



SYLLABUS for CH 1020: Spring 2018 DEPARTMENT OF CHEMISTRY

Look for news and information on the General Chemistry website. You can access our home page through the Chemistry Department site at www.clemson.edu/chemistry (go to “Academics,” then “Undergraduate Courses,” then “General Chemistry”) or directly via www.clemson.edu/chemistry/genchem. Course objectives, exam information including dates, and lab information are posted on this site. Many instructors also use Canvas to post course information as well as other course relevant materials.

Required Materials

- Access to *Sapling Learning* on-line homework system. Instructions for the registration process can be found on the General Chemistry webpage (link is in the previous paragraph).
 - You may purchase access for a single semester directly from Sapling Learning. Alternatively you may purchase an access code through the Clemson University bookstore.
 - Your access remains valid if you chose the two semester purchase option for CH 1010.
- A manual is required for the laboratory portion of the course: *Cooperative Chemistry Laboratory Manual*, Melanie M. Cooper (5th Ed. McGraw Hill, 2012).
- Non-programmable scientific calculator.
 - Possible models include but are not limited to:
 - *Casio*: all fx-115 models
 - *HP*: 33 or 35 models
 - *TI*: 30X or 36X models
 - If you have a calculator that you think may be acceptable, please ask for clarification. A cell phone is not an acceptable calculator.

Recommended Materials

A textbook is recommended but not required; here are two possible options.

- *Chemistry: an atoms-focused approach*, Gilbert, Kirss and Foster. (1st ed. Norton, 2014).
 - Two versions are available in the Clemson bookstore (i) new, three-hole punched loose-leaf textbook (ii) used soft cover textbook. You may be able to find a used version on the internet.
- *Chemistry* OpenStax College.
 - A free etextbook available from Rice University, <https://openstax.org/details/chemistry-atoms-first>.
 - The chapter ordering may differ slightly from that presented in the course but the content is similar. This ebook is an acceptable supplement to the lecture.

Other Materials

- Some instructors use a class response system which requires an iClicker remote. An iClicker2 can be purchased from the Apple Store, which is located in the University Union. Cost is approximately \$60. Note that iclickers may not be required by all instructors.
- An optional math review can be obtained from the bookstore: *Math Survival Guide: Tips for Science Students*, J. Appling and J. C. Richardson (2nd Ed. Wiley, 2004). Note that appendix 1 of the textbook has a math review.

Class Schedule for CH 1020 Spring 2018

Note: This schedule is tentative and subject to change.

| CHAPTER | ACTIVITY | 50 MIN. | 75 MIN. |
|-------------------|---|---------|---------|
| | Introduction to CH 1020 | 1.0 | 0.5 |
| Chap. 12 | Thermodynamics (<i>Entropy & Free Energy</i>) | 3.0 | 2.0 |
| Chap. 11 | Properties of Solutions | 5.0 | 3.5 |
| Chap. 13 | Chemical Kinetics | 4.0 | 3.0 |
| EXAM 1 | Monday February 12 (7:15 pm) | | |
| Chap. 13 | Chemical Kinetics (continued) | 2.0 | 1.5 |
| Chap. 21 | Nuclear Chemistry | 4.0 | 3.0 |
| Chap. 14 | Chemical Equilibrium | 5.0 | 3.5 |
| EXAM 2 | Monday March 12 (7:15 pm) | | |
| Chap. 15 | Aqueous Equilibria | 7.0 | 4.5 |
| Chap. 17 | Electrochemistry | 4.0 | 3.5 |
| Chap. 19 | Organic Chemistry | 3.0 | 2.0 |
| EXAM 3 | Monday April 23 (7:15 pm) | | |
| FINAL EXAM | Wednesday May 2 (11:30 am) | | |

Laboratories: Labs will begin the week of January 22. You must be scheduled for a laboratory section, CH 1021, even if you are repeating the course. Look for an email from the Ms. Lewis, the lab coordinator, with key information regarding your lab section including its location

- A schedule of laboratory experiments will be issued as a separate syllabus.
- Safety goggles must be worn at **ALL** times while in the laboratory. Safety goggles may be purchased during the first week of labs from the Chemistry Graduate Student Association. Notices will be posted as to places and times when goggles will be offered for sale. If you purchase goggles from other sources please note that they must be chemical splash goggles that meet ANSI Z87.1 standard safety code.
- If you are repeating the course, but completed lab with a grade of **75 or above**, you may exempt lab and let your previous lab score count in computation of your overall class grade. Fill out the lab exemption form on the General Chemistry website (www.clemson.edu/chemistry/genchem) and you will be notified if you are eligible to exempt the lab.

Note: You will be moved into an exempt lab section, do not drop the lab since this is a four hour course and you must be registered in a lab section to receive credit.

Help: You may obtain extra help from the following sources:

- Peer Assisted Learning (PAL) Sessions—details on the first day of class. Check the Academic Success Center for dates and schedules (www.clemson.edu/asc/).
- Your lecture Instructor: See section syllabus for office hours.
- Drop-in tutoring on the first floor of the ASC building. The Academic Success Center offers FREE drop-in tutoring in a group setting, <http://www.clemson.edu/asc/tutoring/>.
- Form a study group with other students who are taking CH 1020 (they don't have to be in your section). It can really help; collaboration improves learning.

Grading Scale: Final grades will be assigned on the following average score range:

- 90% through 100% A
- 80% through 89% B
- 70% through 79% C
- 60% through 69% D
- below 60% F

This average score will be based on the laboratory grade (comment 1), three exams, the final exam (comment 2), class quizzes, homework and class participation. Course grades will be apportioned as shown below:

- Laboratory (comment 1) 25%
- Exams 40% (three exams 13⅓ % each)
- Final Exam (comment 2) 20%
- Class Activities (comment 3) 15%
- **Total** **100%**

Comment 1: You must be registered for a laboratory section. If the lab is not completed (more than one unexcused absence or uncompleted lab), your grade will be reduced significantly.

Comment 2: The Final Exam grade may substitute for your lowest exam grade of the semester if it is to your advantage and you make over 70% on the Final Exam. Unexcused exam absences will not be replaced.

Comment 3: What constitutes “class activities” will vary by instructor and may include such things as homework, quizzes, iclickers and/or other class participation activities. See your instructor’s section syllabus for more information.

Important Notes

1. Exams 1, 2 & 3 are given at 7:15 P.M. on a Monday night. Put the dates, table on page 2, and time on your schedule as there will be no rescheduling of exams. The time allotted for the exam and the location of the exam for your section will be communicated by your instructor about one week prior to the exam. Make sure you know where your exam will be given, since it is unlikely that it will be in your usual lecture room. You will be expected to bring your Clemson Student ID card.
2. All exams should be considered comprehensive; previously covered material may be tested. The Final Exam in CH 1020 will be cumulative, covering material from both CH 1010 and CH 1020.
3. No makeup exams will be given for any reason. Students who have conflicts with official university functions must notify their instructor by Friday January 19. Check your commitments to NCAA sports programs, ROTC or other university groups. Pay particular attention to the time of the Final Exam. Students are expected to resolve travel schedule conflicts and attend the Final Exam. If you miss the Final Exam a grade of zero will be recorded.
4. If you require special accommodations for exams, these must be communicated to your instructor via an Academic Accommodation Letter (AAL) at least one week prior to the exam date. If use of the Test Proctoring Center (TPC) is required, you must schedule a time for your exam at least one week prior to the exam date. It is suggested that you schedule your exams as soon as possible.
5. If errors occur with your exam grade, see your instructor. NOTE: Most grade problems are due to poor erasures, not using #2 pencil, poorly filled out answers, I.D. number, section number, etc.
6. Each exam will cover the material listed in the objectives posted on the class web site, or as modified in class. Attempts will be made to cover most of these in class. Covered or not, these objectives will be subject to examination. Use your textbook; stay at least a half chapter ahead by reading the text and working the problems.

7. Resolve Final Exam scheduling issues before finals week. A student who has more than two exams in one calendar day may request that one of the exams be taken at a different time. The registrar has established a priority as to which course must provide an alternative exam time. The CH 1020 final exam has top priority and cannot be rescheduled. See the registrar's webpage for additional information, www.registrar.clemson.edu/html/examSched.htm.
8. Cancelled lectures: If your lecturer is more than 15 minutes late, you can assume that the lecture will be canceled for the day. However, you are still responsible for the material that would have been reviewed during this period. Check for an email from your instructor regarding the missed material.
9. The last day to drop the course without a final grade is March 16, four days after the second exam.
10. For other problems - First see your instructor. For general questions, see Ms. Kris Coleman in Hunter 219; email: kcolem3@clemson.edu. If necessary, see the Director of General Chemistry, Dr. Dennis Taylor in Hunter 265; email: dftay@clemson.edu.

Make-up Exam Policy

Should a student be unable to take a scheduled exam due to an emergency situation, the student should contact his/her instructor as soon as possible, providing documentation of the emergency. For an excused absence on any major exam, the weight for that exam will be applied to the Final Exam (this is the fairest way to handle absences for everyone concerned, including the absent student). Excused absences include documented student illness and family emergencies.

Should you be unable to take the final exam due to an emergency situation, contact your instructor prior to the exam, providing documentation. A make-up will be scheduled and the student will receive an Incomplete (I) grade in the course. The expectation is that the make-up exam will be completed within 30 days of the beginning of the spring semester.

Attendance Policy

The academic resources of Clemson University are provided for the intellectual growth and development of students. Class attendance is critical to the education process; therefore students are expected to attend class. A student who misses more than four MWF classes (three TTh classes) including exams without a valid excuse may be dropped from the course due to excessive absences. The university attendance policy can be found on pages 27-28 of the *2017-2018 Undergraduate Announcements*.

Two options are available for alerting a student's instructor and the absence whether anticipated or unanticipated. (1) Use the "Notification of Absence" module on the student's tab of Canvas should be used to notify the instructor of the absence. A brief explanation should be included in the notification along with dates and times of the absence. (2) Contact the instructor directly using email. This notification does not serve as documentation of an excused absence.

Any exam that is scheduled at the time of a class cancellation due to inclement weather, power outage, etc. will be given at the earliest possible date, probably the next week. Details will be communicated by your instructor through Canvas and/or your Clemson email. Any assignments due at the time of a class cancellation will be due the next class meeting unless contacted by your instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email or Canvas within 24 hours of the weather related cancellation.

Academic Integrity Policy

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, that instructor will make a formal written charge of academic dishonesty to the Associate Dean of Undergraduate Studies.

Accessibility Accommodations Policy

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

Students who receive Academic Access Letters are expected to meet with their instructor to discuss necessary accommodations. This meeting should take place during the instructor’s office hours as Academic Access Letters are confidential and not to be discussed in a classroom setting. This meeting should be scheduled as early as possible in the semester so that accommodations can be made in a timely manner. It is the student’s responsibility to schedule the meeting and ensure that accommodations are adequate. Attaching an Academic Access Letter to an email message addressed to your instructor is not an acceptable substitute for a face to face discussion with your instructor. Accommodations will be made no earlier than the date that the AAL is presented to the instructor; the AAL is not retroactive.

Clemson University Title IX Statement

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, (864) 656-3181 (voice) or (864) 656-0899 (TDD).

Outside Study Help

Peer-Assisted Learning (PAL) sessions are available to support your success in CH 1020. At these sessions, fellow students who have taken this course in the past offer extra practice with course material as well as tips and tricks for being successful in the course. These sessions are designed to help you study effectively with others who also want to be successful. You are welcome to attend sessions with any PAL leader for the course and even if you do not have a PAL leader attending your section of the class, you still have free support available to you. The scheduled times, locations and peer leaders for CH 1020 are provided on the ASC website under the tab on the right labeled “View PAL Scheduled” (<https://www.clemson.edu/asc/>).

CH 1020 is supported by the Academic Success Center tutoring program. The ASC tutors have completed and done well in this course, and they understand the concepts well enough to help you work through questions you have. The ASC tutoring program is certified by the College Reading and Learning Association, which means that our tutors are trained to share learning and study strategies during tutorial sessions. While tutors will not complete/correct homework for you or help you on take-home tests or quizzes, they will help you understand and reinforce concepts that you are learning in your classes. For more information visit <https://www.clemson.edu/asc/courses/tutoring/index.html>.

If you discover that you would like additional support to meet your success goals for CH 1020, contact the Academic Success Center using their “Request for Course Assistance” form (<http://www.clemson.edu/asc/courses/index.html>). Private tutoring may be available through the Tutor Matching Service. If you feel confident in your abilities in this course after completion, or in other courses you have already completed, please consider signing up to provide tutoring at a pay rate you set for yourself (<http://www.clemson.edu/asc/courses/private-tutoring.html>).

Prerequisites:

The main prerequisite for CH 1020 is a 'C' or better in CH 1010. It is your responsibility to recognize whether or not you meet the prerequisite requirement. If you are found to be missing this prerequisite you will be dropped from the course, even if after the final drop date of January 24 or if your removal from the class drops you below 12 enrolled hours.

We assume that you bring the following skills with you from CH 1010 or its equivalent. If you cannot do these, you must quickly learn them by self study. We may give a pretest the first week of classes to test your knowledge of these topics.

Before beginning this course you should be able to:

1. Define, identify, and/or give examples of:

| | | |
|---------------------|-----------------|---------------------|
| chemistry | matter | mass |
| energy | work | liquid |
| solid | gas | solution |
| chemical properties | chemical change | physical properties |
| physical change | pure substances | mixtures |
| elements | compounds | atoms |
| molecules | density | temperature |

2. Make conversions of quantities using dimensional analysis (include units!).
3. Use the rules for significant figures with numbers in calculations.
4. Use the mole concept to interconvert among mass, moles, number of molecules, number of atoms, volume of gas (using gas laws), density and molarity.
5. Write and balance a chemical equation if given the names or formulas of each reactant and product.
6. Define and calculate: theoretical yield, actual yield, percent yield and limiting reagent; and determine which reactant is the limiting reagent.
7. Identify compounds as ionic or molecular and predict the properties based upon the structure of the compound.
8. Identify elements as metals, non-metals, metalloids and Noble gases, describe their ideal properties, and describe the periodic trends of each of these
9. Predict relative magnitude of the elemental properties of electronegativity, electron affinity, ionization potential, and ionic or covalent radius from the position in the Periodic Chart
10. Use the periodic chart to predict the ionic charge of an element in a compound and write formulas of chemical compounds using ionic charges
11. Draw Lewis structures for covalent compounds and identify bond order (single, double, triple, etc.) covalent bonds in these compounds.
12. Use VSEPR concepts and Lewis structure to predict: a) bond angles b) geometry c) hybridization.
13. Distinguish between intramolecular and intermolecular forces of attraction .
14. Identify the types of intermolecular forces and use them to predict properties of liquids, such as viscosity, surface tension and heat of vaporization.
15. Classify compounds according to their behavior in solution: salt, strong acid, weak acid, strong base, weak base, strong electrolytes, weak electrolytes, non-electrolyte.

16. Distinguish between the system and the surroundings.
17. Apply the 1st Law of Thermodynamics to explain energy transfer (work and/or heat) between the system and the surrounding during chemical or physical changes.
18. Calculate the enthalpy change, ΔH , for a reaction using (a) Hess's Law (b) enthalpies of formation, ΔH°_f (c) bond dissociation energies.
19. Recognize that bond breaking requires energy and bond formation releases energy.

Student Learning Objectives for CH 1020

1. Recognize how changes in enthalpy and entropy affect the spontaneity of a chemical reaction or physical process.
2. Use ΔG to indicate the position and direction of a reaction.
3. Describe the entropy and energy changes that accompany the solution process.
4. Perform colligative property calculations for solutions.
5. Distinguish between zero, first and second order reactions and recognize how changes in reactant concentration affect the different reactions.
6. Relate kinetic information to the mechanism of a reaction.
7. Identify key characteristics of different nuclear reactions.
8. Define what dynamic equilibrium means and how it applies to chemical systems.
9. Calculate equilibrium concentrations.
10. Apply equilibrium principles to acids and bases.
11. Perform pH calculations.
12. Describe the operation of a buffer.
13. Explain the operation of a simple electrochemical cell.
14. Classify by family and name simple organic compounds.

To The Student:

The study of chemistry can be exciting and rewarding when there is a joint effort among students and instructors to continually improve learning. The General Chemistry program has been designed to give you every opportunity to master fundamental chemical concepts, to demonstrate this mastery and earn a good grade in the course.

Learning chemistry can be a challenge: you are confronted with a new language (terminology and symbolism) and you must synthesize new ideas while integrating your previous understanding of basic math and science. Success is a matter of exposure and practice, as any successful chemistry student will tell you. Take advantage of all facets provided for your study of chemistry: the text, lecture, computer software, lab, help sessions and office hours with your instructor. To earn a good grade you must apply yourself in all of these areas. Your goal is to understand the material well enough to answer questions, both numerical calculations and concept questions, with an ease that comes from familiarity with a subject. Read your text, and stay about one half of a chapter ahead of your lecturer. After each lecture go back to your book to reinforce things that were unclear in class. This is important — **do some chemistry every day**. Study of your textbook and attention in class will be most effective if you work with chemistry in small sessions, as opposed to "cramming" right before an exam. Do not expect that just because you go to class and listen that you are learning. You must explore chemistry on your own to make the subject a part of your working knowledge.

Learning is hard work. Make the effort to put in the time necessary to understand chemistry and you will be rewarded. If you fall behind seek help immediately. See your instructor as soon as you feel unsure of your learning so that together you can determine how to fix small problems early to avoid big problems later.