

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

Course and Contact Information

Instructor:	Nicholas Esker PhD.
Office Location:	Duncan Hall 501, 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: (Esker)	Mon 09:30am – 11:00 am Wed 12:30pm – 02:00 pm
Class Days/Time:	Tuesdays and Thursdays, 12:00pm – 1:15pm Fridays, 12:00 pm – 12:50 pm
Classroom:	On-line: Canvas Page and Zoom Room 812 8391 0712 In-person: Duncan Hall 351
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

COVID-19 Pandemic

All students registered for a College of Science (CoS) class with an in-person component must view the [CoS COVID-19 Training slides](#) and the [SJSU Phased Adapt Plan website](#) and electronically sign the CoS Acknowledgement form located in the associated Canvas course prior to any in-person meeting for CoS classes. Failure to comply with the safety requirements outlined in the CoS COVID-19 Training slides, the SJSU Phased Adapt Plan, and outlined by instructors and TAs for in-person classes will be grounds for dismissal from class or laboratory and building or field site. Please review this material as needed throughout the semester, as updates will be implemented as changes occur (and posted to the same links).

Requirements for Online Lectures

This course is a hybrid course. Though most of the class will be in-person, the first two weeks will be run through Canvas and zoom. Most of the class, including examinations, require you to attend class in-person. During the on-line portion, you will have certain technological and behavioral expectations. During the in-class portions, you will be expected to follow the SJSU Adapt COVID-19 requirements for in-person learning.

Technology Requirements

Students are required to have an electronic device (laptop, desktop, or tablet) with a camera and built-in microphone. The SJSU library has a [free equipment loan program](#) available for students for the semester. Students are responsible for ensuring that they have access to reliable WiFi during

tests. If students are unable to have reliable WiFi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See [LearnAnywhere website](#) for current WiFi options on campus.

Recording Zoom 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. If, however, you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording).

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 (syllabi, 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

Hybrid Class Expectations

Though we will meet online for the first two weeks, we will evaluate (based on student and instructor feedback) whether to meet in person for instruction. Any in-person instruction will have a parallel online component offered. However, all exams will be proctored in this course in person.

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, Spring 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	Jan 27 Jan 28	Syllabus, Mathematics Fundamentals, Gen Chem Review
2	Feb 01 Feb 03 Feb 04**	Chapter 1. The First Law of Thermodynamics
3	**Feb 08 Feb 10 Feb 11††	Chapter 2. The Second Law of Thermodynamics
4	††Feb 15 Feb 17 Feb 18	Chapter 3. Phase Equilibria
5	Feb 22 Feb 24 Feb 25	Tues – Finish up Thermodynamics Thurs – Midterm 1 Review Activity Fri – Midterm 1 Practice Exam
6	Mar 01 Mar 03 Mar 04	Tues – Midterm Examination 1 Thurs & Fri – Chapter 4. Chemical Equilibria
7	Mar 08 Mar 10 Mar 11	Chapter 6. The Rates of Reactions
8	Mar 15 Mar 17 Mar 18	Chapter 7. Accounting for Rate Law
9	Mar 22 Mar 24 Mar 25	Tues – Finish up Kinetics Thurs – Midterm 2 Review Activity Fri – Midterm 2 Practice Exam
10	##Mar 29## ##Mar 31## ##Apr 01##	Spring Break (no joke!)

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
11	Apr 05 Apr 07 Apr 08	Tues – Midterm Examination 2 Thurs & Fri – Chapter 9. Microscopic Systems and Quantization
12	Apr 12 Apr 14 Apr 15	Chapter 9. Microscopic Systems and Quantization
13	Apr 19 Apr 21 Apr 22	Chapter 10. The Chemical Bond
14	Apr 26 Apr 28 Apr 29	Tues – Chapter 11. Macromolecules and Self-assembly Thurs – Midterm 3 Review Activity Fri – Midterm 3 Practice Exam
15	May 03 May 05 May 06	Tues – Midterm Examination 3 Thurs & Fri – Chapter 12. Optical Spectroscopy
16	May 10 May 12 May 13	Chapter 12. Optical Spectroscopy
	May 24	Final Examination: 09:45 AM – 12:00 PM

Important Dates

- ** Feb 07 Last day to drop without an entry on permanent record (“W”)
 †† Feb 14 Last day to add classes and register late
 †† May 28 – Apr 01 Spring Recess
May 24 Final Examination