Chemistry 161A.01, Physical Chemistry, Fall 2022

San José State University
Department of Chemistry

Course and Contact Information

Instructor:	Abraham Wolcott, Ph.D., Assistant Professor of Chemistry
Office Location:	Duncan Hall 5A
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Office Hours:	Tuesday and Thursday, 3 – 4pm or by appointment with Prof. Wolcott
Class Days/Time:	Tuesdays and Thursdays, 12:30 – 1:45pm,
Classroom:	Duncan Hall 415
Prerequisites:	Chem 55, Phys 50, Math 32 or Math 32X (with grades of "C" or better, "C-" not accepted)
Credit:	3 units

Textbooks

Required: "Physical Chemistry, Thermodynamics, Structure and Change", 10th Edition, Peter Atkins and Julio De Paula, W.H. Freeman and Company (2011). ISBN-10: 1-4292-9019-6.
This is a low-cost class and book purchases/rentals are ~$30. By keeping this text the cost of the course was reduced from $230 to $30. This is in compliance with California bill SB-1359; Low-cost course material bill (The Donahoe Higher Education Act). You are required to have the text and Prof. Wolcott will verify that the text is in your possession. Please provide a receipt.

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

Virtual Reality Headsets and Tablets (SJSU Property)(Headsets available to those who do not want to complete VR work in the MLK Library)

Virtual reality (VR) headsets that allow VR content to be displayed will be provided free of charge. They will be signed out and you are responsible for their care and safe return. A replacement cost is $30 for a VR headset. They are provided with a remote control and case. The replacement fee for the remote is $12 and the case is $22. The complete set of VR equipment will be returned at the end of the semester or you will be charged $64 to your school account. **NOTE: VR content should be viewed while sitting down comfortably in your residence. VR content should be viewed in 10 minute increments.**

Tablets may also be distributed for video production work and will be distributed prior to the assignment being posted on CANVAS. The tablets will also be returned at the end of the semester and a replacement fee is $85.

VR content will also be used in the King Library Experential Virtual Reality of KLEVR lab using Occulus RIFT and HTC Vive technology. The library is open now for the Fall 2021 semester.

Course Web Page (CANVAS)

Copies of the course materials such as this syllabus, assignments, handouts, extra materials and **Kahn Academy style lecturers**, etc. may be found on the course website hosted by Canvas. **We will also be using virtual reality in the class and Canvas will be used to link to instructions and VR assignments.** You are responsible for the material on the course website, so you should either check it daily or set up your profile to notify you when there are changes. **Camtasia will be used to communicate complex topics and complete mathematical derivations for topics in Thermodynamics, Kinetics, Quantum Mechanics and Spectroscopy. The Kahn-academy style videos are posted to Youtube and as video files on Canvas.**

Catalog Course Description

Introduction to the fundamental principles of physical chemistry which includes topics in thermodynamics, kinetics and statistical mechanics.

Course Learning Outcomes

Upon successful completion of this course, the student should be fluent in the language of thermodynamics, and to be able to derive the necessary equations for solving problems in thermodynamics from definitions and first principles. Additionally, the student should understand a number of concepts involved in the use of chemical kinetics, and how these techniques can be used in the laboratory to investigate chemical reactions.

1. Understand the kinetic theory of gases.
2. Understand the origin of intermolecular interactions and their role in the non-ideality of gases and the properties of liquids.
3. Understand and use the concepts of work, heat, energy, entropy and the secondary thermodynamic functions – enthalpy, Helmholtz free energy and Gibbs free energy – in a variety of chemical applications.
4. Understand the physical transformations of pure substances and mixtures and be able to interpret the related phase diagrams.
5. Understand how to calculate equilibrium constants from thermodynamic data.
6. Understand gas and liquid transport phenomena.
7. Understand how to formulate rate laws which relate chemical concentrations to time and use them to help understand the molecular mechanisms of chemical change.
8. Understand the various microscopic theories that seek to explain chemical reaction rates.
9. Develop numerical problem solving skills and the ability to apply such skills to applications of current interest in the field of physical chemistry.

Program Learning Objectives

This course addresses the following **BS/BA Chemistry Program Learning Objectives**

1. Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in quantum mechanics.
2. Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in spectroscopy.

Attendance

Attendance will not be taken in lecture, but you are responsible for all announcements and material presented during class. Lecture material will not necessarily reiterate the exact text material, but will generally follow the progression in the text. 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. **There will be no make-up exams and exams are ~80% of your grade!**

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

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 161A Canvas page in a pdf format. 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 (edition #10) with respect to exams.

It is difficult to learn physical chemistry by simply attending lectures and reading the book (although I highly encourage you do both of these activities!). 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 problems, both assigned and “unassigned” (at the end of chapters, in other texts, etc.) on your own. You need to spend at least 4-5 hours weekly practicing problems.

Lecture Exams and Final

Some topics have been covered in General Chemistry and in other Chemical Engineering courses. Review that course materials and exams! Two midterm exams (100 points each), will be given approximately every sixth week. Dates for the exams are

on the course schedule (On this greensheet/syllabus below and on Canvas). There will be no make-ups for lecture exams.
NOTE: On-line exams will help in CANVAS and will include your use of your smartphone camera in ZOOM.
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 can do so via e-mail, including a phone number where you can be reached. You will need to provide me with written evidence (doctor's note, police report, etc.) for your absence. If I accept your explanation, 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:

Homework/Online Problem sets	50 pts.	
On-line quizzes and VR content	25 pts.	
2 Midterm Exams	200 pts.	100 pts. Each
Final Exam	150 pts.	
Extra credit assignments	5 pts.	
Total	**430pts.**	

NOTE: Grading points are subject to change and the instructor will explain any changes that are implemented.

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. **Grade percentages are rounded to nearest whole number based on standard rounding practices.**

A:	>93%	**A-**:	88-92%	**B+**:	84-87%	**B**:	79-83%	**B-**:	75-78%
C+:	69-74%	**C**:	64-68%	**C-**:	60-63%	**D**:	51-59%	**F**:	<50%

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

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 at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. 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 at http://www.sjsu.edu/advising/.

University Policies

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 (http://www.sjsu.edu/studentconduct/policies/) 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. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

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 forty-five 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 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Class Attendance

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf 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, http://www.sjsu.edu/senate/docs/S12-7.pdf, 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."
    - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
    - 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. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. 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 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

Note from Dr. Wolcott: This ensures protection of privacy as well as allows for adequate accommodations to be provided in cases where they are necessary. Assignments missed due to disabilities or other special concerns will not be accepted except as requested by the AEC.

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 at http://peerconnections.sjsu.edu for more information.

Course Schedule

The following schedule of lecture topics is tentative and subject to change at the instructor's discretion. (**Exam dates are not tentative and should be noted in your calendar immediately.**) Readings should be completed **before** the lecture.

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
1	Tues. 8/23	Atkins 1: The Properties of Gases
	Thurs. 8/25	
2	Tue. 8/30	Atkins 1: The Properties of Gases Atkins 2: The 1st Law
	Thu. 9/1	
3	Tue. 9/6	Atkins 2: The 1st Law
	Thu. 9/8	Atkins 2: The 1st Law
4	Tue. 9/13	Atkins 2: The 1st Law
	Thu. 9/15	Atkins 3: The 2nd and 3rd Law
5	Tue. 9/20	Atkins 3: The 2nd and 3rd Law
	Thu. 9/22	Atkins 3: The 2nd and 3rd Law
6	Tue. 9/27	Atkins 3: The 2nd and 3rd Law
	Thu. 9/29	Atkins 3: The 2nd and 3rd Law
7	Tue. 10/4	**Midterm Exam #1**
	Thu. 10/6	Atkins 4: Physical Transformations of Pure Substances
8	Tue. 10/11	Atkins 4: Physical Transformations of Pure Substances
	Thu. 10/13	Atkins 4: Physical Transformations of Pure Substances
9	Tue. 10/18	Atkins 4: Physical Transformations of Pure Substances
	Thu. 10/20	Atkins 5: Simple Mixtures
10	Tue. 10/25	Atkins 5: Simple Mixtures

Week	Date	Readings from Atkins and De Paula, Topics for Lectures, Exams
	Thu. 10/27	Atkins 5: Simple Mixtures
11	Tue. 11/1	Atkins 5: Simple Mixtures
	Thu. 11/3	Atkins 5: Simple Mixtures
12	Tue. 11/8	Atkins 6: Chemical Equilibrium
	Thu. 11/10	**Midterm #2**
13	Tue. 11/8	Atkins 6: Chemical Equilibrium
	Thu. 11/10	Atkins 20: Chemical Kinetics
14	Tue. 11/15	Atkins 20: Chemical Kinetics
	Thu. 11/17	Atkins 20: Chemical Kinetics
15	Tue. 11/22	Atkins 20: Chemical Kinetics
	Thu. 11/24	**Thanksgiving**
16	Tue. 11/29	Atkins 21: Reaction Dynamics
	Thu. 12/1	Atkins 21: Reaction Dynamics
	Tues. 12/6	**Last Day of Class for Fall 2021**
17	**Wed. 12/7**	**Final Exam Review (Study/Conference Day)**
	Thurs. 12/8	**Final Exam: 9:45pm – 12:00pm**

Important Dates

September 15th	Last day to drop without a “W”
September 15th	Last day to add classes
December 6th	Last day of instruction
December 7th	Study day
December 8th	Final Examination

Disclaimer

This document is subject to change with fair notice.

SJSU ACADEMIC YEAR CALENDAR
2022/23*

FALL 2022

Monday	*July 4*	*Independence Day - Campus Closed **(I)***
Wednesday	August 17	Academic Year Begins – Fall Semester Begins
Wednesday - Thursday	August 17 and 18	Pre-Instruction Activities: Faculty Orientation, Advisement, Faculty Meetings and Conferences **(P)**
Friday	August 19	First Day of Instruction – Classes Begin
Monday	*September 5*	*Labor Day - Campus Closed **(L)***
Thursday	September 15	Last Day to Drop Courses without an Entry on Student's Permanent Record **(D)**
Thursday	September 15	Last Day to Add Courses & Register Late **(A)**
Friday	September 16	Enrollment Census Date **(CD)**
Friday	*November 11*	*Veteran's Day - Campus Closed **(V)***
Wednesday	*November 23*	*Non-Instructional Day – **(NI)***
Thursday	*November 24*	*Thanksgiving Holiday - Campus Closed **(T)***
Friday	*November 25*	*Rescheduled Holiday - Campus Closed **(RH)***
Tuesday	December 6	Last Day of Instruction - Last Day of Classes
Wednesday	December 7	Study/Conference Day (no classes or exams) **(SC)**
Thursday - Friday	December 8-9	Final Examinations ***(exams)***
Monday - Wednesday	December 12-14	Final Examinations ***(exams)***
Thursday	December 15	Final Examinations Make-Up Day **(MU)**
Friday	December 16	Grade Evaluation Day **(E)**
Thursday - Friday	December 15-16	Commencement **(C)**
Monday	December 19	Grades Due From Faculty - End of Fall Semester **(G)**
Monday	*December 26*	*Christmas Holiday - (Observed) - Campus Closed **(CH)***
	December 25	WINTER RECESS

SPRING 2023

Monday	*January 2*	*New Year's Day- (Observed) - Campus Closed **(N)***
Monday	*January 16*	*Dr. Martin Luther King, Jr. Day - Campus Closed **(K)***
Monday	January 23	Spring Semester Begins
Monday-Tuesday	January 23-24	Pre-Instruction Activities: Faculty Orientation, Advisement, Faculty Meetings and Conferences **(P)**
Wednesday	January 25	First Day of Instruction – Classes Begin
Monday	February 20	Last Day to Drop Courses without an Entry on Student's Permanent Record **(D)**
Monday	February 20	Last Day to Add Courses & Register Late **(A)**
Tuesday	February 21	Enrollment Census Date **(CD)**
Monday - Friday	March 27-March 31	Spring Recess ***(*SPRING RECESS*)***
Friday	*March 31*	*Cesar Chavez Day - Campus Closed **(CC)***
Monday	May 15	Last Day of Instruction – Last Day of Classes
Tuesday	May 16	Study/Conference Day (no classes or exams) **(SC)**
Wednesday - Friday	May 17-19	Final Examinations ***(exams)***
Monday - Tuesday	May 22-23	Final Examinations ***(exams)***
Wednesday	May 24	Final Examinations Make-Up Day **(MU)**
Thursday	May 25	Grade Evaluation Day **(E)**
Friday	May 26	Grades Due From Faculty **(G)**
Friday	May 26	End of Academic Year - End of Spring Semester
Wednesday-Friday	May 24-26	Commencement **(C)**
Monday	*May 29*	*Memorial Day - Campus Closed **(M)***

Subject to change based on factors beyond campus control

To obtain an electronic copy of this calendar and other AY Calendars, please visit
http://www.sjsu.edu/provost/academic_affairs/resources/academic_calendars/

2022/23 AY Cal
July 27, 2022

SJSU ACADEMIC YEAR CALENDAR
2022/23

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Fall																															
JULY		S	S	I					S	S						S	S						S	S					S	S
AUGUST						S	S						S	S			P	P		S	S						S	S			
SEPTEMBER			S	S	L					S	S				A D	CD	S	S						S	S					
OCTOBER	S	S						S	S						S	S						S	S					S	S	
NOVEMBER					S	S					V	S	S						S	S			NI	T	RH	S	S			
DECEMBER			S	S			SC	e	x	S	S	a	m	s	C MU	C E	S	S	G					S	S	CH					S
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Spring																															
JANUARY	S	N					S	S						S	S	K					S	S	P	P				S	S	
FEBRUARY				S	S						S	S						S	S	A D	CD				S	S				
MARCH				S	S						S	S						S	S						S	S	Spring Recess			cc
APRIL	S	S						S	S						S	S						S	S					S	S	
MAY						S	S						S	S		SC	e	x	a	S	S	m	s	C MU	C E	C G	S	S	M		
JUNE			S	S						S	S						S	S						S	S					

FACULTY DUTY DAYS		DAYS OF INSTRUCTION	
Fall…	85	Fall…	73
Spring…	85	Spring…	74
Total…	170	Total…	147

- Faculty Duty Day
- Day of Instruction
- Non-Instruction Day, Non-Faculty Duty Day
- Holiday, Campus Closed

A - End of Official Add Period
C - Commencement
D - End of Official Drop Period
E - Grade Evaluation Day
G - Final Grades Due Day
I - Independence Day
K - Dr. Martin Luther King, Jr. Day
L - Labor Day
M - Memorial Day
N - New Year's Day
P - Preinstruction Activity Day
S - Weekend
T - Thanksgiving Day
V - Veteran's Day
CC - Cesar Chavez Day
CD - Census Date
CH - Christmas Holiday
MU - Final Exams Makeup Day
NI - Non-Instructional Day
SC - Study/Conference Day
RH - Rescheduled Holiday

To obtain an electronic copy of this calendar and other AY Calendars, please visit
http://www.sjsu.edu/academic_programs/calendars/academic_calendar