being responsible for all assigned problem sets but only one or two representative problems will be thoroughly evaluated. Students will be responsible for comparing their work with the provided answer keys.

Friday Discussion Evaluations

The abbreviated Friday class will be used to discuss material and work through representative problem sets in small groups. Students will be assigned to groups and each group will be assigned one homework problem per week. Though attendance will not be taken (see *Class Attendance* on p. 5 for more detail), participation and engagement will be included as part of the overall “problem set / Friday discussion” evaluation.

Lecture Exams and Final

Some topics have been covered in General Chemistry courses. Review that course materials and exams! Three midterm exams (100 points each), will be given approximately every fourth week. Dates for the exams are on the course schedule (On this syllabus below and on Canvas). There will be no make-ups for lecture exams. Should you miss an exam because of illness or equally compelling reasons, you should inform me of the fact as soon as possible, and hopefully before the exam is given. You will need to provide me with written evidence (doctor’s note, police report, etc.) for your excuse. If I accept your excuse, I will use the score on the final as your missing exam score. An unexplained or unsatisfactory excuse for missing an exam will result in a grade of zero.

Grading

Your performance in the course will be evaluated as follows:

Problem Sets / Friday Discussions	50 pts.
Midterm Exam 1	100 pts.
Midterm Exam 2	100 pts.
Midterm Exam 3	100 pts.
Final Exam	150 pts.
Extra credit assignments	25 pts.
Total	500pts.

Failure to take the final will result in a failing grade (F) for the course. The following scale indicates the letter grade has a function of the percentage of points received per student. I reserve the right to adjust the scale downward if conditions warrant, but will not raise the minimum required for any particular grade. Standard rounding practices apply.

Grade	Percent (%)
A	≥ 93.0
A-	92.9 – 88.0
B+	87.9 - 84.0
B	83.9 – 79.0
B-	78.9 – 75.0
C+	74.9 – 69.0
C	68.9 – 65.0
C-	64.9 – 60.0
D	59.9 – 50.0
F	< 50

University Policies

Per [University Policy S16-9](#), relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](#). Make sure to visit this page, review and be familiar with these university policies and resources.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](#) section. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](#). The [Late Drop Policy](#) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes. Information about the latest changes and news is available at the [Advising Hub](#).

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University [Academic Integrity Policy S15-7](#) requires you to be honest in all your academic course work. Executive order 1098 also outlines student conduct and honesty policies and can be found on the student conduct website. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. Please see the [Student Conduct and Ethical Development website](#) for more information.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. Any text, diagram, chart or data that is not the product of the student author must cite a reference for the source as appropriate. This includes (but is not limited to) material taken from reference books, tables, primary research literature, laboratory manuals and computer programs. Failure to adhere to the principles that protect the academic integrity of this course will be dealt with according to the policies and procedures of the Department of Chemistry, the College of Science and San Jose State University.

Workload

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of 45 hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](#).

Class Attendance

Attendance will not be taken in lecture, but you are responsible for all announcements and material presented during class. Lecture material does not necessarily reiterate text material. It is a serious mistake either to depend on a classmate's notes or exclusively on the textbook. To succeed in this course it is essential to attend class, perform the readings prior to class and complete the assigned homework. The instructor is not responsible for covering material you missed due to unexcused absences.

NOTE that [University policy F69-24](#) states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](#) requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
 - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises, as discussed in [University Policy S90-5](#). More detailed information on a variety of related topics is available in the [SJSU catalog](#). In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](#) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](#) (AEC) to establish a record of their disability.

SJSU Peer Connections

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, enhanced critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](#) for more information.

Chemical Safety

[CHEM 120S Chemical Safety Seminar](#) is a required course for all chemistry majors and minors. The additional [Safety Training](#) is a requirement/prerequisite for CHEM 180/298, if working in a wet/chemical research lab. Please visit the [Safety Training website](#) to sign up for more information.

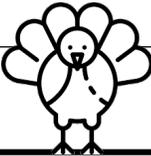
Disclaimer

This document is subject to change with fair notice.

CHEM 160 / Physical Chemistry, Fall 2019, Course Schedule

The following schedule of lecture topics is tentative and subject to change at the instructor's discretion. Readings should be completed **before** the lecture.

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
1	Aug 22, Thu. Aug 23, Fri.	Fundamentals, Gen Chem Review, and Kinetic Molecular Theory of Gases
2	Aug 27, Tue. Aug 29, Thu. Aug 31, Fri.	Chapter 1. The First Law of Thermodynamics
3	Sep 03, Tue.** Sep 05, Thu. Sep 06, Fri.	Chapter 2. The Second Law of Thermodynamics
4	Sep 10, Tue.†† Sep 12, Thu. Sep 13, Fri.	Chapter 3. Phase Equilibria
5	Sep 17, Tue.	Midterm Exam #1
	Sep 19, Thu. Sep 20, Fri.	Chapter 4. Chemical Equilibrium
6	Sep 24, Tue. Sep 26, Thu. Sep 29, Thu.	Chapter 4. Chemical Equilibrium Chapter 6. The Rates of Reactions
7	Oct 01, Tue. Oct 03, Thu. Oct 04, Fri.	Chapter 6. The Rates of Reactions
8	Oct 08, Tue. Oct 10, Thu. Oct 11, Fri.	Chapter 7. Accounting for the Rate Laws
9	Oct 15, Tue.	Midterm Exam #2
	Oct 17, Thu. Oct 18, Fri.	Chapter 9. Microscopic Systems and Quantization
10	Oct 22, Tue. Oct 24, Thu. Oct 25, Fri.	Chapter 9. Microscopic Systems and Quantization

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
11	Oct 29, Tue. Oct 31, Thu. Nov 01, Fri.	Chapter 9. Microscopic System and Quantization Ch 10. The Chemical Bond 
12	Nov 05, Tue. Nov 07, Thu. Nov 08, Fri	Chapter 10. The Chemical Bond & Chapter 11. Macromolecules and Self-assembly
13	Nov 12, Tue.	Chapter 11. Macromolecules and Self-assembly
	Nov 14, Thu.	Midterm #3
	Nov 15, Fri.	<i>TBA</i>
14	Nov 19, Tue. Nov 21, Thu. Nov 22, Fri.	Chapter 12. Optical Spectroscopy and Photobiology
15	Nov 26, Tue.	Chapter 13. NMR and EPR
	Nov 28, Thu.## Nov 29, Fri.##	<i>Thanksgiving Holiday</i> 
	Dec 03, Tue. Dec 05, Thu. Dec 06, Fri.	Chapter 13. NMR and EPR
	Dec 09 - 13	Final Exam Review
	Dec 17, Tue.	Final Exam: 9:45am – 12pm

Important Dates

- ** Sep 03 Last day to drop without an entry on permanent record (“W”)
 †† Sep 10 Last day to add classes and register late
 ## Nov 28, 29 Thanksgiving Holiday, Campus Closed
Dec 17 Final Examination