San José State University  
College of Science  
Chemistry Department (Office - DH 518) 
CHEM 1A - Section 01 - GENERAL CHEMISTRY I – Fall 2013

Instructor: Dr. Resa Kelly  
Office Location: DH 418  
Telephone: (408) 924-4940  
E-mail: resa.kelly@sjsu.edu  
Office Days and Hours: Mondays and Wednesdays (11 to noon) or by appointment.  
Class Days/ Time: MWF – 9:30AM to 10:20AM  
Classroom: SCI 142  
Prerequisites: 1 Year of High School Chemistry. Must be eligible to take MATH 19 and ENGL 1A  
Course Fees: Purchase lab manual in the basement of Duncan Hall (SAACS) DH 20 ($20 cash only). Purchase OWL homework and iClicker for use in lecture.

CANVAS
Copies of the course materials such as the greensheet may be found on Canvas. During the first 3 weeks of the semester when students are still trying to get enrolled, I will also post these materials on my website (http://www.sjsu.edu/people/resa.kelly/). You are responsible for regularly checking with the messaging system on Canvas and MySJSU.

PROGRAM LEARNING OUTCOMES (PLO)
The following PLOs (think of these as learning goals) for SJSU’s BA/BS chemistry program have been established by faculty members of the SJSU Chemistry Department and apply to CHEM 1A students. Chem 1A provides a basic foundation for all branches of chemistry. For a full list of program learning outcomes visit - http://www.sjsu.edu/chemistry/Academic_Programs/undergraduate_program_learning_objectives.html

PLO #1 - Demonstrate understanding of core concepts and to effectively solve problems in inorganic chemistry.  
PLO #2 - Demonstrate understanding of core concepts and to effectively solve problems in organic chemistry.  
PLO #3 - Demonstrate understanding of core concepts and to effectively solve problems in analytical chemistry.  
PLO #4 - Demonstrate understanding of core concepts and to effectively solve problems in physical chemistry.  
PLO #6 - Answer questions regarding safe practices in the laboratory and chemical safety.  
PLO #7 - Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

COURSE DESCRIPTION
The object of the course is to gain knowledge and understanding of the basic principles of chemistry, and of their applications. The overall goal is to be able to demonstrate an understanding of the basic principles of chemistry on clicker questions, quizzes, exams and online web homework. Lab and seminar complement lecture; however, please note that sometimes lab will be used as an introduction to the concepts covered in lecture and other times the labs will reinforce what is covered in the lecture. In the case of an introduction, you may need to do preparatory reading for the lab. The chapters in the textbook that coincide with the labs are marked on this greensheet (Homework Section p. 11-13).

COURSE LEARNING OBJECTIVES
A list of very specific learning outcomes for Chem 1A lecture are included at the end of this greensheet. These are statements that basically tell you what you should know or be able to do or demonstrate at the end of this course. The lab will also provide hands-on opportunities to develop and apply your understanding. If a specific outcome is also partially addressed with an experiment, then the experiment number has been included in parenthesis. Please note that for many of the topics in this course, real world examples, including historical accounts, and economic and societal issues will be discussed.
REQUIRED TEXTS/SUPPLIES

Required
1) OWL homework – Online web learning – instructions will be provided. This electronic homework can be purchased with an ebook, but you may also purchase it without the ebook. You will be assigned homework problems on a daily basis. These will be due usually on the day of a quiz or exam, but not always so you need to look closely at all deadlines and realize that you are responsible for submitting your work by the due date (no exceptions). You will receive points for your work. By the end of the semester, the final percentage you earn for your homework grade is converted to points. OWL homework is approximately 14% of your grade.

2) Textbook Chemistry: The Central Science (optional) – Brown, LeMay, Bursten, Murphy, & Woodward – 10th through 12th) editions; ISBN-10: 0136006175 or ISBN-13: 978-0136006176 (Or a college level Chem. text if you feel comfortable with a different textbook. We have two versions of the book, the silver hardcover is used in 1A and 1B and a 10th edition paperback covers topics relevant to only CHEM 1A. The paperback is an option for those who only have to take 1A for their major. Students considering taking 1B need the full textbook. A new 12th edition of the book has recently come out and this would work as well. Homework will be assigned from OWL, not from the book.

3) Lab Manual for Chemistry 1A – Available in DH 20
4) Hand-held scientific calculator - Must be non-programmable and should have log x, 10^x, ln x, e^x and x^y keys. - You will not be allowed to use your programmable calculator during a lecture or lab exam, or quiz!
5) Scantron forms 882-E - Purchase one scantron form for the final and give it to Dr. Kelly. DO NOT WRITE YOUR NAME ON IT! She will distribute the blank scantrons on the day of the final.
6) Check Canvas for the course regularly. I will post PowerPoint notes and an overview of concepts covered in lecture – you may also receive additional homework problems(See p. 8 for login instructions).
7) iClickers – Purchase at the bookstore. Register for Chem 1A with Kelly. Must be registered to earn points.

Not Required (But possibly useful)
1) Academic Excellence Workshops to help you study for Chem. 1A. These are 3 hour a week organized student sessions. There will be 6 or 8 different sessions facilitated by former Chem. 1A students. 
2) Solutions manuals to textbook problems - These options are available with your textbook.
3) Student study guide for full textbook.

CLASSROOM PROTOCOL

THINGS YOU MUST DO THIS FIRST WEEK OF CLASS:
1) Attend your lab section to claim your space. If you miss your first lab, it is likely that you will be dropped from the course.
2) Attend your seminars starting from the first Friday or risk losing points! Quizzes and lab discussion are the primary components of seminar.
3) Read this greensheet thoroughly. Refer to it regularly.
4) Read pages i – viii of the lab manual before attending your lab session.
5) Review significant figures/units/atomic and molecular weights – Chapter 1.
6) If you decide to drop the course, please give Dr. Singmaster (Chem 1A Lab Coordinator) a note with your name indicating that you will be dropping the course. It will allow her to add people more efficiently.
7) If you are trying to add, you must attend one lab section and one seminar section a week until you are added. Earning a place is largely determined by whether or not you can get a place in the labs. The lab and seminar instructors do not have codes, nor can they save you a space. Adds will be done in order of priority. The adds will be announced in lecture and the list posted in the glass cabinets across from DH17. If you are offered a space, you must claim your space in writing within 24 hours by placing a note with your name, SJSU ID number and a statement indicating that you accept in Dr. Singmaster’s IN BOX on the door to DH16. Once she has that information, she will
provide you with a permission number to add the lecture, lab and seminar.

ATTENDANCE/WORKLOAD

Regular attendance to lecture, seminar and lab is required. Lecture material will not necessarily reiterate text material. It is a serious mistake either to depend on a classmate’s notes or exclusively the textbook. It is essential to keep up with class work, homework and laboratories to succeed in this course. The instructor is not responsible for covering material you missed due to unexcused absences. I do not give copies of my notes if you are absent, but you can find some resources online. Absences to lab can and will result in an F grade for the FULL course (two unexcused absences from lab are sufficient for you to be dropped or failed). Please remember that missing lecture or lab to study for another class is not an acceptable excuse. You signed up for your course load; you are now responsible for fulfilling the obligations that come with that course load. 

Please remember this is a 5 unit course, it will require a great deal of your time. The university guidelines are three hours of study time per unit per week.

DROPPING AND ADDING

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-324.html. Information about late drop is available at http://www.sjsu.edu/sac/advising/latedrops/policy/. Students should be aware of the current deadlines and penalties for adding and dropping classes.

ABSENT?

Please email or call (408-924-4940) prior to class if you are going to be absent for a legitimate reason. If you find yourself ill on a test day, you MUST contact Dr. Kelly BEFORE the exam by email or phone message (see more elaboration under GRADING).

Lab Absence:

ONE excused lab absence may be made-up by attending another section and completing the work within the same week of the absence. You will need the consent of the lab instructor of the session you attend for your make-up. They are not required to accept you in their lab, particularly if their lab is full! The expectation is that you will always attend your own lab.

MISCELLANEOUS – BEHAVIOR

a) Turn your cell phone off prior to the start of lecture.
b) No headsets for cell phones or headphones/ear devices for ipods or music technology are allowed during lectures. If you wear them, be prepared to remove them or leave the lecture.
c) Notebook computers will only be allowed if you sit in the very back rows. Tablet computers are allowed. If one person is found to be using their computer inappropriately (ex. surfing the Internet, emailing) no students will be allowed to use their computers during the lectures for the rest of the semester.
d) No text messaging, unless you are instructed to do so as part of the class! If it is noticed that you are text messaging during class– you will be asked to leave the lecture.
e) Cell phones will not be allowed to double as your simple scientific calculator.
f) Before emailing Dr. Kelly, please ask yourself whether the information you seek could be found in the greensheet.
g) Lecture requires your being awake. If you decide to take a snooze, you may be asked to leave the lecture so that you can catch up on your rest in a more comfortable setting.
h) If you are late for class on the day of a test or quiz, you will not be given extra time to finish nor will you be allowed to make-up the exam or quiz. If you take mass transit—you need to plan ahead to make sure that you get to the campus in plenty of time.
i) If you do not fill in the bubbles until the end of the exam please know that you will not be awarded extra time to finish the task and the grader will not hand grade your exam just because you did not budget your time accordingly.
j) If you miss a class, you are responsible for getting the information you missed from a peer who was present and you should check Canvas.
k)
LECTURE EXAM RULES
(There will be assigned seats—make sure you know where you sit!)
1) You must sit in the seat you are assigned. Check the seating chart well before the exam date! It will be posted a week before, both in lecture and online. Find the seat in the lecture hall a few days before the exam so that you do not waste time looking for it! If you reach your seat and it is broken, please come tell me and I will find another one. No sitting on the floor in the back of the lecture hall or on the stairs!
2) No programmable calculators. No sharing of calculators. (This applies to lab also!). Remove the calculator lid before the exam.
3) No caps, hats, etc. unless required by a physician and then they must be turned around.
4) No cell phones or PDAs. They must be stored under the desk.
5) No head phones or other devices in ears unless they are prescribed hearing aids!
6) Ask for scratch paper. Do not pull it from your backpack.
7) Place backpacks under your seat so as to make sure that others don’t trip trying to get out. No open books, notes, etc. on the floor at your feet.
8) No talking during an exam, even if you have handed in your exam.
9) You should circle your choice on the exam as well as marking it on the scantron. The scantron is the document that will be graded!
10) No notes, open books, lab manuals or any other materials should be available.
11) You must hand in your scantron, your exam and all scratch paper. All of the “Student Information” portion on the first page of the exam must be filled out! This includes signing an honor pledge.

GRADING POLICY
Lecture Exams and Final
Three fifty-minute exams (100 points each), which could consist of a variety of question formats such as multiple choice, short answer and calculation type problems will be given approximately every 3 to 4 weeks. Scheduled dates for the exams are included on this greensheet. Plan ahead for these exams. Do not schedule appointments during these times. The final exam (200 points) will be 2 hours long; it is a comprehensive (cumulative) multiple-choice exam. This course builds on itself so material covered on a previous lecture exam could be needed in a following exam. There will be no make-ups for lecture exams. In order to miss an exam due to illness or emergency, you MUST contact Dr. Kelly PRIOR to the exam day. In addition, you will need to provide written proof of your reason for missing with a signed and dated note from the doctor’s office or the health center, your coach for University athletics, a police report, or funeral notice, etc. If I accept your excuse, I will use the score on the final exam section (pertaining to the particular exam you missed) as your exam score. An unexplained or unsatisfactory excuse for missing a lab or exam will result in a grade of zero. You may take the exam a day early if you have a planned, excused absence for the exam day, but you should always clear this with Dr. Kelly with at least 3 weeks notice.

Getting your exam grades –Check the Canvas website to learn how you scored on your exams. Always check your score, because grades, as they appear on Canvas will be used to determine your overall grade for the course. You will have approximately 3 weeks or until the time of the next exam to attend office hours to review your performance and if necessary request a regrade. Your grade for the exam will be final after the 3-week period or announcement that your time to review has ended. You will not be allowed to review the exam again, nor ask for it to be regraded, which means in the weeks prior to finals you will not be allowed to review old exams or claim an issue with the grade.

Quizzes
These will be unannounced and typically in class. You could be asked to work one problem as a team. You might be asked to draw your understanding of a concept. You should expect a variety of quiz formats including periodic Canvas quizzes.

Homework – OWL
We will be using an online learning homework system called OWL (Online Web Learning) this semester. Please follow the instructions below to register for OWL. Your access will be good for 6 months. Click Support on any page in OWL or at www.cengage.com/OWL.
**iClicker Participation**
Throughout each lesson you can expect to be asked to participate. iClickers will be used to check your participation. You earn more points if you answer correctly than incorrectly, but you do earn points for guessing even if you guess incorrectly. It is very important that you register your iClicker right away and only register once. If you do not register, you will not earn credit for your participation. Periodically, perhaps two times during the semester, your participation up to that date will be posted so that you can make sure that you are registered. Register your clicker here - [http://www1.iclicker.com/register-an-iclicker/](http://www1.iclicker.com/register-an-iclicker/)

**Laboratory**
The total lab grade constitutes 35% of the final grade. **Failing lab (55.0% or less) or lack of attendance to lab will result in an F grade for the FULL COURSE, irrelevant of how well you are doing in lecture.** Do not miss labs! Details regarding the lab grade will be provided in the lab greensheet.

**Grading Scale**
At the end of the semester you will receive a single grade for the course. The following grading scale is used for determining your overall grade which is a weighted average of lecture (65%) and lab (35%).

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>A+</td>
<td>78.9 - 76.0%</td>
<td>55.9 - 53.0%</td>
</tr>
<tr>
<td>A</td>
<td>75.9 - 71.0%</td>
<td>52.9 - 50.0%</td>
</tr>
<tr>
<td>A-</td>
<td>70.9 - 64.0%</td>
<td>Below 50.0%</td>
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<tr>
<td>B+</td>
<td>63.9 - 60.0%</td>
<td>C-</td>
</tr>
<tr>
<td>B</td>
<td>59.9 - 56.0%</td>
<td>D+</td>
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</table>

A record of your lecture grades will be posted on CANVAS, you are responsible for making sure that the scores posted on CANVAS match the score you receive on your exam. If a mistake is made, you have 1 week from the time you receive your graded exam to contact Dr. Kelly to request the correction. If you notice a blank where the grade should be, check on it immediately. **Incompletes** will not be given unless a strong compelling reason with proof is furnished to support the need for an incomplete. Incompletes will not be granted just because the university won’t late drop you or because the low grade will disqualify you, put you on probation or increase your car insurance payment! Incompletes do not remove past scores on exams! Incompletes are only given to persons who have completed at least 80% of the course. They are removed by completing pending tasks. I do not provide special projects to make up incompletes.

PLEASE note we DO NOT provide extra credit work at the end of the semester for students who are doing poorly. You need to perform well on your tests, lab reports and quizzes.

PLEASE note that I provide bonus points throughout the tests/quizzes to push your grade up a bit just in case you feel some grading was harsh or uneven. This may amount to as much as an extra 2%. At the end of the semester I decide letter grades using the scale above without providing additional bonus.

**UNIVERSITY POLICIES**

**Academic Integrity**
Students should know that the University’s [Academic Integrity Policy is available at http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf](http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf). 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 website for [Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial_affairs/index.html](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 AEC (Accessible Education Center) to establish a record of their disability.

**Emergencies and Evacuations**

If you hear a continuously sounding alarm, or are told to evacuate by Emergency Coordinators (colored badge identification), walk quickly to the nearest stairway. Take your personal belongings as you many not be allowed to immediately return. Follow instructions of Emergency Coordinators. Be quiet so you can hear. Once outside, move away from the building. Do not return to the building unless the police or emergency coordinators announce that you may.

**LECTURE/LAB BUDDIES**

In a difficult and time consuming class such as this one, it is often very useful to establish a buddy relationship with one or two students. You can lend each other notes, study together, collect handouts for each other and commiserate with each other. Seriously consider establishing such a relationship with someone in lecture and in your lab.

**RESOURCES FOR HELP**

1) Dr. Kelly – office hours, CANVAS, Google hangout, email
2) Seminar instructors (Lab and, to some degree, lecture also)
3) Lab instructors (Lab predominantly, although some can also provide excellent help for lecture)
4) Academic Excellence Workshops (Lecture) – You must be enrolled! **Please note these are not tutoring sessions.** They are organized, collaborative study times.
5) COSAC – The College of Science Advising Center is located on the second Floor of Duncan Hall, DH 213. They have peer advisors and tutoring. Check their website. [http://www.science.sjsu.edu/cosac/](http://www.science.sjsu.edu/cosac/)
6) SAACS -(DH20) Student club has tutors at selected times. Look for someone who took Chem. 1A/B.

**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. 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.

**Peer Connections**

Peer Connections is located in Room 600 in the Student Services Center, MLK Library (room LL 67), Academic Success Center in Clark Hall, and Living Learning Center, Campus Village B. They offer free mentoring and tutoring services to undergraduate SJSU students. 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. [http://peerconnections.sjsu.edu/](http://peerconnections.sjsu.edu/)

**College of Science Advising Center (COSAC)**

COSAC provides academic and peer advising to all College of Science majors, with particular focus on frosh who are in their first three semesters at SJSU and transfer students who are in their first year at SJSU, in order to increase student success and graduate rates for College of Science majors. Tutoring in
CHEM 1A is available.

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**Grade Record for Chem. 1A Students – Dr. Kelly**

**Lecture (65% of grade)**

<table>
<thead>
<tr>
<th></th>
<th>Lecture Exams</th>
<th>Quizzes</th>
<th>OWL Homework(%)</th>
<th>Participation</th>
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<tr>
<td>1(100)</td>
<td>Lots</td>
<td>(Your points/ Total Points) x 100</td>
<td>Iclicker questions (your percentage multiplied by 25)</td>
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<td>2(100)</td>
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<td>3(100)</td>
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<td>Final(200)</td>
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Your total number of points divided by 725 gives you your Lecture %.

**Lab (35% of grade) (Must be passed with 55% or better)**

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<th></th>
<th>Exams</th>
<th>Quizzes</th>
<th>Reports</th>
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<tbody>
<tr>
<td>I (100)</td>
<td>1 (10)</td>
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<td>II(100)</td>
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<td>12 (10)</td>
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To calculate your final grade:  (Lecture %)(0.65) + (Lab %)(0.35) = Overall Percentage
<table>
<thead>
<tr>
<th>Month</th>
<th>Lab</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td><strong>August</strong></td>
<td><strong>Tentative</strong></td>
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<td>21 First</td>
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<td></td>
<td><strong>Lab Schedule</strong></td>
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<td>Day</td>
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<td>Check-in</td>
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<td>26</td>
<td>27</td>
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<tr>
<td>Exp. 1</td>
<td>2 Labor Day</td>
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<td>3 Last Day to Add</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Exp. 2</td>
<td>9</td>
<td></td>
<td></td>
<td>10 Last Day to Add</td>
<td>11</td>
<td>12</td>
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<tr>
<td>Exp. 3</td>
<td>16</td>
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<td>17</td>
<td>18 Exam 1</td>
<td>19</td>
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<td>Exp. 4</td>
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<td>Exp. 5</td>
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<td>Exp. 6</td>
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<td>Exp. 7</td>
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<td>16 Exam2</td>
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<td>Exp. 8A</td>
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<td>Exp. 9&amp; 8B</td>
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<td>30</td>
<td>31</td>
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<td>Exp. 10</td>
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<td><strong>November</strong></td>
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<tr>
<td>Exp. 11</td>
<td>11 Veteran’s Day - Closed</td>
<td>12</td>
<td>13 Exam 3</td>
<td>14</td>
<td>15</td>
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<tr>
<td>Exp. 12</td>
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<tr>
<td>No Labs</td>
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<td>26</td>
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<tr>
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<td>No Labs</td>
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<td>13 Final Exam 7:15 – 9:30AM</td>
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List of Topics

Exam I - Will cover Chapters 1 – 4, but the exam will be adjusted to reflect where we are in coverage of the material.

Exam II - Will cover Chapters 4, 20.1 and 20.2, and 6-7, but the exam will be adjusted to reflect where we are in coverage of the material.

Exam III - Will cover Chapters 8 – 11, but the exam will be adjusted to reflect where we are in coverage of the material.

Final Exam (Cumulative)– Will cover all chapters covered on the previous exams and new material from Chapter 5 and parts of Chapter 25

Graded Homework

To register in OWL:


2. Click your textbook category (CHEM 1A) from the “Choose Your Course” box. Choose Register.

3. Choose the textbook you are using: “Chemistry: The Molecular Science-4th Edition” by Moore, Stanitski and Jur – note that this is not the textbook that is listed for our course, but it closely matches.

4. Choose the Institution that you attend.

5. Click the blue arrow in the “Student Registration” column.

6. Click the blue arrow in the “Section #” column that matches your course and section.

7. Follow instructions to complete the Self-Registration Form.

8. The Successful Registration page will be displayed. (Your registration information will also be emailed to you.)

9. Click on the Login Page link at the top of the page to go to the Login Page. Bookmark this page in your browser as your login page for future visits.

If you forget to bookmark the login page or need to get back to it at any time, go to www.cengage.com/owl and make a selection under “Choose Your Course” and Log in.

Use the "I forgot my login/password" link on the login page if you ever forget your login information.

For help, go to www.cengage.com/chemistry/owlsupport page if you ever forget your login information.

For help, see the Support area in the lower right area of the page at www.cengage.com/owl.

How homework will be graded. You will be assigned points for every assignment that is completed. At the end of the semester your percentage will be determined and that is the amount of points you will earn out of 100 points for your grade. Note that your homework grade is the equivalent of one exam.
Extra homework

Extra homework problems from *Chemistry; The Central Science* will sometimes be provided on Canvas. They will not be graded, unless specified.

Topics—where they are located in the book and to what labs are they connected?
It’s all in this table.

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<thead>
<tr>
<th>TOPIC</th>
<th>CHAPTER</th>
<th>Lab</th>
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<tr>
<td>Independent Study of Units, Significant Figures, Dimensional Anal., Density, Temp., Atomic and Molec. Weight</td>
<td>1, 2.4, 3.3</td>
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<td>Mole, % comp., empirical</td>
<td>3.4 - 3.5</td>
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<tr>
<td>Organic Chemistry</td>
<td>2.9, 25.1 – 25.6</td>
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Course Learning Outcomes – Facts you are expected to know

The student will be able to:

1) apply significant figures rules in all calculations providing the correct number of significant figures and units (Exp 1, 2, 6, 7, 10, 11 and 12)

2) convert between different units using conversion factors and dimensional analysis (Exp. 1)

3) name elements, provide their symbols and determine the number of protons, neutrons, electrons and nuclei in elements and compounds

3) calculate percent composition given a molecular formula and molecular formula given the percent composition (Exp. 2)

4) name salts, acids, bases and covalent compounds and provide formulas for these given a molecular formula (Exp. 3)

5) explain the difference between solubility and dissociation in water and apply this knowledge to acids, bases and salts (Exp. 3)

6) identify weak and strong acids and bases and insoluble compounds using dissociation and solubility rules (Exp. 3 and 4)

7) construct molecular, total and net ionic equations for double displacement reactions (Exp. 3 and 4)

8) identify redox reactions including identifying the oxidation, reduction, oxidation agent and reducing agent (Exp. 5)

9) calculate oxidation numbers and balance redox reactions (Exp. 5)

10) perform stoichiometry calculations for chemical and non-chemical systems whether the limiting reactant is known or unknown (Exp. 6 and 10)

11) calculate molarity of a solution starting with pure solute or with a concentrated solution as well as explain how to prepare a solution of a given molarity (Exp. 6)

12) provide brief descriptions of the accomplishments of Planck, Einstein, Thompson, Rutherford, Millikan, Rydberg, Bohr, de Broglie and Schrodinger; and how these contributed to understanding the atom

13) explain how a cathode ray tube works and how it assisted in understanding the electronic configuration of atoms.

14) convert between wavelength, energy and frequency for light and understand the relationship between absorbed light and color (Exp. 7)

15) calculate the energy and wavelength of a given electronic transition in hydrogen (Exp. 7)

16) define what each quantum number represents and how to obtain quantum numbers for any electron in an atom

17) analyze an atom or ion of a given element providing the full electronic configuration, the abbreviated electronic configuration, the nl^x notation, a representative diagram of the orbitals and the unpaired number of electrons; then use this information to determine the possible oxidation states of the element and the magnetic properties of the element (Exp. 8)

18) define electronegativity, electron affinity and ionization potential
19) organize a set of element or monoatomic ions in order of increasing atomic radius, ionic radius, first ionization energy and electronegativity

20) determine whether a bond is metallic, ionic, covalent or polar covalent

21) represent covalent and ionic bonding using Lewis dot structures

22) evaluate the molecular geometry, hybridization and polarity of a covalent molecule (Exp. 9)

23) evaluate the type of molecular bonding(s or p) in a covalent molecule and identify the orbitals used for bonding

24) explain the properties of temperature and pressure including how these are measured and convert between different units for these properties, including the use of different liquids in the measurement of pressure (Exp. 10)

25) derive the relationships between pressure, volume, temperature and moles for ideal gases; perform calculations using these relations, including when they are combined with stoichiometry or percent composition problems (Exp. 10)

26) define and apply Dalton’s Law of Partial Pressures and Graham’s Law of Diffusion and Effusion to mixtures of gases (Exp. 10)

27) use the results from the Kinetic Molecular Theory of Gases to explain the relationship between kinetic energy, average molecular velocity, temperature, pressure, density and number of collisions when an ideal gas undergoes a change of state

28) describe and provide examples of the five types of intermolecular forces and be able to analyze the forces present in a substance and organize a set of compounds in order of increasing intermolecular forces (Exp. 11)

29) define the terms and explain the temperature dependence of surface tension, viscosity, vapor pressure, normal boiling point, capillary action; and be able to organize a set of compounds in increasing order for most of these properties (Exp. 11)

30) explain the concept of specific heat and apply the equation to heating or cooling of materials

31) perform heat transfer calculations for systems with and without phase changes (Exp 12)

32) calculate heats of reaction using Hess’ Law or heats of formation, including combining the process with stoichiometry, and identify whether the reaction is exothermic or endothermic (Exp 12)

33) name unsubstituted and substituted alkanes, alkenes and alkynes given a drawing of a molecule and vice versa

34) identify all the isomers associated with simple aliphatic hydrocarbons and predict boiling point and vapor pressure change as a function of the number of carbons

35) identify and name some organic functional groups in a molecule