# PRINCIPLES OF CHEMISTRY CHEM 1053 (Lecture)

Spring 2021

**Class Time and Location:** MW 8:00 - 9:20 AM, **Room:** S235
**Instructor**: Gaumani Gyanwali – Ph. D.: OSU-Stillwater; MS, BS: Tribhuvan University
**Office Location:** S244
**Office Hours:** Posted on the office door
**Contact Information:** Office: (479)-394-7622, Ext. 1339
Cell: (479)-234-8727 E-mail: gyanwali@uarichmountain.edu

**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. Calculator capable of roots and exponents
2. 1inch or 1and1/2 inch binder for in-class worksheets and notes

**Face Mask Policy:** As per the Executive Order from the governor of Arkansas, all students are required to wear a proper face covering that completely covers the nose and mouth while on campus and in class. Masks with holes or masks that do not completely cover nose and mouth are not acceptable. Any student that does not have a proper mask will leave class and be referred to the Vice Chancellor for Student Affairs for possible disciplinary action.

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

**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 University Chemistry I.

**Program Outcomes:** Students will increase their

-writing, reading, speaking, and listening skills,
-competency in mathematics, utilizing their analytical and occupational skills to solve real life problems,
-understanding of different cultures and societies across the globe and how both have changed over time,
-understanding of basic principles and their application in the field of physical sciences and biological sciences, and
-technological and research skills.

**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 matters, 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, and 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, and solve problems)
8. Demonstrate an understanding of gases and the gas laws both mathematically and conceptually. (Components: calculate, correlate, distinguish, and 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, and solve problems)
11. Demonstrate a working knowledge of basic organic chemistry including hydrocarbons and substituted hydrocarbons. (Components: differentiate, comprehend, classify, logical arguments)

**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; Measurement | 1/11 M, 1/13 W |
| 2 | Energy and States of Matter<br>Atomic Structure | 1/18 M<br>1/20 W |
| 3 | Atomic Structure and Periodic Table | 1/25 M, 1/27 W |
| 4 | Periodic Table/Review | 2/1 M, 2/3 W |
| 5 | **Test 1**<br>Chemical Bonding | **2/8 M**<br>2/10 W |
| 6 | *Winter Break (no class)*<br>Chemical Bonding | *2/15 M*<br>2/17 W |
| 7 | Chemical Quantities and Reaction | 2/22 M, 2/24 W |
| 8 | Chemical Quantities and Reaction/Review<br>**Test 2** | 3/1 M<br>**3/3 W** |
| 9 | Gases | 3/8 M, 3/10 W |
| 10 | Properties of Solution | 3/15 M, 3/17 W |
| 11 | *Spring Break (no class)* | *3/22M - 3/26F* |
| 12 | Acids and Bases | 3/29 M, 3/31 W |
| 13 | Acid and Bases/Review<br>**Test 3** | 4/5 M<br>**4/7 W** |
| 14 | Organic Chemistry | 4/12 M, 4/14 W |
| 15 | Nuclear Chemistry | 4/19 M, 4/21 W |
| 16 | Review<br>**Test 4** | 4/26 M<br>**4/28 W** |
| 17 | **Final Exam** | **5/3 M** |

**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 the following:

| | |
|---|---|
| Four quarterly tests @100 each | = 300 (lowest one dropped when taken all four) |
| One Final Exam @ 100 | = 100 |
| 10 Assignments @ 20 each | = 200 |
| **Total points possible** | **= 600** |

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**:

On-Campus Resources:

1. Your student portal will be populated with the lecture slides for each upcoming chapter. If you wish, you can print the lecture slides of the chapter.
2. You will have in-class practice worksheets to see how the instructor performs the calculations and chemical formulas. Retain those worksheets for future information and knowledge.
3. Student Support Services will have some basic information available about time management, difficulty of the course etc.

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: Absence in this course most often results into failing grades unless covered by immediate action and make-up work. Absence is strictly prohibited unless any unavoidable circumstances. If notified of the absence, the instructor can send you the work and you can catch up with completed work. It is your full responsibility to complete the missed work and cover the missed chapter.

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.

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 required. Upon return after an absence the student is expected to be prepared for the days' class activities.

Cell Phone Policy**:** Do not use the cellphone unless allowed by the instructor.

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) Completing the 'boxed' problems within the chapter for each exam that you give.
b) Being an active member of the Science Club coordinated by the instructor
c) Organize activities within the Science Club or participate actively in the activities organized by the Club
d) Taking leadership in group study sessions and manage study sessions with peers
e) Organize or be involved in science and technology awareness activities and helping society to improve utilizing science knowledge
f) Actively participating in science-related meetings and conferences on/off campus
g) 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:** UA Rich Mountain provides transformative education to all learners.* **under review*

| Credit Hour Requirement Calculator | | | | |
|---|---|---|---|---|
| | | | | |
| **Course Information** | | | | |
| Department, Course Number | CHEM1053(Lecture) and CHEM1051L(Lab) | | | |
| Course Title | Principles of Chemistry | | | |
| Credit Hours | 3 + 1 = 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 |