

# Chemistry 192 - General Chemistry II

## Course Syllabus

### Spring 2022

#### 1. Instructors:

- Dr. David L. Freeman  
Phone: 874-5093  
Office: Beaupre 474 C  
e-mail:dfreeman@uri.edu  
Office Hours: MWF 11. Office hours can either be in person or virtual. For virtual office hours, arrangements must be made in advance with the course instructor. The web address for virtual office hours is <https://rhody.webex.com/meet/dfreemanuri.edu>. If you are unable to make normal office hours, please let me know in person or by email so that we can make an appointment.
- Ben Cromwell  
Office: 495 Beaupre  
e-mail: bcromwell@uri.edu  
Office hour: By appointment

#### 2. Scheduling: Lecture MWF 9, 105 Beaupre

Recitation M 2, 215 Beaupre

Laboratory Tu 1-3:45, 165 Beaupre

#### 3. Emergency Scheduling: While we expect to have in-person lectures for the entire semester, nobody can predict the actual course of the Covid pandemic. We need to be prepared for one contingency where I (the instructor) test positive for Covid and cannot come to campus. If I catch Covid, and I am physically able to teach from home, we will have virtual, online instruction. If ill, I will present online lectures at the usual class time using the web link

<https://rhody.webex.com/meet/dfreemanuri.edu>. The same web link will be used if needed for virtual recitation sections as well. If a modification owing to Covid is needed for the laboratory portion of the course, you will be contacted by your TA for details. In all such circumstances, email will be sent to you with detailed procedures.

4. Text (lecture): *General Chemistry: Principles & Modern Applications* by Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Madura and Carey Bissonnette, Eleventh Edition, Pearson, 2017
5. Prerequisites: CHM 101 and 102 or CHM 191, at least concurrent registration in MTH 141
6. WWW course home page: <http://www.chm.uri.edu/courses/?chm192&1>

7. 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, March 2  
(*No quiz on Monday, February 28*)  
and  
2) Wednesday, April 13  
(*No quiz on Monday, April 11*) 200
- (c) Laboratory 150
- (d) Final exam  
(Friday, May 6, 8:00 AM - 10:00 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. If a quiz or exam is missed owing to illness, contact the instructor to arrange an accomodation. If a quiz or exam is canceled owing to weather or any other reason, the quiz or exam 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.**

8. Mask Requirement: The University is committed to delivering its educational mission while protecting the health and safety of our community. While the university has worked to create a healthy learning environment for all, it is up to all of us to ensure our campus stays that way. As members of the URI community, students are required to comply with standards of conduct and take precautions to keep themselves and

others safe. Visit [web.uri.edu/coronavirus/](http://web.uri.edu/coronavirus/) for the latest information about the URI COVID-19 response.

- Universal indoor masking is required by all community members, on all campuses, regardless of vaccination status. **In CHM 192, masks are required for the entire semester.**

- Students who are experiencing symptoms of illness should not come to class. Please stay in your home/room and notify URI Health Services via phone at 401-874-2246.

- If you are already on campus and start to feel ill, go home/back to your room and self-isolate. Notify URI Health Services via phone immediately at 401-874-2246.

If you are unable to attend class, please notify me prior to the start of class at 874-5093 or [dfreeman@uri.edu](mailto:dfreeman@uri.edu).

9. Anti-Bias Syllabus Statement: We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you are a target or a witness of a bias incident, you are encouraged to submit a report to the URI Bias Response Team at [www.uri.edu/brt](http://www.uri.edu/brt). There you will also find people and resources to help.
10. Disability Services for Students Statement: Your access in this course is important. Please send me your Disability Services for Students (DSS) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DSS, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DSS can be reached by calling: 401-874-2098, visiting: [web.uri.edu/disability](http://web.uri.edu/disability), or emailing: [dss@etal.uri.edu](mailto:dss@etal.uri.edu).
11. Academic Enhancement Center: Located in Roosevelt Hall, the AEC offers free face-to-face and web-based services to undergraduate students seeking academic support. Peer tutoring is available for STEM-related courses by appointment online and in-person. The Writing Center offers peer tutoring focused on supporting undergraduate writers at any stage of a writing assignment. The UCS160 course and academic skills consultations offer students strategies and activities aimed at improving their studying and test-taking skills. Complete details about each of these programs, up-to-date schedules, contact information and self-service study resources are all available on the AEC website, [uri.edu/aec](http://uri.edu/aec).
12. 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 a few 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.

13. 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 Brightspace. 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 or Safari) 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:  $\text{pH} + \text{pOH} = 14.00$  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  $\text{\LaTeX}$ .  $\text{\LaTeX}$  is a language that is frequently used to prepare scientific documents, and  $\text{\LaTeX}$  can be used to translate special symbols into simple text characters. By learning  $\text{\LaTeX}$  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  $\backslash$  followed by the name of the letter. For example  $\alpha$  is typed  $\backslash\text{alpha}$ ,  $\beta$  is typed  $\backslash\text{beta}$ , and so on. A Greek letter is made upper case by making the first letter of its name upper case. For example, the letter  $\Delta$  is typed  $\backslash\text{Delta}$ .
- (b) Subscripts are represented by  $\_{} \{ \}$  where the brackets contain the subscripts. For example,  $\mu_{ij}$  is typed  $\backslash\text{mu}\_{} \{ ij \}$ .
- (c) Superscripts are represented by  $\hat{} \{ \}$  where the brackets contain the superscripts. For example,  $\beta^{12}$  is typed  $\backslash\text{beta}\hat{} \{ 12 \}$ .
- (d) Infinity ( $\infty$ ), is typed  $\backslash\text{infy}$ .
- (e) Square roots  $\sqrt{a + b}$  are typed  $\backslash\text{sqrt}\{a+b\}$ .
- (f) The arrow in chemical reactions  $\rightarrow$  is typed  $\text{--->}$ . For example  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$  is typed  $\text{C} + \text{O}\_{} \{ 2 \} \text{--->} \text{CO}\_{} \{ 2 \}$ .

14. Course outline:

<u>Topic</u>	<u>Book Chapter</u>
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. Nuclear Chemistry (time permitting)	25
10. Final Exam	Comprehensive