Instructor: Assoc. Prof. David Boucher  
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Lecture Schedule: MTWRF 12:00-1:45 in SSMB 138.

Textbook


Course Description

An introductory course in chemistry emphasizing theoretical aspects and designed primarily for students who intend to take one or more additional courses in chemistry. The major topics covered are elementary classical thermodynamics (entropy and free energy), homogeneous and heterogeneous equilibria, properties of gases, liquids, and solids, theories of solutions and solubility, electrochemistry, acid-base theory and applications, and chemical kinetics. Prerequisites: CHEM 111/111L; MATH 111 or equivalent. Co-requisite: CHEM 112L.

Course Outline

1. Chapter 14  Entropy and Free Energy  
2. Chapter 15  Chemical Equilibrium  
3. Chapter 13  Physical Properties of Solutions; Colligative Properties  
4. Chapter 16  Acids, Bases and Salts  
5. Chapter 17  Acid-Base and Solubility Equilibria, Buffers  
6. Chapter 18  Electrochemistry  
7. Chapter 19  Chemical Kinetics and Catalysis

Office Hours

Dr. Boucher will be available for Zoom office hours after each lecture 2-3 MTWRF. If you would like a one-on-one Zoom help session, please e-mail Dr. Boucher to reserve a block of time during the office hours. If you have a problem attending one of the regular office hour period additional appointments can be made outside regularly scheduled times.

Course Webpages

All important information regarding this course, e.g., exam dates, assignment due dates, etc., will be available on the OAKS webpage. This information includes all announcements and postings, lecture schedule and suggested reading assignments, lecture notes, exam answer keys, handouts.
Messages

**Technical issues:** If you experience technical issues (unable to access material, quiz not opening, etc.) notify Dr. Boucher by using the “Technical Issues” discussion board within the course OAKS page. If you have insight into resolving a technical issue that another student posted in this board, you are encouraged to respond to the post on the discussion board and help out your classmate!

**Course content:** If you have questions about course content or a particular assignment (further clarification on assignment directions) you should post your question in the OAKS discussion board related to that content module, which are listed on the last age of this syllabus.

**Other:** All other comments or concerns regarding the course or personal needs should be directed to Dr. Boucher through email (boucherds@cofc.edu) or by making an appointment to virtually meet using Zoom.

Dr. Boucher will respond within 24 hours to e-mails and discussion board posts sent Monday-Friday, and within 48 hours to discussion board posts and e-mails sent on Saturday or Sunday.

Logistics

A majority of the lectures will be presented in Powerpoint format and the lecture notes will be posted on OAKS. This practice is intended to free your hands and minds to concentrate on the material during the lectures. This practice is also intended to encourage questions as you will not have to worry about writing down everything written on the board. Course handouts, lecture notes, homework sets, and homework solutions will be available on the OAKS course website.

In addition to in-person lectures and exams, all lectures will be synchronously broadcast via Zoom and exams can be taken through the course OAKS page. The lectures will not be recorded and posted on OAKS, so if you choose to use the Zoom option you must attend class at the scheduled time (12:00-1:45). Online exams must also be taken at the same time as the in-person class, and you must be logged on to Zoom and your camera must be turned on. More information about the online exam requirements is given in the “Quizzes and Exams” section of the syllabus.

Because there is an online component for this course, there are a few critical elements required to effectively participate in the course.

**Hardware requirements:**
- Computer with high speed internet access, sound card, microphone and external speakers or headphones.
- Webcam for class participation.

**Software requirements:**
- Consistent and reliable access to high speed internet.
- Adobe Acrobat Reader to view assigned readings.

**Student Resources:**
The College of Charleston has put together an online resource guide for students enrolled in a distance education course. I recommend you take a look at the following link to view some helpful strategies and resources for successfully navigating this online course:

[https://academicaffairs.cofc.edu/distance-education/index.php](https://academicaffairs.cofc.edu/distance-education/index.php)

Learning Objectives

General chemistry provides you with an opportunity to do lots and lots of quantitative (numerical) and qualitative (conceptual) reasoning. General chemistry courses are often referred to as “baby” physical
chemistry because they provide an introduction to the same material that is covered in the upper level physical chemistry courses, i.e., CHEM 341 and CHEM 342. At the end of CHEM 112 you should be able to use the tools of basic mathematics and physics to solve problems in chemistry and biochemistry. If someone poses a question about the physical basis of some chemical phenomenon, you should be able to apply your knowledge to suggest the appropriate theory or model to apply, be able to do the calculations necessary to apply the model and explain what you have done clearly and coherently so the person who asked the question has confidence that you know what it is you are doing. It would also be nice if, along the way, you gain some appreciation for the underlying beauty of the physical world. However, progress on this goal is hard for me to assess, so I’ll leave it up you to decide how you are coming along.

At the end of this syllabus is a detailed list of subjects and knowledge requirements that you will encounter throughout the semester. Listed below are the general (and rather broad) learning objectives for CHEM 112:

1. Describe colligative properties and give specific examples.
2. Explain the concept of equilibrium and apply it to chemical reactions including acid/base chemistry, precipitation reactions, and oxidation-reduction reactions.
3. Define entropy and Gibbs energy. Apply these with respect to chemical reactions and evaluate how these affect the spontaneity of a chemical or physical process.
   a. Apply a kinetic analysis to chemical and physical processes (including rates, mechanisms, and activation energy).
   b. Apply the principles of thermodynamics and equilibrium to electrochemistry.

**General Education Learning Outcomes**

1. Students apply physical/natural principles to analyze and solve problems.
2. Students will develop an understanding of the impact that science has on society.

The General Education Learning Outcomes will be assessed in the Lab Co-requisite course, CHEM 112L

**Attendance Policy and Online Conduct (“Netiquette”)**

Although the instructor will not be keeping a record of attendance, students are expected to attend all classes.

In order to foster a cordial and secure learning environment, please be respectful of your instructor and your classmates. Do not obstruct or disrupt the teaching and learning processes by carrying on conversations on your cell phone or with other students in the class using the chat feature on Zoom. Please keep your microphone muted unless you would like to engage in the lecture or ask a question. Additionally, due to the online environment of this course, we should all strive to meet the same of the basic standards of “netiquette”, which is network etiquette, i.e., the do’s and don’ts of online communication.

**Netiquette: What to Do**

- **Be professional**: Use positive, polite language in your comments about a topic and other people’s comments, both in lecture and on the discussion board.
- **Be polite**: Avoid taking the conversation away from the course content.
• **Be a referrer:** When making a comment, be sure to refer to the lecture text (e.g., “On slide #15...”), the professor’s video lecture (e.g., “At the 4:10 mark of video lecture #10...”), or other course materials.

• **Be clear:** Remember that you are not in the room with your classmates. Any information you want to express needs to be self-evident, particularly on the discussion board.

• **Be a reader first, then a responder:** Before you respond, read the other comments on a discussion board first. If someone else made the point you wanted to make, you can agree with them and elaborate further, expand the idea, take in a different direction, or come up with a different approach altogether.

**Netiquette: What Not to Do**

• **Avoid sarcasm:** It’s difficult to detect online. Remember that you are relying on your words to show the tone you intend. If in doubt, leave it out.

• **Avoid yelling:** ALL CAPS LOOKS LIKE YELLING. As does a lot of punctuation!!!!!!!????? Just as you wouldn’t shout during a classroom discussion, avoid shouting in an online discussion.

• **Avoid unprofessional language:** This includes avoiding texting shorthand, e.g. UR, NP, AF. Also, check your spelling and grammar, and be patient with other’s spelling and grammar.

• **Avoid posting when angry:** If a post or feedback upsets you, take a breath before responding. Re-read your responses carefully before finally posting them. If you aren’t sure, wait a few minutes and then re-read. Once you’ve posted a comment or sent an e-mail their impact cannot be undone (even if the post itself is deleted).

• **Avoid overly long posts:** As the number of posts on a discussion board increases as the week goes on, it’s easier for everyone to participate if posts are clear and to the point so that everyone’s posts can be read in a timely manner.

Exams

Rather than administering infrequent, but extensive, comprehensive exams, the course will utilize more frequent and more concise examinations i.e., the “quiz-like” exams will typically take 10-15 minutes to complete. Exams will consist mostly of multiple-choice questions, but there may be one algorithmic problem as warranted by the material covered in the lecture. The exam questions are “all-or-nothing”, i.e., there is no partial credit awarded. The dates of these short exams will be determined by the pace of the lectures, but you may expect to take an exam every 1-2 days.

Absences from any exam must be arranged in advance. No make-up exams will be given. Students should contact Prof. Boucher as soon as possible regarding scheduling conflicts.

The course is broken down into 6 modules, shown in the table below. Each module consists of nine learning objectives: three Essential Learning Objectives (ELOs) and six Supplementary Learning Objectives (SLOs). A list of the ELOs and SLOs will be provided by your instructor at the start of each module, and there will be 2-3 exams per module that will assess your mastery of the nine learning objectives.
As the name implies, ELOs are the most important topics and concepts that you should master in CHEM112. Evidence of successful mastery of an ELO on an exam is worth 2 points; thus, you can earn a maximum of 6 points if you master all three ELOs. Evidence of mastery of an SLO is worth 1 point; thus, you can earn a maximum of 6 points if you master all six SLOs. As shown on the right, the letter grade scale (GPA) has been partitioned into a 12 point scale, and your letter grade for each module is determined by your ability to provide evidence that you have mastered the three ELOs and six SLOs. For example, (1) if you only master the three ELOs, but no SLOs, the 6 points you’ve earned will give you a C+ (2.30) for that module, and (2) if you master two ELOs and four SLOs, the 8 points you’ve earned will give you a B (3.00). Your pre-final exam grade will be determined by the average grade (GPA) across the six modules, and **these exams will constitute 85% of your final course grade.**

***All exams taken online in OAKS must be taken during the scheduled lecture period. In order for your instructor to “proctor” the exams and quizzes, your camera must be turned on and you must be visible on camera taking the exams and quizzes. ***

**Final Exam**

A comprehensive and standardized final exam is scheduled for Tuesday August 10th at 12:00. The multiple-choice, ACS-style final exam is cumulative over the material covered during the entire semester, and your **final exam grade will constitute 15% of your final course grade.**

Requests for an alternate final exam time must be processed through the Office of Undergraduate Studies no later than 5 p.m. on the last day of class. Failure to take the final exam will result in a grade of "X" which turns to an "F" after 48 hours. Undergraduate students should be aware that excuses for missing final examinations may be obtained from the Office of Undergraduate Studies.

The acceptable reasons for missing final examinations are illness of the student (the student must provide documentation, e.g., an absence memo) or circumstances beyond the student’s control. These reasons must be properly documented. See the section entitled "Final Examinations" in the Undergraduate Catalog for more information. Examinations must be taken at the time scheduled except when [a] two or more exams are scheduled simultaneously, or [b] the student has three examinations within a 24-hour period.
Grading and Assessment

Final grades for the course will be calculated using the following criteria: Average of all module exams = 85% and final exam = 15%. Letter grades will be assigned based on GPA scale shown in the table below.

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<tr>
<th>Grade</th>
<th>GPA</th>
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<tbody>
<tr>
<td>A</td>
<td>4.00</td>
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<tr>
<td>A-</td>
<td>3.70</td>
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<tr>
<td>B+</td>
<td>3.30</td>
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<td>B</td>
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<td>B-</td>
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<td>C+</td>
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<td>C</td>
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<td>C-</td>
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<td>D+</td>
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<td>D-</td>
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<td>F</td>
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The instructor reserves the right to increase a student’s grade if the instructor feels that it is warranted.

Disabilities/Access

The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged.

Student Code of Conduct

The Honor Code of the College of Charleston forbids lying, cheating, stealing, plagiarism, and failing to report an Honor Code violation. The Student Code of Conduct can be found in the Student Handbook.

Science is inherently collaborative. If you go on to work in industrial or academic laboratories you will work with other scientists as a collaborator, as a mentor, and as a student throughout your career. Learning to work effectively with other people is therefore an important part of your undergraduate training. You may choose to work together on homework problems with your classmates, but you should not merely copy out their answers to homework questions. Working together means working together. There are two reasons for this. The first is that you will not really understand how to do the problem simply by copying it out, and understanding the problems should be your chief goal. Secondly, your peers will get tired of your mooching. If you do work with people on your assignments, please include the name(s) of your partner(s) on your work.

When we have exams, you should not talk to anyone during the exam but your instructor.

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.
Incidents where the instructor determines the student’s actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration—working together without permission—is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others’ exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at [http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php](http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php)