

## Course Syllabus

### Syllabus CH 102-90

Term: Fall 2020

Location: CUH/CHUUK

Credits: 3

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Textbook: Seventh Edition of Introductory Chemistry: Concepts and Critical Thinking by

Charles Corwin. © Copyright 2014 Pearson Education

### Catalog Course Description

This is an introductory course presenting many different branches of chemistry. In contrast to others in the discipline, there is a significant qualitative component, where impact to the environment and how chemical knowledge can contribute to one's overall awareness are among the topics discussed.

### **STUDENT LEARNING OUTCOMES**

Upon completion of the course, the student will be able to:

Apply the three steps in the scientific methods.

2 Appreciate that chemistry is interesting and relevant to our daily lives.

Explain why measurements are never exact

**Identify** instruments for taking measurements.

**Identify** significant digits in measurements.

**Round off** nonsignificant digits from a calculation.

**Add and subtract** measurements correctly/

**Multiply and divide** measurements correctly.

**Express** an ordinary number as a power of 10.

**Express** a power of 10 as an ordinary number.

**Express** an ordinary number in a scientific notation.

**Express** a scientific notation as an ordinary number.

**List the basic** units, and symbols of the metric system.

List the prefixes for multiples and fractions of the basic units.

**Express** a given metric measurement using a different metric prefix.

**State** the metric equivalent for inch, pound, quart, and second.

**Express** a given measurement in metric units or English units.

**Predict** properties of chemical elements based on their atomic structure and their location in the Periodic Table.

Name chemical compounds, balance chemical and nuclear reactions.

**Predict** properties of chemical compounds based on chemical bonding, molecular shapes, and polarity.

**Calculate** mass relationships in chemical reactions and the quantity of matter in gaseous chemicals and chemical solutions.

**Predict** the products of common chemical reactions.

**Apply** knowledge of chemical concepts to a current environmental, health, industrial, or technological issue or condition by writing a short research paper

### **Course Objectives**

At the conclusion of this course, the students should be able to:

**Introduce** students to Evolution of Chemistry

**Describe** discovery process of chemistry: the study of matter

**Identify** the three steps in the scientific method.

**Describe** the modern practice of chemistry.

**Appreciate** that chemistry is interesting and relevant

**Perform** various calculations by applying reaction data, element properties, and scientific laws and theories, gas laws and applications.

**Utilize** information from the periodic table and periodic trends to describe an element's properties and an element's chemical properties.

**Describe** reactions of elements and compounds at the molecular level through chemical equations and stoichiometry. Course Requirements A scientific calculator with log function is required, as well as concurrent enrollment in Chemistry 102. Seventh Edition of Introductory Chemistry: Concepts and Critical Thinking by Class Policies

### **Grading**

As a courtesy to other students, cellular phones, smart phones, PDA (personal digital assistant), pagers and any other electronic device with device with potential to make noise must be turned off or put on

silent (not vibrate) during the class. Please refrain from texting or web surfing during class, as this can be distracting to others including the instructor. If you are on-call or have an emergency and need to use your phone, quietly leave the classroom to conduct your business. During exams, these devices need to be turned off; if during an exam, your electronic device makes noise (this includes vibrating), you may be asked to stop your exam and leave the room while the rest of the class finishes. The use of any other electronic device other than an approved scientific calculator during exam will be considered a form of academic dishonesty and will result in a failing grade for that exam.

**Due** to the well spread nature of this course; there will be a quiz at the end of a topic or a section. There will be 10 quizzes: multiple choices, true/false, filling in the blanks and matching. Regular attendance is essential for student success in this course; therefore, no makeup quizzes but exams will be given only under exceptional circumstances based on a written request accompanied by a written verification. Homework assignments will be given and should be done for preparation of quizzes. Calculators will be permitted during quizzes and exams; however, one must show all her/his work for full credit.

The course grade will be based on the following:

- 10% - Discussions (2) 5% each\*
- 30% - Assignments (10)
- 30% - Quizzes (10)
- 20% - Exams (2)
- 10% - Final Exam\*

The letter grade will be determined as follows:

- A = 86% to 100%
- B = 70% to 85%
- C = 55% to 69%
- D = 50% to 54%
- F = Below 50%

If you cannot come to my class, please email me for grade-related and personal questions and check your Canvas INBOX account for the responses. Please ALLOW 24 HOURS for responses to emails.

#### DISABILITIES ACCOMMODATION

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor (and instructor) to discuss reasonable accommodations that will help you to succeed in this class.

Week and Date

Topics of Contents

Learning Outcomes

## **Unit 1**

Week 2 Sept 6-19

Chapter 1: Introduction to chemistry pages 1-11

1.1 Evolution of Chemistry: scientific methods.

1.2 Modern chemistry

Chemistry Scientific Method

Assignment 1 Due

Learn the significant figures, rounding off and scientific notation

## **Unit 2: PSS: Prerequisite Science Skill pages 11-27**

### **Weeks 3-4 Sept 20-27**

PSS: Prerequisite Science Skill pages 11-27

1-Measurements in Chemistry:

2- Significant Digits (figures)

3- Rounding off nonsignificant digits

4- Adding and subtracting.

Assignment 2 due for PSS,

### **Measurements**

5. Multiplying and dividing measurements

Use the significant Digits (figures), scientific notation, rounding number,

Adjust calculated answers to give the correct number of significant figures.

Identify a number as measured or exact, determine the number of significant digits or figures in a measured number.

Unit 2. PSS: Prerequisite Science Skill pages 11-27 continued

6- Exponential numbers

7-Scientific notation

Assignment due:

Unit 3-: Chapter 2: The Metric System

### **Weeks 5-6 October 4-17**

1.1: Basic units and symbols

## 2.2: Metric Conversion Factors

## 2.3: Metric-Metric conversions

Write the names and abbreviations for the metric or SI units used in measurements of length, volume, mass temperature and time.

Relate the measurements in daily life in calculations of mass, volume and density, general conversions of one unit to another. Conversion of different units to another in calculations Use the significant figure, scientific notation, rounding number,

## 2.4: Metric English Conversions

## 2.5: The percentage concept

## 2.6: Volume by calculation

## 2.7: Volume by displacement

## 2.8: The Density Concept

Relate the measurements in daily life in calculations of mass, volume and density, general conversions of one unit to another. Conversion of different units to another in calculations. Learn metric and British systems.

Use the numerical values of prefixes to write a metric equality.

Write a conversion factor for two units that describe the same quantity.

Be able to use conversion factors to change from one unit to another.

Unit 2 cont-

## 2:9: Temperature

## 2.10: The Heat Concept

-Calculate the density of a substance; use the density to calculate the mass or volume of a substance.

-State the freezing point and boiling point of water on Fahrenheit, Celsius and Kelvin scales.

-To express a give temperature in degrees Fahrenheit (oF), degrees, Celsius degrees (oC), Kelvin units (K).

## **Unit 4 Chapter 3 Matter and Energy**

### 3.1: Physical states of matter

**Define chemistry** in relation to matter. States of matter.

**Classify matter according** to properties.

Chapter 3 Matter and Energy

### 3.2: Elements, compounds, and mixtures

3.3: Names and symbols of the elements

3.4: Metals, nonmetals, and semimetals

Classify examples of matter as pure substances or mixtures.

### **States and Properties of matter.**

Identify the states and the physical and chemical properties of matter: solid, liquid and gas.

-To apply the conservation of mass law of in chemical changes

-Be able to distinguish between potential and Kinetic energy

### **Chapter 3 Matter and Energy cont'd.**

**3.5: Compounds and chemical formulas**

**3.6: Physical and Chemicals properties**

3.7: Physical and chemical changes

**3.8: Conservation of mass**

**3.9: Potential and Kinetic energy**

**3.10: Conservation of energy**

-To relate kinetic energy, temperature, and physical state

-To apply the conservation of energy law to physical and chemical changes

-To identify the following form of energy: chemical, electrical, mechanical, nuclear, heat and light

Unit 5: Chapter 4

Models of Atom

4.1-3: Dalton, Thomson, and Rutherford models of Atom

**4.4: Atomic Notation**

**4.5: Atomic mass**

**4.6: The wave nature of light**

-Describe the Dalton model of the atom.

-Describe the Thompson plum pudding model of the atom

- Be able to state the relative charge on proton and electrons

-To indicate protons, neutrons, and electron for the given atomic notation.

-To be able to indicate the number of neutrons in each isotope.

**4.8: Bohr Model of atom**

#### **4.9: Energy level and sublevels**

#### **4.10: Electron configuration**

**-To be able to explain the concept relative atomic mass**

**-To calculate** the atomic mass for an element when given the mass and abundance of the naturally occurring isotopes

-To state the relationship of wavelength, frequency, and energy of light

-Be able to explain the relationship between energy levels in an atom and lines in an emission spectrum.

-Be able to state each sublevel within a given energy level

-To state the number of electrons that can occupy a given sublevel or energy level

### **Unit 6: Chapter 5: Periodic Table**

#### **5.1: Classification of elements**

#### **5.2: The periodic law concept**

#### **5.3: Groups and Periods of Elements**

#### **5.4: periodic Trends**

#### **5.5: Properties of Elements**

#### **5.6: Block of Elements**

### **Unit 7: Chapter 6**

Language of Chemistry.

#### 6.1: Classifications of compounds

#### 6.2: Monoatomic Ions

#### 6.3: Polyatomic Ions

#### 6.4: writing Chemical Formulas

#### 6.5: Binary Ionic Compounds

#### 6.6: Ternary Ionic Compounds

#### 6.7: Binary Molecular Compounds

#### 6.8: Binary Acids

#### 6.9: Ternary Oxyacids

-Be able to classify a compound as a binary ionic a ternary or a binary molecular compound.

-To classify an acid as a binary acid or a ternary oxyacid.

- To classify an ion as monoatomic cation, a monoatomic anion, polyatomic cation or a polyatomic anion.
- Write systematic names and formulas for common monoatomic ions.
- Be able to predict the ionic charge for ions of representative elements.
- Write systematic names and formulas for common polyatomic ions.
- Write chemical formulas for ionic compounds composed of monoatomic ions and polyatomic ions.
- Be able to write systematic names and formulas for binary ionic compounds.
- Be able to predict the chemical formulas for binary ionic compounds.
- Be able to write systematic names and formulas for ternary ionic compounds.
- Be able to write systematic names and formulas for ternary ionic compounds.
- Be able to write systematic names and formulas for binary molecular compounds.
- Be able to write systematic names and formulas for binary acids.
- Be able to write systematic names and formulas for ternary oxyacid's

### **Unit 8. Chapter 7: Chemical Reactions**

7.5: Combination reactions

7.6: Decomposition Reactions

7.7: The Activity series concepts

7.8: The Single-Replacement Reactions

7.10: Double Replacement Reactions

7.11: Neutralization Reactions

- Be able to state the four observations that are evidence for a chemical reaction. \*
- Be able to identify seven elements that occur naturally as diatomic molecules: H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub>.
- Write chemical equation from the description of a chemical reaction. \*
- Able to classify a chemical reaction as one of the following types: \*  
Combination; decomposition; single replacement; double-replacement or neutralization. \*
- Write balanced chemical equation for the reaction of a metal and oxygen gas. \*
- Write a balanced chemical equation for the reaction of a nonmetal and oxygen gas. \*
- Write a balanced chemical equation for the reaction of a metal and a nonmetal. \*
- Write a balanced equation for the decomposition of metal carbonate\*

-Be able to write a balanced equation for the decomposition of a compound that releases oxygen gas\*

-Predict whether a metal reacts with an aqueous salt solution, \*

Predict whether a metal reacts with water

-Write a balanced chemical equation for the reaction of a metal in aqueous solution. \*

-Write a balanced chemical equation for the reaction of a metal in an aqueous acid\*

-Write a balanced chemical equation for the reaction of active metal in water\*

- Be able to predict whether an anionic compound dissolves in water given the general rules for solubility, \*

-Write a balanced chemical equation for the reaction of two salts in aqueous solution, \*

-To be able to write a balanced chemical equation for the reaction of an acid and a base.\*

Assignment 9

Assignment 10

### **LAST CLASS**

Turn in unfinished Assignments

Week 14

DECEMBER 11, 2020 Last Class:

NO CLASS

FINAL EXAM

Week 18

December

Final Grade

Subject to change\*