CHEM 122: GENERAL CHEMISTRY II

Spring 2021 Course Syllabus

INSTRUCTORS

Dr. John S. Hutchinson (MWF-10:00-10:50 am)

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Dr. Lesa Tran Lu (MWF-1:00-1:50pm)

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REQUIRED MATERIALS AND RESOURCES

Course Website: Rice Canvas

To access the course website, log in using your Rice netID.

Texts: *Concept Development Studies in Chemistry 2013*, by J. S. Hutchinson

Chemistry, 2nd ed., by Flowers, et al.

Both textbooks can either be accessed digitally at no cost or purchased as a print copy. Note: Reading assignments will be given for the above texts; however, students are welcome to use any general chemistry textbook as a substitute for Flowers et al., as long as it covers the same material.

Co-requisite: **CHEM 122 and 124 must be taken together**; students receive a single letter grade for both courses based on the combined point total (see "Grading" below). Refer to the CHEM 124 syllabus for information on that course.

Note: Any student with a disability requiring accommodations in this class should contact the Rice Disability Support Services (DSS) Office and notify the instructors during the first two weeks of the semester. All discussions will remain confidential.

TOPIC SCHEDULE

Unit I - Properties of Gases and Chemical Kinetics

- o The Ideal Gas Law and Dalton's Law of Partial Pressures
- o Deviations from the Ideal Gas Law, Kinetic Molecular Theory
- o Reaction Rate Laws, Reaction Mechanisms, Collision Theory, Arrhenius Equation
- o Catalysis and Enzymes

Unit II – Chemical Equilibrium, Thermodynamics, Phase Equilibrium

- o Law of Mass Action, Reaction Quotient, and Le Chatelier's Principle
- o Phase Transition, Intermolecular Forces, Vapor Pressure, Phase Diagrams
- o Entropy, Gibbs Free Energy, Spontaneity, Temperature Dependence

Unit III – Examples of Chemical Equilibrium: Acid-Base Reactions, Solubility, Solutions

- o Acid Strength, Acid-Base Equilibrium, Polyprotic Acids, Buffers, and Titrations
- o Ideal Solutions, Raoult's Law, and Colligative Properties

Unit IV – Electrochemistry

- o Galvanic Cells and Nernst Equation
- o Batteries and Electrolysis

GENERAL NOTES

- This course is based on the concepts of student centered active learning. This means we will create the environment for you to learn, and we will work very hard to help you learn, but the real work of learning is your responsibility. This means you must do the work before class, during class, and after class.
- You will be responsible for keeping up with all reading, assignments, and laboratory work so that you can participate in discussions of the material during class.
- You are strongly encouraged to work and study in groups. Experience indicates that group study is one of the most critical ingredients in effective learning. Note, however, that you must turn in your own assignments. Plagiarism, copying of other student work, and any form of academic dishonesty committed on any assignment or exam in this course is considered a violation of the Rice Honor Code. The Honor Pledge should be written in full and signed on all exams and is implied for all assignments. Please speak with the instructors if you are unclear of any course policies regarding the Honor Code.
- You are encouraged to use the support and resources provided by your teaching assistants (TAs). All TA contact information, including office hour schedules, will be available on the course website.
- This semester the instructors will be conducting a study looking at teaching and learning. The purpose of this study is to determine the factors that influence teaching effectiveness and learning. Your participation in this study will last for the duration of the current semester and will entail activities no different from the regular activities you would otherwise engage in as part of the course. Please contact the course instructors if you would like more information or if you would like to opt out of the study.

ASSIGNMENTS

- **Reading** will be assigned every day. You will be responsible for keeping up with the reading so that you can participate in discussion of the material during class.
- **Class participation** is expected. This includes answering in-class discussion questions, both via chat and verbally, both ofwhich will count towards extra credit points (see the Grading section).
- **Online homework** will generally be assigned weekly on Canvas on Mondays, and each will be due the following Monday at 9:00 am. Late submissions will not be accepted, but your lowest homework score will be dropped when calculating your course homework average.
- **Problems of the Week for Exam Review (POWER) sets** are ungraded but highly recommended assignments that contain suggested problems covering concepts covered in class any given week. You are encouraged to discuss the POWER sets with your classmates, TAs, and instructors. They will generally be assigned every Wednesday morning on the course website. Students can elect to submit their work to their assigned TAs for feedback in class each following Wednesday, when the answer key will also be made available on Canvas. TAs reserve the right to not review student work that has been submitted late. You may also review the POWER sets with the instructors and TAs at their office hours.
- You are strongly encouraged to work and study in groups. Experience indicates that group study is one of the most critical ingredients in effective learning. We know this is more difficult in an online class environment, but the online environment makes group study even more important.

EXAMS

- **There will be three unit exams and a cumulative final exam** on the following dates:

First Unit Exam	Tuesday, February 8	7:00PM – 9:00PM
Second Unit Exam	Thursday, March 10	7:00PM – 9:00PM
Third Unit Exam	Thursday, April 14	7:00PM – 9:00PM
Final Exam	TBA by Registrar's Office	

We anticipate that, by the date of the first midterm exam, all students will be present in-person. However, if you are required to remain 100% Remote in a distant (non-US) time zone, we will schedule alternate times for the exams based on your time-zone. It is your responsibility to confirm your exam time with the class coordinator.

- **All exams are mandatory; no grades will be dropped.** Exams include material from both the lectures and the laboratories. Exam policies will be posted on the course website in advance of each exam date.
- **The Final Exam will be comprehensive** and will be three hours in length. If you demonstrate on the Final Exam that you have improved your mastery of material covered on an earlier unit exam, you can earn "redemption points," effectively reclaiming credit lost on the earlier exam (see the Grading section).
- **The grading of exam questions** is based on what is actually written down on your original exam paper. The grader should be able to determine and follow, without guessing, the logical steps used in your written work to answer the question. For free-response questions, show all work for full credit. Proper reasoning, when clearly demonstrated, will earn significant amounts of partial credit, even in the event of small mathematical errors.
- **Late Policy**: Students who fail to begin the exam during the time of an exam may take the exam, but they will have to complete their exams at the same time as the rest of the class. To avoid this time penalty, be sure to pay attention to time!
- **If you have a conflict** with an exam time due to work, another class, or a university-sponsored activity, you must give the instructors at least one week advance notice. We expect you to email us your schedule so that we can arrange an alternate time for you to take the exam. If you do not give advance notice, we will expect you to take the exam at the scheduled time on the day of the exam. In case of a sudden illness or personal emergency, you must contact the instructors as soon as possible (no later than the day of the exam) via email to reschedule the exam.
- **You may request a regrade** of any part of a unit exam in which a grading error has occurred, such as clerical errors or failure to give credit for a clearly correct answer. See Canvas for details on policy and submission. Note that an exam that has been marked or altered in any way after exam grading cannot be submitted for a regrade. Final exams cannot be regraded, but clerical errors will be corrected.

GRADING

- **Grading scale:** Your course grade will be determined from your cumulative performance on the following items and grades will be assigned based upon the following percentage cutoffs:

Note: Your grade will depend only on your scores and not on the class average. Grading is not comparative or competitive: there is no "curve."

Item	**%**	**Letter Grade Cutoffs**	
Unit I Exam	15	A-	90%
Unit II Exam	15	B-	78%
Unit III Exam	15	C-	66%
Final Exam	25	D-	54%
Homework	5		
CHEM 124 Performance	25		
Total	**100**		

- **Extra Credit:** You may earn additional credit up to 5% of your course grade for in-class discussion question participation and other extra-credit course assignments. More details regarding extra credit opportunities will be announced in class or on the course website throughout the semester.
- **Exams and laboratories are required.** Failing to take an exam due to an inexcusable reason, to make arrangements for a missed exam, or to notify the instructors of your absence from an exam within the day of the exam will result in a score of zero points for that exam and will forfeit your eligibility to earn redemption points for that exam. All laboratories are mandatory; any unexcused absence will result in a score of zero for that report. **See the CHEM 124 syllabus for details on the laboratory attendance policy.**
- **Redemption points:** On the Final Exam, you will have the opportunity to earn "redemption points" for points lost on the unit exams. The Final Exam is cumulative and contains sections corresponding to the material covered on each unit exam. If your performance on the corresponding section of the Final Exam is a higher percentage than what you earned on your unit exam, your score will be adjusted up to the higher percentage by adding redemption points to your unit exam score. A maximum of 100 redemption points can be earned on the Final Exam. You cannot lose points through the redemption mechanism.
- **No-Fail Contract:** An optional "no-fail" contract is available for this course. If you choose this option, you must agree, under the Rice Honor Code, to abide by specific study practices. Students who successfully complete the contract are guaranteed to pass the course. Specific details are in the contract, which you may obtain from the course website.

HONOR POLICY

- **Rice Honor Code:** In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. Students are required to use proper citations and follow other practices outlined in the Rice Honor Code information on Academic Fraud and Acknowledgement of Sources (see http://honor.rice.edu/honor-system-handbook/).
- All submitted assignments, including exams, must represent your own work.
- Plagiarism, copying of other student work, and any form of academic dishonesty committed on **any** assignment or exam in this course is considered a violation of the Rice Honor Code. The Honor Pledge should be written in full and signed on all exams and is implied for all assignments. Please speak with the instructors if you are unclear of any course policies regarding the Honor Code.
- Although you are encouraged to discuss the homework with fellow students, TAs, and instructors, you must turn in your own work in accordance with the Rice Honor Code. For example: in a group you can discuss what the question is looking for and reach a consensus about the correct approach, but then you must individually solve and submit your answer, rather than submit a collective answer.

Direct questions and comments about this syllabus or the class in general to lesa@rice.edu or jshutch@rice.edu. Last modified January 3, 2022.