Chemistry 192 - General Chemistry II
Course Syllabus
Spring 2019

1. Instructors:

   - Dr. David L. Freeman
     Phone: 874-5093
     Office: 474C Beaupre
     e-mail: freeman@chm.uri.edu
     Office Hours: MWF 11 or by appointment
   - Ben Cromwell
     Office: 355 Beaupre
     e-mail: bcromwell@chm.uri.edu
     Office hour: M 11 in 115 Beaupre or By appointment

2. Scheduling: Lecture MWF 9, 105 Beaupre
   Recitation M 2, 215 Beaupre
   Laboratory Tu 1-3:45, 165 Beaupre

3. Text (lecture): *General Chemistry: Principles & Modern Applications* by Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Madura and Carey Bissonnette, Eleventh Edition, Pearson, 2017

4. Prerequisites: CHM 101 and 102 or CHM 191, at least concurrent registration in MTH 141

5. WWW course home page: http://www.chm.uri.edu/courses/?chm192&1

6. Course requirements:

   (a) Weekly quizzes (almost every Monday during recitation). The lowest two numerical scores will be dropped in determining grades. 200

   (b) Hour Exams:
   1) Wednesday, February 27
   (*No quiz on Monday, February 25*)
   and
   2) Wednesday, April 10
   (*No quiz on Monday, April 8*) 200

   (c) Laboratory 150

   (d) Final exam
   (Wednesday, May 8, 8:00 AM - 11:00 AM) 200

   (e) Total 750

   Grades are to be determined using a combination of an absolute scale and a curve. To pass CHM 192, at least 50% of the points must be earned. To obtain a C- or higher, at least 60% of the points must be earned. The remainder of the grades are determined using a curve. Based on past experience, the median grade tends to be a C. Incompletes are given only for valid medical reasons. A note from a medical professional is required to obtain an incomplete. Quizzes cannot be made up. If a quiz is canceled owing to weather or any other reason, the quiz will be given during the lecture portion of the course on the next date the class meets.

   Chemistry is a laboratory science, and the laboratory portion of this course is essential to mastering the subject. **For the laboratory portion of CHM 192, any student submitting 5 or fewer laboratory reports for grading will receive an F as their final course grade in CHM 192. Students submitting only 6 or 7 laboratory reports for grading will receive 0 points for the laboratory portion of the course. Keep in mind that the laboratory portion of the course represents 20% of the total possible points.**

7. Illness Due to Flu
   The nation is experiencing widespread influenza-like illness. If any of us develop flu-like symptoms, we are being advised to stay home until the fever has subsided for 24 hours. So, if you exhibit such symptoms, please do not come to class. Notify me at 874-5093 or freeman@chm.uri.edu of your status, and we will communicate through the medium we have established for the class. We will work together to ensure that course instruction and work is completed for the semester.

The Centers for Disease Control and Prevention have posted simple methods to avoid transmission of illness. These include: covering your mouth and nose with tissue when coughing or sneezing; frequent washing or sanitizing your hands; avoiding touching your eyes, nose, and mouth; and staying home when you are sick. For more information please view www.cdc.gov/flu or flu.gov . URI Health Services web page, www.health.uri.edu , will carry advice and local updates.

8. Overview:

   As you are all aware, CHM 192 is the second semester of the full year general chemistry course sequence. Most generally, this semester we seek to understand the physical principles that govern chemical reactions. Those principles include understanding the factors that govern how fast reactions occur, the nature of the equilibrium state, and the thermodynamic principles that govern the direction of spontaneous change. Special topics include the behavior of acids and bases, precipitation reactions and electrochemistry.

   As in CHM 191 the course includes 3 lectures per week, 1 recitation section per week and 1 three-hour laboratory period per week. Success in CHM 192 requires that you attend and satisfy the requirements of all three aspects.

   You will receive a separate syllabus for the laboratory portion of the course. The laboratory experiments are designed to illustrate the principles learned in the lecture/recitation parts of the course.

   The lecture and recitation section portions of the course are closely coupled. The recitation section has two purposes. First, with three exceptions, each recitation section will begin with a 15 minute quiz covering the material from the previous week. For those recitation periods having a quiz, after completing the quiz and reviewing the quiz solution, the remainder of the recitation section will be used to solve problems that illustrate the principles of the course.

   Success in CHM 192 requires constant practice in solving problems. To help with such practice, problems sets are to be posted on the CHM 192 web page each week. The problem sets will not be collected and graded, but the problem sets are most helpful if they are treated as if they are to be collected and graded. After a portion of time solutions to the problems sets will also be posted. You are encouraged to try to solve the problems by yourselves before examining the solved problems. Keep in mind that it is far easier to understand a solution to a problem than it is to solve the problem on your own. You will need to solve the problems on your own when taking quizzes and exams.

9. The CHM 192 Web page:

   In this course all problem sets, problem set solutions, quiz solutions and exam solutions are to be posted on the course web page. No paper copies of the problem sets are to be distributed. The URL of our course web page is http://www.chm.uri.edu/courses/?chm192&1 . It is strongly suggested that you link to our web page to obtain the first problem set as soon as possible.

   It is expected that for most of you, success in this course will require some level of help beyond classroom instruction. Because some of you may find it difficult to come to the scheduled office hours, we have installed as part of our course web pages, a page that can be used to submit questions. Questions are submitted by anyone in the class by filling out a form on the web page, and answers are distributed either to the entire class or only to the person asking the question. If the entire class is to receive a copy of the question and answer, the question is treated as anonymous; i.e. the person who asks the question is never identified. In fact, it is possible to submit a question so that even the instructor does not know who submitted the question. Anonymous questions and responses by the instructor are distributed automatically to everyone using the email addresses on ecampus or equivalently Sakai. With ordinary electronic mail, there is a private correspondence between the student and instructor. By using the web page, the entire class has an opportunity to learn from the questions submitted.

   The use of the web page does not preclude personal interaction between any of you and the course instructors. All course instructors have regular office hours, and you are all encouraged to make use of these hours. Alternate meeting times can be arranged by appointment. Additionally, you can contact the instructors by e-mail or telephone. The e-mail address and phone number for the instructors are given on the first page of this syllabus.

   Any student in CHM 192 can submit questions and comments to the instructors. Submission of such comments or questions must be made using the WWW home page for this course. The address (URL) of our home page is http://www.chm.uri.edu/courses/?chm192&1 . You can ask questions related either to the lecture or laboratory portions of CHM 192. To submit a lecture question click on the highlighted text that says "submit a question concerning the lecture portion of the course." For a laboratory question click on the highlighted text that says "submit a question concerning the laboratory portion of the course." Dr. Freeman will answer lecture questions and the TA will answer laboratory questions.

   As an example, suppose a student in our class, Ms. Benzene Ring, wonders, "What is the relation between pH and pOH?" (If you don't know what this means, don't worry. You will understand the question early in the semester). To obtain an answer to her question, Ms. Ring links her web browser (e.g. Chrome, Firefox, Safari or Microsoft Internet Explorer) to http://www.chm.uri.edu/courses/?chm192&1, and she then clicks on the text linking her to the page for questions (i.e. the highlighted text that says "submit a question to the CHM 192 list"). Ms. Ring then enters her e-mail address in

the appropriate box (this is optional) and specifies whether she wants her question to be answered to the entire CHM 192 class or to her alone. Ms. Ring then types in the large box

```
What is the relation between pH and pOH?
```

Ms. Ring then clicks the "send" button. Ms. Ring's question is received by the instructor. One of the instructors then sends an e-mail message to the whole list that might be

```
Subject:  CHM 192 Question
The question is:  What is the relation between pH and pOH?
Answer:  pH+pOH=14.00 at 25 degrees C.
```

Now Ms. Ring and the entire class have an answer to her question.

If the answer to the question can be sent to the entire list, the answer will not indicate who asked the question. If Ms Ring wants to ask the question with full anonymity so that even the course instructors have no idea who asked the question, the e-mail portion of the form can be left blank. Of course, if the e-mail section of the form is blank, the answer must be sent to the list and not just to the sender.

Because many questions may contain mathematical formulas, we need a notation to communicate the special symbols used in the course. To avoid confusion, it is most useful if we agree on the same set of symbols. The symbols that follow are taken from a language called LaTeX. LaTeX is a language that is frequently used to prepare scientific documents, and LaTeX can be used to translate special symbols into simple text characters. By learning LaTeX notation, you will learn a widely used method to communicate mathematical symbols via e-mail. The instructors plan to use these symbols in answering your questions, and it is asked that you use the same symbols in posing questions. The most important symbols are the following:

(a) Greek letters are represented by \ followed by the name of the letter. For example α is typed `\alpha`, β is typed `\beta`, and so on. A Greek letter is made upper case by making the first letter of its name upper case. For example, the letter Δ is typed `\Delta`.

(b) Subscripts are represented by `_{}` where the brackets contain the subscripts. For example, μ_{ij} is typed `\mu_{ij}`.

(c) Superscripts are represented by $\hat{\{\}}$ where the brackets contain the superscripts. For example, β^{12} is typed `\beta^{12}`.

(d) Infinity (∞), is typed `\infty`.

(e) Square roots $\sqrt{a+b}$ are typed `\sqrt{a+b}`.

(f) The arrow in chemical reactions $\rightarrow$ is typed `--->`. For example C+O_2 $\rightarrow$ CO_2 is typed `C + O_{2} ---> CO_{2}`.

10. Course outline:

Topic	Book Chapter
1. Review	4-6
2. Principles of Chemical Equilibrium	15
3. Acids and Bases	16
4. Additional Aspects of Acid-Base Equilibria	17
5. Solubility and Complex Ion Equilibria	18
6. Spontaneous Change: Entropy and Free Energy	13
7. Electrochemistry	19
8. Chemical Kinetics	20
9. Solutions and Their Physical Properties (time permitting)	14
10. Final Exam	Comprehensive