Instructors:

Dr. Kyle Beran
   Email: Kyle.Beran@angelo.edu
   Phone: 486-6663
   Office: CAV 102B
   Office Hours: MWF 2-3, TR 11-12, or by appointment

Dr. David Carter
   Email: David.Carter@angelo.edu
   Phone: 486-6626
   Office: CAV 218
   Office Hours: M 10:30-11:30; W 8:00-11:00; R 11:30-12:00 or by appointment

Dr. Gregory Smith
   Email: Gregory.Smith@angelo.edu
   Phone: 486-6628
   Office: CAV 207A
   Office Hours: MTWF 11:00-noon, or by appointment

Dr. Janet Maxwell
   Email: Janet.Maxwell@angelo.edu
   Phone: 486-6624
   Office: CAV 229B
   Office Hours: MTWF 10:00-11:00; T 2:00-3:00; R 11:00-12:00, or by appointment

Dr. Ralph Zehnder
   Email: Ralph.Zehnder@angelo.edu
   Phone: 486-6662
   Office: CAV 204B
   Office Hours: M 11:00-Noon; W 11:00-12:30pm; F 11:00-1:00pm, or by appointment
CHEM 1312 — GENERAL CHEMISTRY LECTURE CLASS

Lecture Class Meeting Times

<table>
<thead>
<tr>
<th>Sec</th>
<th>Days</th>
<th>Time</th>
<th>Instructor</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>040</td>
<td>TR</td>
<td>09:30 am-10:45 am</td>
<td>Dr. Carter</td>
<td>CAV 200</td>
</tr>
</tbody>
</table>

Required Texts and Materials

- **Class Test Textbook and Online Homework [Required]**
  
  *Section 040 is utilizing an open source (OER) textbook and alternative online homework system (ALEKS). These will be provided free of charge.*
  
  Textbook: *Chemistry 2e*, Flowers et al., is available from the [OpenStax website](http://openstax.org/12).
  
  Excerpts will be provided for all topics covered in Blackboard.
  
  Online Homework: ALEKS is available at the [ALEKS website](http://aleks.com).  

- **Textbook and SmartWork Required in Other Sections – [Recommended ]:**
  
  
  Smartwork Online Homework
  
  Some extra credit assignments will be available in Smartwork.

- **Approved Lab Goggles [Required]** (available from the ASU Bookstore or from the lab stockroom)

- **Calculator [Required]:** Scientific calculator capable of performing calculations with scientific notation and logarithms. *Bring your calculator to class and to lab every day.* Only non-programmable calculators may be used on the exams.

- **Lab Notebook [Required]:** Scientific lab notebook (ISBN: 9780984516315) can be found in the ASU Bookstore.

Course Description

**1312/CHEM 1312 General Chemistry II (3-0).** This course, which is a continuation of Chemistry 1311, focuses on chemical kinetics, chemical equilibrium, acid-base chemistry, and thermodynamics. Additional topics, such as environmental chemistry, electrochemistry, coordination chemistry, nuclear chemistry, organic chemistry, and/or polymers, may also be introduced.

**Prerequisites:** Chemistry 1311/1111 or 1411, must be completed with a “C” or better in order to enroll in Chemistry 1312/1112. **Corequisite:** Chemistry 1112.

**1112/CHEM 1112 General Chemistry II Laboratory (0-3).** Laboratory experiments that focus on laboratory technique, data collection, and analysis. The experiments will expand upon the concepts and topics presented in Chemistry 1312. **Corequisite:** Chemistry 1312.
Technology Requirements

**ALEKS** is an online homework that adapts to individual student needs. To successfully complete this course, students need to obtain access to and use ALEKS. ALEKS assignments will be averaged to give a 200-point grade. *For Aleks to work as designed, it is essential for the student to do all assignments on time. ALEKS tracks student ability and will not let you work on questions or problems for which you do not have the prerequisite knowledge. If you get behind, it is very difficult to catch up.*

**Top Hat** is a classroom response system (clicker) that allows students to respond to questions in the classroom. Attendance will be recorded with Top Hat.

See Blackboard for information on registering for and using ALEKS [ALEKS](#) & [Top Hat](#).

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**Grading**

**Evaluation and Grades**

Course grades will be determined as indicated in the table below.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (3×100 pts)</td>
<td>300 pts</td>
</tr>
<tr>
<td>Final Exam</td>
<td>150 pts</td>
</tr>
<tr>
<td>Quizzes, classroom participation</td>
<td>150 pts</td>
</tr>
<tr>
<td>ALEKS Homework</td>
<td>200 pts</td>
</tr>
<tr>
<td>Laboratory Points</td>
<td>200 pts</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1000 pts</strong></td>
</tr>
</tbody>
</table>

Students who are taking both CHEM 1112 and CHEM 1312 for the first time who wish to drop either course **must** drop both courses, because dropping either course would result in the co-requisite requirement no longer being met.

Overall grades in CHEM 1312/1112 will be determined as follows:

- If **BOTH** CHEM 1312 and CHEM 1112 are completed, the letter graded will be based on a total of 1000 points.
- For students who begin and complete **ONLY** CHEM 1312, a percentage will be calculated using only lecture assessments (first four items listed above with 800 points possible) and the letter grade will be assigned based on that percentage.
- For students who begin and complete **ONLY** CHEM 1112, the percentage will be calculated using only lab assessments and that percentage will be used to assign a letter grade."
Grading System
Course grades will be dependent upon completing course requirements and meeting the student learning outcomes.

The following grading scale will be used for this course:
- A = 900-1000 points (90-100%)
- B = 800-899 points (80-89.9%)
- C = 700-799 points (70-79.9%)
- D = 600-699 points (60-69.9%)
- F = 0-599 points (<60%)

Exams
The exams will be given outside of regular class time on the dates listed below:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
<th>Room</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>Thursday, February 13</td>
<td>CAV</td>
<td>5:30 pm</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Thursday, March 19</td>
<td>CAV</td>
<td>5:30 pm</td>
</tr>
<tr>
<td>Exam 3</td>
<td>Thursday, April 23</td>
<td>CAV</td>
<td>5:30 pm</td>
</tr>
</tbody>
</table>

Most of the exams will be over material covered since the last exam. However, the course builds on material delivered earlier so the concepts, calculations and techniques from earlier exams may be required. **Only non-programmable calculators may be used on the exams (i.e., no graphic calculators are allowed).**

Make-up exams will be at the discretion of your individual faculty. Usually, allowances will only be made in the case of an excused university absence. Communication with your instructor is critical.

Final Exam
The Final Exam will be a comprehensive multiple-choice standardized exam published by the American Chemical Society (ACS). Study guides for the ACS exam ("General Chemistry - Official Study Guide") are available for sale in the lab stockroom and from the ACS web page. The schedule for the 1312 final exams is shown below. The complete final exam schedule is also available on the ASU web page.

<table>
<thead>
<tr>
<th>Sec</th>
<th>Days</th>
<th>Time</th>
<th>Instructor</th>
<th>Final Exam Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>040</td>
<td>TR</td>
<td>9:30 - 10:45 am</td>
<td>Dr. Carter</td>
<td>Thursday, May 7</td>
<td>8:00 am-10:00 pm</td>
</tr>
</tbody>
</table>
Blackboard
Grades will be posted on Blackboard. Information, handouts, homework assignments, and other course documents will either be posted on your instructor’s faculty web page, or on Blackboard.

Attendance and Class Participation
The 150-point Quiz-Class Participation grade will be taken from assignments, in-class work sheets, quizzes and Top Hat activities.
Class attendance is mandatory. Students should personally provide documentation of all excused absences in writing. Excused absences include sickness, family emergencies (death in the immediate family) and official university activities (athletic events, field trips, etc.) Email notifications of participation in university activities ARE NOT SUFFICIENT unless the student directly contacts Dr. Carter prior to the event.

Students missing more than 25% (8) of the lectures will receive a grade of F.

Role will be taken the first week of class. Starting the second week of class, attendance will be monitored with Top Hat. Students arriving late or who have issues with Top Hat recording their attendance need to inform Dr. Carter at the end of class. There will be approximately twelve 10-point quiz/worksheet/assignment activities. The ten highest grades will be used (all others dropped.)
Top Hat scores will be a result of attendance (approximately 30 pts) and responses to in-class questions (approximately 60 pts). Top Hat questions will be worth 1 point (0.67 for submitting a response and 0.33 for correct answer). Even though approximately 90 points are possible, the maximum point grade for Top Hat will be capped at 65 points.

This grading scheme allows for students to get a maximum Quizz-Class Participation grade of 165 points (15 points extra credit) in addition to dropped scores an extra points available in Top Hat. This policy accomplishes the following

- Encourages ongoing participation in class
- Provides extra opportunities to recover from a reasonable number of missed classes or occasional poor quiz or assignment performance.
- More than offsets any point deductions due to a reasonable amount of technical individual technical problems.

As a result, students will NOT be given the opportunity to make up for missed classroom work and there will be no effort made to make corrections for point loss due to minor technical issues. You are encouraged to report technical issues FIRST to the technology provider (ALEKS or Top Hat) and then to me. As needed, I will follow up with the provider are chronic technical issues.
Last Day to Drop
The last day to drop the course with a grade of “W” is Thursday, March 26, 2020.

CHEM 1112 — GENERAL CHEMISTRY LABORATORY

Laboratory Meeting Times
The lab classes that accompany the CHEM 1312 lecture course are shown in the table below. The labs will meet first for pre-lab lectures in the Class Room listed in the table.

<table>
<thead>
<tr>
<th>Section</th>
<th>Day</th>
<th>Meeting Time</th>
<th>Instructor</th>
<th>Class Room</th>
<th>Lab Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>05Z</td>
<td>M</td>
<td>02:00 am-04:50 pm</td>
<td>Dr. Carter</td>
<td>CAV 211</td>
<td>CAV 212</td>
</tr>
<tr>
<td>06Z</td>
<td>T</td>
<td>11:00 pm-01:50 pm</td>
<td>Dr. Carter</td>
<td>CAV 215</td>
<td>CAV 212</td>
</tr>
<tr>
<td>07Z</td>
<td>T</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Zehnder</td>
<td>CAV 215</td>
<td>CAV 212</td>
</tr>
<tr>
<td>09Z</td>
<td>R</td>
<td>11:00 am-01:50 pm</td>
<td>Dr. Smith</td>
<td>CAV 219</td>
<td>CAV 212</td>
</tr>
<tr>
<td>10Z</td>
<td>R</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Smith</td>
<td>CAV 219</td>
<td>CAV 212</td>
</tr>
<tr>
<td>11Z</td>
<td>M</td>
<td>11:00 am-01:50 pm</td>
<td>Dr. Maxwell</td>
<td>CAV 211</td>
<td>CAV 212</td>
</tr>
</tbody>
</table>

The CHEM 1112 General Chemistry laboratory class accompanies this lecture class. The lab is designed to illustrate some of the principles involved in performing scientific measurements, handling chemicals, and performing chemistry experiments. In some cases, the experiments in the lab will introduce you to concepts before you cover them in the lecture course, and in some cases, the experiments will reinforce concepts already covered in the lecture course.

Labs will begin meeting on the first day of class. Bring your calculator!

Laboratory Attire
Beginning on the first day of lab, everyone MUST have approved goggles, long-sleeved shirts which cover the midriff, long pants, and shoes with closed toes and heels (no sandals, slides, etc.). Anyone not wearing the appropriate attire will not be allowed into lab.

Lab Procedures and Lab Reports
Lab procedures will be posted on Blackboard. Before coming to lab, students should
- Read the background information for the experiment
- Answer Pre-laboratory questions to turn in as directed by your lab instructor
- Print the lab procedure (or have electronic access) for the experiment.
• Print out data sheets and/or prepare your lab notebook as directed by your lab instructor.
Each lab will be worth 100 points. The point average in Lab will be scaled to 200 points and then incorporated into your overall CHEM 1312/1112 grade.

Cleaning Up After Lab
Make sure that your lab area is clean and that all glassware and hardware has been cleaned and returned to the appropriate drawers before leaving the lab.

Make-Up Lab Policy
The lowest lab score will be dropped from the total. If you miss a lab for a valid reason, that is the score that will be dropped.

Lab Safety Training
All students enrolled in lab courses are required to take a Mandatory Laboratory Safety Training and Quiz on Blackboard. Instructions for completing the quiz are given below:
1. Login to Blackboard, and choose the course: entitled “Lab Safety Training.”
2. Under the left hand menu, choose: “Get Started Here”.
3. There are three sections:
   a. Welcome to Lab Safety Training — There are your instructions.
   b. Lab safety training — Click on “Lab Safety — Click here to begin”. This will download a PowerPoint slide show which will cover the safety training.
   c. The lab safety quiz. You must score 90% or higher. You can take it again in 24 hours.

The Lab Safety Training must be completed by the evening of Friday, January 24.

Lab Final
There will be one 50-point lab mid-term, one 50-point lab practical, and a 100-point lab final. These grades will not be dropped from the total.

General Policies Related to This Course
All students are required to follow the policies and procedures presented in these documents:
• Angelo State University Student Handbook
• Angelo State University Catalog
**Academic Integrity**
Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject to disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#).

**Accommodations for Students with Disabilities**
ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student’s responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the [Student Disability Services website](#). The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford  
Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
dallas.swafford@angelo.edu  
Houston Harte University Center, Room 112

**Incomplete Grade Policy**
It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#) for more information.
**Plagiarism**

Plagiarism is a serious topic covered in ASU’s Academic Integrity policy\(^\text{12}\) in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the ASU Writing Center.\(^\text{13}\)

**Student Absence for Observance of Religious Holy Days**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day\(^\text{14}\) for more information.

**Title IX at Angelo State University**

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.
Director of Title IX Compliance/Title IX Coordinator
Mayer Administration Building, Room 210
325-942-2022
michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form.
If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information about Title IX in general you may visit www.angelo.edu/title-ix.

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**Student Learning Outcomes**

- **Learning Goal 1:** Students will be able to analyze complex chemical problems and draw logical conclusions.
  - Students will be able to identify intermolecular interactions in a solid, liquid or solution and analyze the strength and nature of those interactions.
  - Students should be able to write equilibrium expression for any chemical reaction and determine the value of equilibrium constants from experimental data.
  - Students should be able to use equilibrium constants and expressions to
    - describe the tendency of the reaction to favor reactants or products
    - predict the direction of the reaction given the equilibrium constant and the starting concentrations of all reactants and products
    - determine the equilibrium concentrations given sufficient information about either the equilibrium or starting concentrations of the reactants and products
  - Students should be able to use Le Chatelier’s Principle to determine how a system at equilibrium will change with changes in reaction conditions such as concentration, pressure or temperature.
  - Students should be able to describe electrochemical cells using cell notations or a sketch and determine the standard state cell potential.
  - Students should be able to use the relationship between cell potential, free energy and equilibrium constants.

- **Learning Goal 2a:** Students will be able to understand and apply scientific reasoning in the chemical sciences.
  - Students should be able to classify solids by type of bonding (molecular, ionic, metallic or network covalent) and extent of organization (crystalline, microcrystalline and amorphous) and describe and explain the properties of different solids based on that classification.
  - Students will be able to define the phases of matter using the following frameworks:
    - Compressibility and fluidity
    - Kinetic molecular theory (movement of molecules within a sample)
    - Kinetic molecular theory (kinetic energy vs. intermolecular interactions)
  - Students should be able to describe phase transitions in terms of enthalpies, heating curves and phase diagrams.
  - The student should be able to state the first three laws of thermodynamics and explain how they affect real world systems.
• Students should have a knowledge of common forms of nuclear radiation and processes.
• Student should be able to use oxidation numbers to identify and balance redox reactions.

• **Learning Goal 2b:** Students will be able to employ mathematics in the analysis of chemical problems.
  • Students should be able to describe solution concentrations in a variety of ways and use concentration to predict properties of solutions.
  • Students should be able to do calculations involving solution concentrations including those involving colligative properties.
  • Students should be able to use experimental data to obtain reaction rate laws and use reaction rate laws to predict the rates of reactions.
  • Students should understand how free energy, enthalpy and entropy are related and how free energy is dependent on temperature.
  • Students should be able to determine the entropy and enthalpy changes of a reaction from free energy values or equilibrium constants measured at different temperatures.
  • Students should be able to use an understanding of the relationship between free energy, enthalpy and entropy to explain the dependence of free energy on temperature.

• **Learning Goal 3:** Students will be able to demonstrate technical and analytical skills in chemistry.
  • Students will be able to analyze rates of chemical reactions and be able to relate reaction rates to the molecular mechanisms of those reactions.
  • Students should be able to determine the entropy and enthalpy changes of a reaction from free energy values or equilibrium constants measured at different temperatures.
  • Students should be able to use reaction rate versus temperature data to determine the activation energy of a chemical reaction.
  • The student should be able to predict the products of α-particle and β-particle emission.
  • The student should know how to determine cell potentials at non-standard state concentrations and partial pressures of reactants and products or be able to use potentials measured under these conditions to determine the concentration of a reactant or product.

**Evaluation of Student Learning Outcomes**
Student learning outcomes will be evaluated by test questions or by the grading of in-classroom activities, as described by your instructor.

**Texas Higher Education Coordinating Board Natural Sciences Objectives**
The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the basis for building and testing theories.

**Exemplary Educational Objectives**

1. To understand and apply method and appropriate technology to the study of natural sciences.
2. To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
3. To identify and recognize the differences among competing scientific theories.
4. To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
5. To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.

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1. [https://openstax.org/details/books/chemistry-2e](https://openstax.org/details/books/chemistry-2e)
2. [https://www.aleks.com/](https://www.aleks.com/)
3. [https://tophat.com/](https://tophat.com/)
5. [http://www.angelo.edu/services/registrars_office/final.html](http://www.angelo.edu/services/registrars_office/final.html)
6. [http://blackboard.angelo.edu](http://blackboard.angelo.edu) (or access Blackboard from RamPort)
7. [https://www.angelo.edu/student-handbook/](https://www.angelo.edu/student-handbook/)
8. [https://www.angelo.edu/catalogs/](https://www.angelo.edu/catalogs/)
10. [https://www.angelo.edu/services/disability-services/](https://www.angelo.edu/services/disability-services/)
11. [https://www.angelo.edu/content/files/14197-op-1011-grading-procedures](https://www.angelo.edu/content/files/14197-op-1011-grading-procedures)
13. [https://www.angelo.edu/dept/writing_center/academic_honesty.php](https://www.angelo.edu/dept/writing_center/academic_honesty.php)
14. [https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of](https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of)
CHEM 1311 — General Chemistry II — Spring 2020
Proposed Course Schedule

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
<th>Exam 1</th>
<th>Thursday Feb. 13, 5:30 PM-7:30 PM, MCS 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 2</td>
<td></td>
<td></td>
<td>Thursday, Mar. 19, 5:30 PM-7:30 PM, TBA</td>
</tr>
<tr>
<td>Exam 3</td>
<td></td>
<td></td>
<td>Thursday, April 23, 5:30 PM-7:30 PM, MCS 100</td>
</tr>
<tr>
<td>FINAL</td>
<td></td>
<td>Monday, May 6, 10:30 AM -12:30 PM, RAS 105</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wk #</th>
<th>Lecture Topics</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Textbook References are to Chemistry 2e by Openstax</strong></td>
<td><strong>All lab procedures are posted on Blackboard</strong></td>
</tr>
<tr>
<td></td>
<td>Tues 1/14:</td>
<td>Lab 1/13-1/16</td>
</tr>
<tr>
<td></td>
<td>• Brief review of Lewis Structures, VSEPR and Polarity.</td>
<td>Qualitative Analysis of Anions</td>
</tr>
<tr>
<td></td>
<td>• Brief survey of organic nomenclature, structure &amp; polarity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thur 1/16:</td>
<td>Mandatory Lab Safety Training and Quiz</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 01-02 Intermolecular Forces (pp. 367, 371-374, 522-534)</td>
<td>• See separate Blackboard course “Lab Safety and Chemical Hygiene” - follow instructions provided</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 03-04 Practicing Identifying and Comparing Intermolecular Forces</td>
<td>• Must be completed by January 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ONLY necessary if not taken before.</td>
</tr>
<tr>
<td>2</td>
<td>Tues 1/21:</td>
<td>Monday Holiday - NO Lab This Week</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 05 Intermolecular Interactions Special Topics</td>
<td><strong>Lecture Classes meet Tuesday-Friday as scheduled</strong></td>
</tr>
<tr>
<td></td>
<td>• Study Unit 06-07 Properties of Liquids (Sec. 10.2)</td>
<td>Take home assignment:</td>
</tr>
<tr>
<td></td>
<td>Thurs 1/23:</td>
<td>• Significant Figures and Algebra worksheet</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 08 Overview Physical States (pp. 13-16, Sec. 10.3)</td>
<td>• Posted on Blackboard</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 9-10 Phase Changes - Def’s &amp; Enthalpies (Sec.10.3)</td>
<td>• Due beginning of lab, week of January 28</td>
</tr>
<tr>
<td></td>
<td>• Clausius-Clapeyron Self-Study (pp. 542-546)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tues 1/28:</td>
<td>Lab 1/27-1/30</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 11-12 Heating and Cooling Curves (pp. 549-550)</td>
<td>Qualitative Analysis of Group I Cations</td>
</tr>
<tr>
<td></td>
<td>• Study Unit 13 Phase Diagrams (pp. Sec. 10.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thur 1/30:</td>
<td></td>
</tr>
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<td>• Study Unit 14-15 Solids (Sec. 10.5)</td>
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<td>• Study Unit 16 Review or Special Topics - Liquids and Solids</td>
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<td>• Study Unit 17-18 Solutions &amp; Solubility (pp. 152, Sec 11.1-11.2)</td>
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<td>4</td>
<td><strong>All lab procedures are posted on Blackboard</strong>&lt;br&gt;Tues 2/4:&lt;br&gt;• Study Unit 19-21 Concentration Units (pp. 151-164, 618-621)&lt;br&gt;• Study Unit 22-24 Colligative Properties (Sec. 11.4)&lt;br&gt;Thur 2/6:&lt;br&gt;• Study Unit 25 Review or Special Topics – Solutions/Colloids&lt;br&gt;• Study Unit 26-27 Reaction Rates (Sec. 12.1)&lt;br&gt;• Reaction Rates Worksheet</td>
<td>Lab 2/3-2/6&lt;br&gt;Qualitative Analysis of an Unknown Salt</td>
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<td>Tues 2/11:&lt;br&gt;• Study Unit 28-29 Experimental Rate Laws (Sec. 12.3)&lt;br&gt;• Rate Laws Worksheet&lt;br&gt;Thur 2/13&lt;br&gt;• Study Unit 30 Integrated Rate Laws (Sec. 12.4)&lt;br&gt;• Study Unit 31 Review or Special Topics – Rates and Rate Laws&lt;br&gt;• Study Unit 32-33 Reaction Mechanisms (Sec. 12.6)&lt;br&gt;Thurs 2/13 Exam 1 Chap 10-11, Sec’s 12.1-12.3&lt;br&gt;5:30-7:30 PM in MCS 100</td>
<td>Lab 2/10-2/13&lt;br&gt;Spectrophotometry of FD&amp;C Red 40</td>
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<td>Tues 2/18:&lt;br&gt;• Study Unit 34 Arrhenius Equation (pp. 685-690)&lt;br&gt;• Study Unit 35 Catalysts (Sec. 12.7)&lt;br&gt;• Study Unit 36 Review or Special Topics – Applied Kinetics&lt;br&gt;Thur 2/20:&lt;br&gt;• Study Unit 37 The Equilibrium Constant (pp. 694-703, 713-714)&lt;br&gt;• Study Unit 38 Conversion between K_c and K_p (pp. 731-733)&lt;br&gt;• Study Unit 39 Manipulating Equilibrium Constants (pp. 733-735)</td>
<td>Lab 2/17-2/20&lt;br&gt;A Kinetic Study: The Reaction of Crystal Violet with NaOH</td>
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| 7    | **Tues 2/25:**  
|      |   • Study Unit 40 Looking at Reaction Trends Using Equilibrium (pp. 728-731)  
|      |   • Study Unit 41 Le Chatelier's Principle (Sec. 13.3)  
|      |   • Study Unit 42 Review or Special Topics - Equilibrium Basics  
|      | **Thurs 2/27**  
|      |   • Study Unit 43-45 Equilibrium Calculations (Sec. 13.4)  |
| 8    | **Tues 3/3:**  
|      |   • Study Unit 46 Review/Special Topics – Equilibrium Calculations  
|      |   • Study Unit 47-49 Acid Base Definitions (Sec. 14.1)  
|      | **Thurs 3/5:**  
|      |   • Study Unit 50 Definitions Part II Lewis Acids and Bases (Sec. 15.1)  
|      |   • Study Unit 51-52 Autoionization of Water, pH Scale and Strong Acids (pp. 765-766, Sec. 14.2)  |
|      | *** 3/9 to 3/13 Spring Break *** | Spring Break - No Labs Either! |
| 9    | **Tues 3/17:**  
|      |   • Study Unit 53-55 Calculating pH: Weak Acid & Base Solutions (Sec. 14.3)  
|      | **Thurs 3/19:**  
|      |   • Study Unit 56 Acid Base Behavior of Salt Solutions (Sec. 14.4)  
|      |   • Study Unit 57 Polyprotic Acids and Bases (Sec. 14.5)  
|      |   • Study Unit 58 Review or Special Topics - Acid-Base Calculations  
|      | **Thur 3/19**  
|      |   Exam 2  5:30-7:30 PM in MCS 100  
|      | **Chap's 12, 13, Sec's 14.1-14.2**  
|      | Lab 2/24-2/27  
|      |   A Kinetic Study Part II: Temperature Dependence and Activation Energy of the Rate of Reaction of Crystal Violet and NaOH  
|      | Lab 3/2-3/5  
|      |   Equilibrium and Le Châtelier's Principle  
|      | Lab 3/16-3/19  
|      |   Analysis of Antacid Tablets  

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| 10   | **Tues 3/24:**  
• Study Unit 59-60 Buffers and Other Acid-Base Mixtures (Sec. 14.6)  
• Study Unit 61-62 Reactive Mixtures of an Acid and a Base  
**Thur 3/26**  
• Study Unit 63-65 Acid-Base Titration Curves (Sec. 14.7)  
***Friday, Mar. 26 - Last Day to Drop*** | Lab 3/23-3/26  
Lab Midterm Exam |
| 11   | **Tues 3/31:**  
• Practice Titration Curve Calculations  
**Thur 4/2:**  
• Study Unit 66-67 Solubility Equilibria (Sec. 15.1)  
• Study Unit 68 Review or Special Topics - Advanced Equilibrium | Lab 3/30-4/2  
Analysis of Titration Curves |
| 12   | **Tues 4/7:**  
• Study Unit 69 Thermodynamic Intro. (Chap 5 Review)  
• Study Unit 70-71 Applied Thermodynamics (pp. 263-269, 874-875, 877-880)  
**Thurs 4/9:**  
• Worksheet on Calculating $\Delta H^0$, $\Delta G^0$ and $\Delta S^0$.  
• Study Unit 70-71 Understanding Entropy (Sec. 16.3) | Lab 4/6-4/9  
No Lab This Week - Moon Lecture |
| 13   | **Tues 4/14:**  
• Study Unit 72-73 Understanding Free Energy (Sec. 16.4)  
**Thurs 4/16:**  
• Study Unit 74-75 Free Energy and Equilibrium (pp. 883-886)  
• Study Unit 76 Review or Special Topics - Thermodynamics | Lab 4/13-4/16  
Gibb’s Free Energy, Entropy, and Spontaneous Reactions |
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<td><strong>Textbook References are to Chemistry 2e by Openstax</strong></td>
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| 14   | Tues 4/21:  
• Study Unit 77 Review Redox (pp. 190-194, Sec. 17.1)  
• Study Unit 78-79 Balancing Redox reactions (pp. 195-197)  
Thurs 4/23:  
• Study Unit 80-81 Electrochemical Cells (Sec. 17.2)  
• Study Unit 82-83 Standard Potentials and Free Energy (pp. 906-913)  
Thurs 4/23 Exam 3 5:30-7:30 PM in MCS 100 | Lab 4/20-4/23  
Electrochemistry: Anodizing Aluminum and Etching Brass. |
| 15   | Tues 4/28:  
• Study Unit 86-87 Nernst Equation (pp. 913-915)  
• Study Unit 88-89 Applied Electrochemistry (Sec. 17.5-17.7)  
Thurs 4/30:  
• Study Unit 90-91 Intro to Nuclear Chemistry (Sec. 21.1-21.4) | Lab 4/27-4/30  
Lab Final |
|      | **Final Exam Sec 040**  
**Thursday, May 7, 8:00 AM - 10:00 AM**  
**In Rassman 105** |