Northern Marianas College
CURRICULUM ACTION REQUEST

Course: CH124 General Chemistry

Effective Semester / Session: Fall 2023

Type of Action:

__ New
X Modification
__ Move to Inactive (Stop Out)
__ Cancellation

Course Alpha and Number: CH124

Course Title: General Chemistry

Reason for initiating, revising, or canceling:
Additional compensation of 1 credit is being added to the course guide for the extra time and effort associated with the lab preparation

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Lorna B. Liban (Sep 12, 2023 11:35 GMT+10)
Lorna B. Liban — Sep. 10, 2022

Proposer — Date

Velma C. Deleon Guerrero (Sep 12, 2023 11:36 GMT+10)
Velma C. Deleon Guerrero — Sep 12, 2023

Department Chair/Director — Date

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Language & Format Review Specialist — Date

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Academic Council Vice Chair — Date

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Interim Dean of Academic Programs and Services — Date

1. **Department**
   Science, Mathematics, Health, and Athletics

2. **Purpose**
   This course will enable students to develop an understanding of the major concepts in general chemistry, organic chemistry, and biochemistry, practice related chemical calculations, and acquire appropriate laboratory techniques and skills. CH124 is a transferable chemistry course to help students who intend to transfer to four year colleges and universities and need to complete educational requirements for careers as nurses, chemists, physicists, biologists, agriculturists, medical doctors, and numerous STEM and health-related occupations.

3. **Description**

   A. Required/Recommended Textbook(s) and Related Materials
   Required:
   Denniston, K.T., Topping, J.J., and Caret, R.L. 2022. General, Organic, and Biochemistry Textbook and Lab Manual. 11th ed. New York, U.S.A. McGraw Hill.

   B. Contact Hours
   1. **Lecture:** 3 hours per week / 45 hours per semester
   2. **Lab:** 3 hours / 45 hours per semester"
   3. **Other:** Occasional labs maybe replaced with field trips or seminars by guest speaker

   C. Credits
   1. **Number:** 4
   2. **Type:** Regular Degree Credits

   D. Catalogue Course Description
   This is a rigorous chemistry course covering the principles of chemistry and the application of these principles to technological society. Chemistry is the study of matter, its physical and chemical properties, the physical and chemical changes it undergoes, and the energy changes that accompany these processes. This course provides a comprehensive chemistry foundation through lab activities and lectures. The course is divided into three broad sections: general chemistry, organic chemistry, and biochemistry. Prerequisites: EN101 and MA091 (Offered Fall and Spring)

   E. Degree or Certificate Requirements Met by Course
   This course satisfies the general education requirement for all degree programs requiring physical science with a laboratory, an Associate in Nursing, an AA in Liberal Arts, Health, and PE, and Pre-engineering emphasis, and as an elective course for non-nursing majors.

F. Course Activities and Design

Course activities include lectures, discussions, homework assignments, quizzes, tests, laboratory investigations, oral-reports, field trips or seminars by guest speakers, group-presentations, and lab research projects.

4. Course Prerequisite(s); Concurrent Course Enrollment

Prerequisites: EN101, MA091
Concurrent Course Enrollment: None

Required English/Mathematics Proficiency Level(s)

English Placement Level: EN101
Mathematics Placement Level: MA091

5. Estimated Cost of Course; Instructional Resources Needed

Cost to the Student: Tuition for a 4-credit course, lab fees, cost of the textbook, lab manual, graphing calculator, and research project materials.

Cost to the College: Instructor's salary for 5 credits, encompassing 4 credits plus an additional 1 course credits to accommodate the instruction of a science lab.

Instructional resources needed for this course include chemistry classroom and laboratory space, whiteboard and markers, television and multimedia projectors, audio-visual programs/software, chemicals, laboratory apparatus, computer, internet connection, and reference materials.

6. Method of Evaluation

Student learning will be evaluated on the basis of homework assignments, quizzes, tests, laboratory reports, research projects, and oral presentations. NMC's grading and attendance policies will be followed.

7. Course Outline

This is a topical outline and does not necessarily indicate the sequence in which the material will be presented.

1.0 Scientific Method and Measurement
- 1.1 Chemistry and the scientific method
- 1.2 Classification, properties, and changes of matter
- 1.3 Significant figures and scientific notation
- 1.4 System of measurement and conversion of units
- 1.5 Density and specific gravity

2.0 The Structure of the Atom and the Periodic Table
- 2.1 Development of the atomic structure
- 2.2 Composition of atom
- 2.3 Periodic table
- 2.4 Writing electronic configuration

3.0 Structure and Properties of Ionic and Covalent Compounds
- 3.1 Chemical bonds
- 3.2 Cations, anions, and polyatomic ions
- 3.3 Naming ionic and covalent compounds
- 3.4 Writing chemical formulas of ionic and covalent compounds
- 3.5 Writing Lewis structures

4.0 Calculations and the Chemical Equation
- 4.1 Mole concept and Avogadro's number
- 4.2 Calculation of molar mass
- 4.3 Identifying and balancing chemical equations
- 4.4 Stoichiometry

5.0 States of Matter: Solids, Liquids and Gases
- 5.1 Gas laws
  - 5.1.1 Boyle's Law
  - 5.1.2 Charles' Law
  - 5.1.3 Gay-Lussac's Law
  - 5.1.4 Combined Gas Law
  - 5.1.5 Ideal Gas Law
  - 5.1.6 Dalton's Law of Partial Pressure
  - 5.1.7 Amagat's Law

5.1.8 Avogadro's Law

5.2 Liquids
5.2.1 Properties and hydrogen bonding
5.3 Solids
5.3.1 Properties and structures

6.0 Solutions
6.1 Parts and properties of solutions
6.2 Concentration based on % m/m, ppt, ppm, and ppb
6.3 Concentration based on % m/v, %v/v, dilution
6.4 Concentration based on molarity and molality
6.5 Colligative properties

7.0 Energy, Rate, and Equilibrium
7.1 Thermodynamics and kinetics
7.2 Writing equilibrium constants
7.3 Calculation of equilibrium constants

8.0 Acids, Bases, and Oxidation-Reduction
8.1 Concepts of acids and bases
8.2 pH and hydrogen ion concentration calculations
8.3 pOH and hydroxide ion concentration calculations
8.4 Redox reactions

9.0 The Nucleus, Radioactivity, and Nuclear Medicine
9.1 Alpha, beta, and gamma radiation
9.2 Balancing nuclear equations
9.3 Medical applications of radioactivity

10.0 Introduction to Organic Chemistry
10.1 General formula, functional groups, structures, and nomenclature of hydrocarbons
10.1.1 Alkanes
10.1.2 Alkenes
10.1.3 Alkynes
10.1.4 Cyclic hydrocarbons
10.1.5 Aromatic hydrocarbons
10.2 General formula, functional groups, structures, and nomenclature of substituted hydrocarbons

11.0 Introduction to Biochemistry

11.1 Carbohydrates
11.2 Lipids
11.3 Proteins

8.0 Instructional Goals

This course will introduce students to:

1.0 Scientific method and measurement;

2.0 Atomic structure and the periodic table;

3.0 Structure and properties of ionic and covalent compounds;

4.0 Chemical Nomenclature and chemical calculations;

5.0 Problem-solving in gas laws, solution concentration, equilibrium constants, acids & bases, and nuclear reactions;

6.0 Introduction to hydrocarbons and hydrocarbon derivatives;

7.0 Introduction to biomolecules; and

8.0 Laboratory apparatus, safety procedures, and techniques.

9. Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1.0 Discuss the scientific method and its application in solving real-life problems;

2.0 Explain the composition, classification, properties, phases, and changes of matter;

3.0 Solve problems involving conversion of measurement;

4.0 Demonstrate safe laboratory techniques and appropriate use of common laboratory apparatus;

5.0 Explain the composition of atom and the development of atomic structure;

6.0 Use the periodic table to obtain information about an element and describe the relationship between the electronic structures of an element and its position in the periodic table;

7.0 Explain the major types of chemical bonds and nomenclature of ionic and covalent compounds;

8.0 Draw the Lewis structure of molecules and polyatomic ions;

9.0 Perform chemical calculations using Avogadro's number, molar mass, and the mole;

10.0 Balance and classify chemical reactions;

11.0 Solve problems involving gas laws;

12.0 Describe the parts and properties of solutions and solve solution concentration;

13.0 Write and calculate equilibrium constants;

14.0 Calculate pH, pOH, hydrogen ion concentration, hydroxide ion concentration and identify the types of nuclear reactions; and

15.0 Identify the major groups of organic compounds and biomolecules.

10. Assessment Measures for Student Learning Outcomes

Assessment of student learning may include, but not be limited to, the following:

1.0 Homework/assignments;

2.0 Experiment and laboratory report sheets;

3.0 Research projects;

4.0 Class presentation; and

5.0 Quizzes, and

6.0 Tests, and final exam.

CH 124 FA 23

Final Audit Report 2023-09-12

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