PRINCIPLES OF CHEMISTRY CHM 134
Spring 2020

Class Time and Location: Lecture: MW 12:30 - 1:45, **Lab:** W 2:00 - 4:00, **Room:** S235
Instructor: Gaumani Gyanwali – Ph. D.: OSU-Stillwater; MS, BS: Tribhuvan University
Office Location: S244
Office Hours: Posted on the office door
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Prerequisite: A grade of 'C' or better in Elementary Algebra.

Resources:

Textbook: Chemistry Tenth Edition, by Karen Timberlake. New York: Pearson Benjamin Cummings, 2009 *ISBN 978-0-13-603522-0*

Required Materials:

1. Laboratory Manual: Principles of Chemistry Lab Manual, Gaumani Gyanwali, UA Rich Mountain, 2016 (Revised: December 2018)
2. Lab Safety Goggles
3. Calculator capable of roots and exponents
4. 2½ inch binder divided into three sections – In-class, Assignments, Exams.

Course Description: This is an introductory course in chemistry designed to meet the needs of students in nursing, home economics, and other non-science majors. This course may not be taken for credit after successful completion of CHM114.

Program Outcomes: The purpose of the Associates of Arts Program is to provide the student with the knowledge and critical thinking skills that will enable them to analyze problems, arrive at intelligent conclusions, and make reasoned choices in his or her professional and personal life.

- Students will demonstrate an understanding of physical and chemical principles.
- Students will demonstrate an understanding of one-step mathematical calculations and applications.
- Students will apply technological skills to identify, locate, and process information.
- Students will be prepared academically upon transfer to a four-year institution.

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

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

1. Make a variety of measurements using the Systeme Internationale (SI) units.
2. Use dimensional analysis to convert units and to solve problems in general. (Components: analyze, evaluate, and interpret data)
3. Demonstrate a working knowledge of modern atomic structure as it relates to periodicity demonstrated by the elements on the Periodic Table.

4. Name and write the equations for ionic and covalent compounds, and balance equations involving these compounds. (Components: critical thinking skills, compare and contrast)
5. Perform chemical calculations involving the amount of reactant and product. (Components: calculate, correlate, compare, solve problems)
6. Demonstrate a working knowledge of the different types of chemical reactions.
7. Demonstrate a working knowledge of the composition of solutions and the reactions that take place in solution. (Components: calculate, correlate, compare, solve problems)
8. Demonstrate an understanding of gases and the gas laws both mathematically and conceptually. (Components: calculate, correlate, distinguish, solve problems)
9. Demonstrate an understanding of chemical bonding.
10. Describe difference between the properties and examples of acids and bases, calculation of pH values. (Components: calculate, identify, apply, compare, solve problems)
11. Demonstrate a working knowledge of basic organic chemistry including hydrocarbons and substituted hydrocarbons. (Components: differentiate, comprehend, classify, logical arguments)
12. Perform experiments designed to reinforce the concepts, derive conclusions, and prepare a lab report. (Components: collaboration, data collection, calculation and formulation, proper grammar and format, documentation, logical argument, hands-on skills)

Topical/Unit Outline:

I. Measurements:
A. Scientific Methods
B. Systeme Internationale
C. Conversion Factors
D. Scientific Notation
E. Significant Figures
F. Density
II. Energy and States of Matter:
A. Temperature
B. Heat
C. States of matter
III. Atomic Structure and Periodic Table
1. Atomic Structure
A. The atom
B. Atomic number and mass number
C. Isotopes
D. Atomic energy levels
E. Electron Energy levels
2. Periodic Table
A. Classification of Matter
B. Elements and symbols
C. The Periodic Table
D. Metals, Non-metals, and Metalloids
E. Periodic Trends: Atomic Size and Ionization Energy
IV. Chemical Bonding:

A. Valence electrons
B. Octet rule
C. Ionic and Covalent bonds
D. Naming ionic and covalent compounds
E. Polyatomic ions
F. Electronegativity

V. Chemical Quantities and Reactions:

A. The Mole
B. Molar Mass
C. Chemical changes
D. Balancing chemical equations
E. Types of chemical reactions
E. Calculations using Mole concept

VI. Gases:

A. Kinetic Molecular Theory of Gases
B. Gas Pressure
C. Boyle's Law, Charles law and Avogadro's Law
D. Ideal gas law

VII. Properties of Solutions:

A. Solutes and solvents
B. Solubility
C. Concentration
D. Dilution
E. Colloids
F. Osmosis and Dialysis

VIII. Acids and Bases:

A. Bronsted-Lowry acids and bases
B. pH scale and calculations
C. Buffers
D. Acid-Base titrations

IX. Nuclear Radiation:

A. Radioactivity
B. Nuclear equations
C. Measuring Radiation
D. Half-life
E. Medical applications
F. Fission and Fusion

X. Organic Chemistry:

A. Properties of organic compounds
B. Formulas
C. IUPAC naming system
D. Alkanes, Alkenes, Alkynes
E. Isomers
F. Aromatics
G. Alcohols

Tentative Schedule for Lecture: Principles of Chemistry

Week	Topics/Activities by Book Chapter	Date/Day
1	Discuss syllabus; Survey, Measurement	1/13 M, 1/15 W
2	Energy and States of Matter Atomic Structure	1/20 M 1/22 W
3	Atomic Structure and Periodic Table	1/27 M, 1/29 W
4	Periodic Table/Review	2/3 M, 2/5 W
5	**Test 1** Chemical Bonding	**2/10 M** 2/12 W
6	*Winter Break (no class)* Chemical Bonding	*2/17 M* 2/19 W
7	Chemical Quantities and Reaction	2/24 M, 2/26 W
8	Chemical Quantities and Reaction/Review **Test 2**	3/2 M **3/4 W**
9	Gases	3/9 M, 3/11 W
10	Properties of Solution	3/16 M, 3/18 W
11	*Spring Break (no class)*	*3/23M - 3/27F*
12	Acids and Bases	3/30 M, 4/1 W
13	Acid and Bases/Review **Test 3**	4/6 M **4/8 W**
14	Nuclear Chemistry	4/13 M, 4/15 W
15	Organic Chemistry	4/20 M, 4/22 W
16	Review **Test 4**	4/27 M **4/29 W**
17	**Final Exam**	**5/6 W**

Tentative Schedule for Lab: Principles of Chemistry Lab Manual, Author: Gaumani Gyanwali

Date	Activities	Page # lab manual
1/15	Safety: turn in safety quiz and safety agreement	
1/22	1. Measurement	4
1/29	2. Density	14
2/5	3. Specific Heat of Metals	24
2/12	4. Energy from Foods	34
2/19	5. Flame Tests for Salt Solutions	44
2/26	6. Ionic and Covalent Compounds	52
3/4	Make-up *(need to notify one week ahead)*	
3/11	7. Chemical Reactions	60
3/18	*8.* Empirical Formula of Compounds	70
3/25	*Spring Break (no lab)*	
4/1	9. Charles's Law: Volume Temperature Relations	80
4/8	10. Titrations of Acids and Bases	88
4/15	11. Organic Compounds: Alkanes and Functional Groups	98
4/22	Make-up *(need to notify one week ahead)*	

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) to check the concepts in homework assignments, quizzes, and exam reviews but you cannot 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 (Grading):

Your grade for this course comes from 4 tests (100 points each) after completion of two or three chapters, one comprehensive final exam in the finals week (100 points), ten assignments (10 points each), ten quizzes (10 points each) and eleven laboratory reports (20 points each).

Four tests @100 each = 300 (lowest one dropped when taken all four)
One Final Exam @ 100 = 100
11 Lab reports @ 20 each = 200 (lowest one dropped after submitting all eleven)
10 Quizzes @ 10 each = 100
10 Assignments @ 10 each = 100
Total points possible = 800

The final grade for the course will be determined by dividing the student's total number of points earned by the number of possible points. Grades are assigned on the basis of the following percentage scale, after rounding the calculated percentage to the nearest whole number:

90-100	**A**
80- 89	**B**
70- 79	**C**
60- 69	**D**
<60	**F**

Class Procedures/Student Requirements:

<u>On-Campus Resources:</u> Your student portal will be populated with the lecture slides for each upcoming chapter. If you wish to bring the printed lecture slides to class and write notes on

them, you will need to print the lecture slides of the chapter. I will not bring the printed copies to class just because it is too much waste of paper. Computer labs with printers are available in several places on campus including the Johnson Learning Commons. UA Rich Mountain offers students assistance with quality tutors available in the Student Support Services and Learning Enrichment and Advising Center in the Johnson Learning Commons.

tutor.com provides 5 hours of free tutoring online for each UA Rich Mountain student per semester. Johnson Learning Commons has contract with this online site where personal tutors are available 24/7. Create an account and get help personally from home or anywhere if internet access is available. Follow the link to log in www.tutor.com/uarichmountain

Attendance Policy: Regular attendance and punctuality are expected. It is the responsibility of the student to initiate arrangements for all missed activities. If an absence is a planned absence the student is expected to make arrangements for making up work prior to the absence. More than three absences will be considered excessive and, along with work not made up, may adversely affect the grade for the course. Under no circumstances will the student receive credit for the course if more than a fourth of the classes are missed (13 classes). In case of extended illness, or other circumstances, the student must contact the instructor if a WP is desired. If the instructor is not notified a failing grade will be assigned for the course. Laboratory work is scheduled for a specific time and day. However, if it can be done safely (guidelines provided in class), students may do the missed laboratory works at another time if course schedule conflicts dictate. Each student is expected to participate in the required laboratory time in order to receive credit for the laboratory activity. There will be no designation of excused or unexcused absences in the lab. If a student is not in lab they will be counted as absent no matter what the reason may be. Also, if the student is present in lab but fails to submit the lab report, it is counted as absent and no point will be awarded for that lab.

Assignment Due Dates: Students are expected to submit the assignments and other works on or before the assigned due dates. You will be penalized for the late works depending on the number of days and full point and importance of the works assigned. Lab reports will be due the next week of the lab period.

Make-up Work Policy**:** Make up work should be competed promptly after the absence. A maximum of one week will be the guideline. Make-up exams are given only in instances of the most unavoidable, serious circumstances. Prior notice of absence from an exam is expected. Upon return after an absence the student is expected to be prepared for the days' class activities. It will be the student's responsibility to obtain the assignment for that day. Missed labs must be made up during assigned make-up days. If not made up, no grades will be assigned for that lab. There are two make-up days available during the semester. See the lab schedule for available make-up days.

Cell Phone Policy**:** Turn off your cell phone prior to class. If you work for an emergency service such as a fire department, put it on vibrate. It is a sign of disrespect as well as a disruption if non-emergency calls are taken during class. If you chose to take a call anyway, leave the room and take your supplies with you. You are expected not to return that session.

Extra Credit Opportunity: Optimum student involvement in the course as well as course-related activities is highly recommended and rewarded with extra credit. The value of extra credit points varies with the nature of the activity and the application of that activity in the real life as well as relation of the activity with the course. Points that can be received are unlimited. Simple idea is: the more you are involved in real life science experiences, the more you understand and enjoy it, and you get good grades!!! Some examples of activities (but not limited to) that earn extra credit points include:

a) Being an active member of the Science Club coordinated by the instructor
b) Organize activities within the Science Club or participate actively in the activities organized by the Club
c) Taking leadership in group study sessions and manage study sessions with peers
d) Organize or be involved in science and technology awareness activities and helping society to improve utilizing science knowledge
e) Actively participating in science-related meetings and conferences on/off campus
f) Any other science related activities and duties beyond the demand of the course deemed worthy of extra credit by the instructor

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 point in that particular unit up to dismissal from the whole course, depending on the severity of the offense.

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-Chancellor for Student Affairs Office, 394-7622, ext. 1400.

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.

UA Rich Mountain Mission: University of Arkansas Rich Mountain exists to provide all residents of the Ouachita Mountain Region with exemplary educational and enrichment opportunities to improve the quality of life and standard of living.

Credit Hour Requirement Calculator				
Course Information				
Department, Course Number	CHM 134			
Course Title	Principles of Chemistry			
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			45	45
Lab Contact Hours			24	24
	Pages Asg'd	**Hours/Week**	**Hours/Term**	
Syllabus Items				
Reading	350			35
Assignment		1		15
Online Quiz		1		15
Researching Lab questions		2		30
Reviewing for exams			10	10
				0
				0
				0
				0
				0
Total Hours				174
Required Hours				150
Difference				Ok + 24