San José State University
College of Science/Department of Chemistry
Chem 161A: Physical Chemistry I, Fall, 2015

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Office Hours: Tuesdays, 1430 – 1630, or by appointment only.
Class Days/Time: TR 1200 – 1315
Classroom: SCI-164
Prerequisites: Chem 55, Math 32 and Physics 50 (or their equivalents), with grades of C or better (C- not accepted). Reminder: prerequisite means that you have already completed the class, and are responsible for knowing the material presented in the class.

Canvas:
Copies of the course materials such as transparencies, power point presentations, major assignment handouts, problem set solutions etc. may be found on the Canvas page for the course. You are responsible for regularly (i.e. daily) checking the Canvas shell throughout the semester.

Course Description
Principles of classical physical chemistry. Chemical thermodynamics and kinetics.

Course Goals and Student Learning Objectives
To derive chemical thermodynamics and classical kinetics from first principles, and to develop a working proficiency in problem solving in these fields.

Course Content 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. |
| 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. |

Textbooks

Textbook (required):

“Physical Chemistry: Thermodynamics and Kinetics”, Peter Atkins and Julio de Paula, 10th Edition, Freeman. (note: this book is just the first half of the following text – this is the edition that I ordered for you, and should be available in the Spartan bookstore).

-or-


-or-

Any edition of Atkins “Physical Chemistry should suffice. Personally, I feel that the 3rd edition was the best. If you’re going to get a used copy, strive to get a copy of the 3rd to 6th editions. Note: assignments will be made from the 10th edition, but it should be easy for you to correlate to the older edition.

Textbooks (recommended):

Note: the above recommended texts have been ordered for you, and should be available in the bookstore.

Course Philosophy
It is virtually impossible 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 nature, meant to supplement the text material and will serve to help introduce you to the concepts that are necessary for problem solving. Lecture time is both valuable and scarce, and aside from occasional examples worked in class, there is simply not enough time to work problems during lecture (let alone cover all of the material that should be covered during the semester). Therefore, this requires that you take on the responsibility of working problems, both assigned and “unassigned” (at the end of chapters, in other texts, etc.) on your own. You need to spend at least several hours weekly practicing problems (the typical student will need ~15 hours per week outside of class to work problems, to be successful in this course). If you run into difficulties, you should see me in office hours for consultation, or call me and make an appointment. Extra tutorial problem solving sessions will be scheduled, to the best of my abilities (given the limitations of my schedule). You should feel free to send questions to me via email!

Practically anyone who has already learned physical chemistry will agree that the key to understanding this material is accomplished through repeated problem solving. This may seem like the “brute force” method, but this is the way that I and all other chemists and engineers that I know have learned the material, and it is the only way that I know to accomplish this (there is no painless, learn-by-osmosis method that works, to my knowledge!).

Attendance
Lectures are for your own edification, so attending lectures is to your benefit. Attendance is, of course, not required, but highly recommended. However, you are responsible for any material discussed in lecture, as well as for any announcements that are made during lecture. If you choose to attend lecture, I ask that you show me the courtesy of arriving on time! Persons arriving late for lecture are disruptive to other students and distracting to me while I am trying to present the best lecture possible. If people coming late to lecture become a problem, I may have to resort to locking the door 5 minutes after lecture commences.

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 calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/ 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/

Assignments and Grading Policy

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<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Midterm Exam I</td>
<td>30%</td>
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<tr>
<td>Midterm Exam II</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam (ACS)</td>
<td>40%</td>
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Exams
1. Midterms I and II will be in-class, problem solving oriented exams. They will be primarily multiple choice, with an additional hand-graded problem(s) a possibility.
2. The American Chemical Society (ACS) standardized test in Physical Chemistry covering thermodynamics and kinetics will be given as the Final Exam.

I will regularly assign problem sets, with problems relevant to the lectures that are particularly interesting or challenging. You will be responsible for these problems with respect to the exams. I highly recommend that you form study groups, optimally 3-6 people, to work the problems together. In some cases, solutions will be provided by me.

In addition to assigned problems, I highly recommend doing the problems at the end of each chapter in Atkins. You will be responsible for any problems in Atkins with respect to exams. I strongly recommend that your work as many problems as possible from other texts. Some additional sources of problems can be found in the following:

- “2000 Solved Problems in Physical Chemistry” (Schaum’s Outline Series)
- Any other bona fide Physical Chemistry text (such as Levine, Alberty, Atkins, Castellan, Moore, Mortimer, Noggle, Adamson, McQuarrie, etc.).

University Policies:

Academic integrity

Students should know that the University’s Academic Integrity Policy is available at http://sa.sjsu.edu/judicial_affairs/faculty_and_staff/academic_integrity/index.html. Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University’s integrity policy, require you to be honest in all your academic course work. 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.sa.sjsu.edu/judicial_affairs/index.html.

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. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy F06-1 requires approval of instructors.

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 Disability Resource Center (DRC) at http://www.drc.sjsu.edu/ to establish a record of their disability.

Workload Policy

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 Policy

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 Policy

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.”

**Student Technology Resources**

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college (Chemistry majors may use the Departmental computer lab in DH-503). Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include digital and VHS camcorders, VHS and Beta video players, 16 mm, slide, overhead, DVD, CD, and audiotape players, sound systems, wireless microphones, projection screens and monitors.

**Learning Assistance Resource Center**

The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The [LARC website](http://www.sjsu.edu/larc/) is located at http://www.sjsu.edu/larc/.

**SJSU Writing Center**

The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The [Writing Center website](http://www.sjsu.edu/writingcenter/about/staff/) is located at http://www.sjsu.edu/writingcenter/about/staff/.
**Peer Mentor Center (Optional)**

The Peer Mentor Center is located on the 1st floor of Clark Hall in the Academic Success Center. The Peer Mentor Center is staffed with Peer Mentors who excel in helping students manage university life, tackling problems that range from academic challenges to interpersonal struggles. On the road to graduation, Peer Mentors are navigators, offering “roadside assistance” to peers who feel a bit lost or simply need help mapping out the locations of campus resources. Peer Mentor services are free and available on a drop–in basis, no reservation required. The [Peer Mentor Center website](http://www.sjsu.edu/muse/peermentor/) is located at http://www.sjsu.edu/muse/peermentor/

**General Expectations, Rights and Responsibilities of the Student Policy**

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](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](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.