San José State University
College of Science, Dept. of Chemistry
Chem 160.01, Physical Chemistry, Fall 2022

Course and Contact Information

Instructor:	Nicholas Esker PhD.
Office Location:	Duncan Hall 501 and zoom link (below)
Zoom Personal ID:	221 532 1796 (password required, see canvas page for details)
Telephone:	(408)-924-4950
Email:	nicholas.esker@sjsu.edu
Office Hours:	Wed 09:30am – 11:00 am Fri 09:30am – 11:00 am
Class Days/Time:	Tuesdays and Thursdays, 12:00pm – 1:15pm Fridays, 12:00 pm – 12:50 pm
Classroom:	In-person: Duncan Hall 250 Canvas: https://sjsu.instructure.com/courses/1489713/
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

1.1 –Students will be able to identify, formulate, and solve a range of chemistry problems (fundamental to complex) through application of mathematical, scientific, and chemical principles.
1.2 –Students will be able to recognize, relate, and/or apply chemistry terms and concepts to propose and solve interdisciplinary and multidisciplinary real world problems.
3.2 –Students will be able to identify as scientists within the scientific community through constructing peer reviews, engaging in collaborations, and participating in mentorship.

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

Public Health Advisory: COVID-19 & Monkeypox

Students registered for a College of Science (CoS) class with an in-person component should view the CoS COVID-19 and Monkeypox Training slides for updated CoS, SJSU, county, state and federal information and guidelines, and more information can be found on the SJSU Health Advisories website. By working together to follow these safety practices, we can keep our college safer. Failure to follow safety practice(s) outlined in the training, the SJSU Health Advisories website, or instructions from instructors, TAs or CoS Safety Staff may result in dismissal from CoS buildings, facilities or field sites. Updates will be implemented as changes occur (and posted to the same links).

Recorded Classes

This course or portions of this course (i.e., lectures, discussions, student presentations) will be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through Canvas. The recordings will be deleted at the end of the semester.

Students are not allowed to record without instructor permission. Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabii, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development

office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor

Library Liaison

Anne Marie Engelsen, annemarie.engelsen@sjsu.edu

Course Requirements and Assignments

Flipped Classroom

The course will be attempting a "flipped classroom," in which 15-25 min lecture videos will be placed on the Canvas site, to be watched before attending the in-person zoom meeting. You are expected to watch these videos and take thorough notes *before* each lecture. It is very important you watch and comprehend the pre-class videos! It may require multiple watchings to absorb the concepts and mathematical descriptions.

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 distributed in class 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.

Homework is due, submitted through canvas, on the due date. 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. There will also be a completion component. Late homework will not be accepted penalty-free. Students unable to turn in their assignment in class have until midnight the due date to get it to the instructor, with a sliding penalty scale where they get deducted -0% for the first late, -20% for the second late, -40% for the third late, etc. Extra credit may be awarded to the first student to identify typos in the problem set.

Group Work

Half of every class period will be used to discuss material and work through representative problem sets in small groups. Though attendance will not be taken, participation and engagement will be included within your grade as a single problem set.

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). 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, we will plan a redo exam or 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 & Group Discussions	100 pts.
Midterm Exam 1	100 pts.
Midterm Exam 2	100 pts.
Midterm Exam 3	100 pts.
Final Exam	150 pts.
Total	**550pts.**

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.

Safe and Respectful Community

We hope that the classroom and laboratory will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in a classroom or lab is unacceptable. Students exhibiting this behavior will be asked to leave the class. Examples of such behavior include

a) Persistent interruptions or using disrespectful adjectives in response to the comments of others.
b) The use of obscene or profane language.
c) Yelling at classmates and/or faculty.
d) Persistent and disruptive late arrival to or early departure from class without permission.
e) Physical threats, harassing/bullying behavior, or personal insults (even when stated in a joking manner).
f) Use of personal electronic devices such as pagers, cell phones, PDAs in class, unless it is part of the instructional activity.

Disclaimer

This document is subject to change with fair notice.

CHEM 160 / Physical Chemistry, Fall 2022, 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	Fri Aug 19	Syllabus, Mathematics Fundamentals, Gen Chem Review
2	Tue Aug 23 Thu Aug 25 Fri Aug 26	Chapter 1. The First Law of Thermodynamics
3	Tue Aug 30 Thu Sep 01 Fri Sep 02	Chapter 2. The Second Law of Thermodynamics
4	Tue Sep 06 Thu Sep 08 Fri Sep 09	Chapter 3. Phase Equilibria
5	Tue Sep 13 **Thu Sep 15** Fri Sep 16	Tue – Finish up Thermodynamics Thu – Midterm 1 Review Activity Fri – Midterm 1 Practice Exam
6	Tue Sep 20 Thu Sep 22 Fri Sep 23	Tue – Chapter 4. Chemical Equilibria **Thu – Midterm Examination 1**
7	Tue Sep 27 Thu Sep 29 Fri Sep 30	Chapter 6. The Rates of Reactions
8	Tue Oct 04 Thu Oct 06 Fri Oct 07	Chapter 7. Accounting for Rate Law
9	Tue Oct 11 Thu Oct 13 Fri Oct 14	Tues – Finish up Kinetics Thurs – Midterm 2 Review Activity Fri – Midterm 2 Practice Exam
10	Tue Oct 19 Thu Oct 20 Fri Oct 21	**Tues – Midterm Examination 2** Thurs & Fri – Chapter 9. Microscopic Systems and Quantization

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
11	Tue Oct 25 Thu Oct 27 Fri Oct 28	Chapter 9. Microscopic Systems and Quantization
12	Tue Nov 01 Thu Nov 03 Fri Nov 04	Chapter 9. Microscopic Systems and Quantization Chapter 10. The Chemical Bond
13	Tue Nov 08 Thu Nov 10 Fri Nov 11	Chapter 10. The Chemical Bond *Fri – VETERAN'S DAY*
14	Tue Nov 15 Thu Nov 17 Fri Nov 18	Tues – Chapter 11 Macromolecules and Self-assembly Thurs – Midterm 3 Review Activity Fri – Midterm 3 Practice Exam
15	Tue Nov 22 Thu Nov 24 Fri Nov 25	**Tues – Midterm Examination 3** *Thu – THANKSGIVING* *Fri – THANKSGIVING HOLIDAY*
16	Tue Nov 29 Thu Dec 01 Fri Dec 02	Chapter 12. Optical Spectroscopy
17	Tue Dec 06	Final Exam Review Session
	Thu Dec 08	**Final Examination: 09:45 AM – 12:00 PM**

Important Dates

**	Sep 15	Last day to drop / add classes
‡‡	Nov 23 – 25	Thanksgiving Holidays
	Dec 08	Final Examination