Lecture CHEM1123
Lab CHEM1121L
UNIVERSITY CHEMISTRY II
SPRING 2024

Class Time and Location: Monday – Friday (12:52p.m. – 1:57p.m.)
Room #209 (Cossatot River High School Campus)
Instructor: Mr. Nichalas DePriest
Office Location: Room #209 (Cossatot River High School Campus)
Office Hours: Tuesday – Friday (1:57p.m. – 3:07p.m.) by appointment.
Contact Information:
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Prerequisite: Successful completion of University Chemistry I – CHEM1103 and the lab CHEM1101L

Resources

Textbook: Chemistry, Eighth Edition, by Steven S. Zumdahl. Lexington: D. C. Heath and Company, 2010. ISBN 978-0-547-12532-9
(*Older editions of the text will likely serve you well as they do not change much from one edition to the next*)

Required Materials:

1. Lab Safety Goggles
2. (optional) Study Guide: Study Guide for Chemistry, Second Edition, Steven S. Zumdahl, by Pal B. Kelter. Lexington: D. C. Heath and Company
3. Laboratory notebook
4. Calculator capable of roots, exponents, and logarithms.
5. Miscellaneous pens, paper, and pencils.

Course Description: University Chemistry is designed as a two-semester course. CHM 1123 is the second semester of that course. It reinforces the concepts learned in CHM 1103 in topics including chemical kinetics, electrochemistry, chemical and acid/base equilibria. Concept building will be stressed and problem solving skills will be applied to a great extent in this area. These topics will be reinforced with laboratory work.

Program Outcomes: The knowledge and critical thinking skills acquired in the general education component enable students to analyze problems, to arrive at intelligent conclusions, and to make reasoned choices in their professional and personal lives.

- Use analytical and reasoning skills to solve practical problems based on structure-property relationship.
- Develop critical thinking and research skills based on basic laws of nature and chemistry

Rationale: Through the study of chemistry, problem solving experiences, and laboratory activity, the student develops an understanding of matter and the laws that explain the interactions between matters, including the energy changes involved.

Course Objectives: Upon completion of University Chemistry II, the student should be able to:

1. Understand the solubility and solution composition using the controlling factors affecting them.

2. Know the different colligative properties and their dependence on solute present.

3. Understand the concept of kinetics of a reaction by applying rate laws. Perform related calculations based on the information from the rate laws.

4. Understand equilibrium constant and the equilibrium expression and apply them to solve problems quantitatively and qualitatively.

5. Compare pH of strong and weak acids and bases and compare acidic and basic properties of salts and oxides.

6. Understand and perform titrations between acids and base involving pH measurements applying common ion effect.

7. Establish relation between solubility and solubility product constant.

8. Understand and develop a relationship among three fundamental quantities of thermodynamics.

9. Understand the concept of electrochemical reactions as redox reactions and develop a working formula of a fuel cell through half reactions.

10. Working knowledge implies not only the ability to discuss and perform pencil and paper exercises involving the topic, but also to be able to conduct laboratory investigation into the topic.

Topical/Unit Outline:

I. Properties of Solutions:
A. Solution composition
B. Energies of solution formation
C. Factors affecting solubility
D. Vapor pressure of solutions
E. Boiling point elevation and freezing point depression
F. Osmotic pressure
G. Colligative properties of electrolyte solutions
H. Colloids

II. Chemical Kinetics:
A. Reaction rates
B. Rate laws
C. Integrated rate laws
D. Reaction mechanisms
E. Activation energy and transition state
F. Catalysis

III. Chemical Equilibrium:
A. Equilibrium condition
B. Equilibrium constant
C. Equilibrium expression involving pressure
D. Heterogeneous equilibrium
E. Application of equilibrium constant
F. Solving equilibrium problems
G. Le Chatelier's principle

IV. Acid-Base Theory:
A. Nature of acids and bases
B. Strong and weak acids
C. The pH scale
D. Calculation of pH of strong and weak acids
E. Calculation of pH of strong and weak bases
F. Polyprotic acids
G. Acidic and basic properties of salts
H. Acidic and basic oxides
I. Lewis acid-base model

V. Acid-Base Equilibrium:
A. Common ion effect
B. Buffer solutions
C. Buffering capacity
D. Titrations and pH curves
E. Acid base indicators

VI. Solubility and complex ion equilibria:
A. Solubility product and solubility product constant
B. Calculation of solubility from K_{sp}

VII. Thermodynamics
A. Spontaneous process and entropy
B. Entropy and 2nd Law of Thermodynamics
C. Effect of temperature
D. Free energy
E. Entropy change in a chemical reaction
F. Free energy and chemical reaction
G. Free energy and pressure
H. Free energy and equilibrium
I. Free energy and work

VIII. Oxidation/Reduction and Electrochemistry:
A. Balancing oxidation/reduction equations
B. Galvanic cells
C. Standard reduction potential
D. Cell potential, electrical work, and free energy
E. Batteries
F. Fuel cells
G. Electrolysis and electroplating

Course Conduct: The class will be taught using a combination of lecture using *Powerpoint* presentation, solving in-class questions, demonstrations, group interaction and discussions, and performing laboratory

experiments. Students are strongly encouraged to discuss concepts and examples as opportunities are presented during instructor presentation. It is the student's responsibility to inform the instructor when a concept is confusing or otherwise unclear. Students must answer all the in-class questions before leaving the classroom and discuss with the instructor about any confusing concept right away.

You are encouraged to solve problems forming a study group and actively taking part in discussion. You may seek assistance from Student Support Services (SSS) or Learning Enrichment Advising Center (LEAC) to check the concepts in homework assignments, quizzes, and exam reviews but it is not the responsibility of SSS or LEAC to teach the entire lesson to complete your homework, neither can you directly ask for the answer. In case of extreme difficulty, you must inform me no later than two weeks after the classes started. You cannot pass the course without completing the homework. Expect a minimum of 12 hours of work on this class

UA Rich Mountain Credit Hour Calculator: For every course credit hour, you should expect to spend at least three clock hours per week of concentrated attention on course-related work, including but not limited to time attending class, as well as out-of-class time spent completing homework, seeking help from instructor or tutors, preparing for upcoming quizzes/tests/exam, reviewing material, problem solving, and organizing your notebook. For a four hour course, a typical student should expect to spend at least twelve hours per week dedicated to this course. This includes the time spent in class. Please see credit hour calculator attached to end of syllabus.

Course Requirements/Evaluation:

- Major tests - 60% - will be announced at least 2 days in advance
- Laboratory reports - 25% - Late Labs NOT accepted for any reason
- Quizzes – 15% - One low quiz grade will be dropped every grading period

Homework will not be counted but it is expected that you complete the homework daily. You will be provided with solutions to all the problems and it will be up to you to come to me with any questions you have regarding those problems. If you don't work on the homework regularly, you will not do well on the quizzes.

Quizzes will mimic the homework and can cover any homework that was to be done by the day we have the quiz. Some of the quiz problems will be copied directly from the homework and others will be the same with different numbers used.

Labs are taken very seriously so you need to follow a specific format. If you don't follow the format in the write up instructions provided, you will get a 50 and the lab will be returned to you ungraded. Late labs are NOT accepted but one lab grade is dropped every semester. The laboratory notebook is designed to organize students' graded lab reports. The lab notebook should be brought to class the day before and the day of the laboratory experiment. **This notebook is mandatory.** If a student is missing more than one lab each term, they will be given an "incomplete" until this deficiency is corrected.

Class Procedures/Student Requirements:

Assignments: A calendar will be issued every unit with all assignments listed. It is the students' responsibility to keep up with the calendar and anything listed on it. Any changes that need to be made to the calendar will be announced in class. A calendar will also be available on the website.

Absences and Make-up Work: According to the school handbook, students have one day for every day absent to make up missing work. I will only make exceptions in the event of extenuating circumstances. Students will also be responsible to take any quiz or test scheduled **on the day they return** from an absence if no new material was covered in regards to that quiz/test. Students who actually miss quizzes and tests need to expect to make them up **on the day they return** during lunch, before school, or after school. The student handbook states that 8 unexcused absences within a semester will result in a failing grade for the course.

Tardiness: You will be counted tardy if you are not in class when the bell rings. After 5 minutes, you will be counted absent. I am an instructor who takes tardiness seriously and make no exceptions without a pass or an admit from the office.

Study Habits - The material in this course must be studied and learned daily as it is presented because the units build upon one another. Students should spend at least 5 hours a week studying outside of class. The actual amount of time spent will depend upon each student's background. If a student does not understand a concept, he or she should see me as soon as possible.

Academic Dishonesty: It is expected that each student shall do his/her own work on class works, quizzes, exams, and lab reports. Cheating, copying other's answers, writing other's statement without citing their reference are all considered plagiarism and are penalized from allowing no points in that particular unit up to dismissal from the whole course, depending on the severity of the offense. ***Use of AI tools to help with or complete assignments will not be allowed.***

Disability Policy: It is the policy of UA Rich Mountain to accommodate students with disabilities, pursuant to state and federal law. Any student with a disability who needs accommodations should contact the Vice President for Student Affairs Office, 394-7622, ext. 1460.

Title IX and Discrimination Policy: UA Rich Mountain adheres to a policy that enables all individuals regardless of race, color, gender, national origin, age, religion, sexual orientation, veteran's status, or disability, to work and study in an environment unfettered by discriminatory behavior or acts. Harassment of an individual or group will not be condoned, and any person (student, faculty, of staff member) who violates this policy will be subject to disciplinary action.

Harassment that is considered discriminatory includes actions or conduct (verbal, graphic, gestural, or written) directed against any person or group with the intent to demean or create a hostile or threatening environment. It is not the intent of this policy to infringe upon or limit educational, scholarly, or artistic expression. Any person who believes he or she has been discriminated against should contact the Title IX Coordinator to obtain assistance and information concerning the filing of a complaint.

Attendance Policy: For attendance purposes, a student who is displaying symptoms of illness must email: contact.tracing@uarichmountain.edu to determine next steps for an excused absence related to COVID or flu. Contacting an instructor DOES NOT start this process or guarantee an excused absence.

Arkansas Clean Air Act: In compliance with the Arkansas Clean Air Act, UA Rich Mountain is a smoke and tobacco free facility. Students and guests are to refrain from the use of all tobacco products while on campus.

Student Misconduct: Students committing misconduct are subject to disciplinary sanction(s) and/or restrictions. Misconduct or prohibited behavior includes, but is not limited to endangerment, harassment, disruption, sexual misconduct, illegal drugs and/or alcohol, fire or safety issues, gambling, property violations, computer violations or other violations as listed in the UA Rich Mountain catalog.

Food and Drink: Food and drinks, including water are not allowed in the classroom at any time.

UA Rich Mountain Mission: UA Rich Mountain provides transformative education to all learners.

Campus Security: UA Rich Mountain strives to provide a safe learning environment; therefore, students who know of any security risk are asked to contact a college official. For more information follow this link and look under the title Health and Safety: http://www.uarichmountain.edu/at-a-glance/disclosures

During the semester, due to unforeseen circumstances, it may be necessary to add to or delete from this document. This will only be done with adequate notification to the students affected.

Credit Hour Requirement Calculator				
Course Information				
Department, Course Number	CHM 1123 – lec CR1			
Course Title	University Chemistry II			
Credit Hours	4			
Mode of Delivery	Traditional			
Weeks in Part of Term	15			
Level of Reading Material	Advanced/Scientific/Technical (2)			2
Reading Level of Students	Average Student (2)			2
Average Pages per Hour	10			
		Enter either week or term, not both		
Contact Hours		**Hours/Week**	**Hours/Term**	**Total Hours**
Lecture/Recitation			46	46
Lab Contact Hours			22	22
	Pages Asg'd	**Hours/Week**	**Hours/Term**	
Syllabus Items				
Reading	380			38
Assignment		1		15
Quiz		1		15
Researching Lab questions		2		30
Reviewing for exams			10	10
				0
				0
				0
				0
				0
Total Hours				176
Required Hours				150
Difference				Ok + 26