

Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2017

Type of Action:

- New
- Modification
- Move to Inactive (Stop Out)
- Cancellation

Course Alpha and Number: CH 124

Course Title: General Chemistry

Reason for initiating, revising, or canceling:

This course has been modified for periodic updates.

Lorna B. Liban
Lorna B. Liban

05/26/17

Proposer

Date

Velma C. De Leon Guerrero
Velma C. De Leon Guerrero

5.23.2017

Department Chair

Date

Jenny Wilson

Jenny Wilson

8/11/17

Language & Format Review Specialist

Date

Ajani Burrell

Ajani Burrell

8/11/17

Academic Council Chair

Date

for *Barbara K. Meralen*
Barbara K. Meralen

8/11/2017

Dean of Academic Programs and Services

Date

Course: CH 124 General Chemistry

1. Department

Science, Mathematics, Health, and Athletics

2. Purpose

This course will enable students to develop an understanding of the fundamental physical principles and concepts in general chemistry, practice related mathematical calculations, and acquire appropriate laboratory and analytical skills. This is the first course of a two-semester sequence. It is a required course for Associate of Science degree majors and is available as a physical science elective open to all students.

3. Description

A. Required/Recommended Textbook(s) and Related Materials

Required:

Denniston, K.T., Topping, J.J., and Caret, R.L. 2017. *General, Organic, & Biochemistry*. 9th ed. New York, McGraw Hill.

Henrickson, C., Byrd, L.C., and Hunter, N.W. 2017. *Laboratory Manual for General, Organic, & Biochemistry*. 9th ed. New York, McGraw Hill.

Readability Level: 13

B. Contact Hours

1. **Lecture:** 3 per week / 45 per semester
2. **Lab:** 3 per week / 45 per semester
3. **Other:** Lab hours may occasionally be replaced by field trips or seminars presented by guest speakers.

C. Credits

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

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D. Catalogue Course Description

This is a rigorous introductory course covering the principles of chemistry and the application of these principles to a technological society. Topics included are the principles of inorganic chemistry with emphasis on nomenclature, stoichiometry, mathematical calculations, and solution chemistry. A weekly laboratory is required. This is a required course in the Nursing degree program. English Placement Level: EN 101. Mathematics Placement Level: MA 132. (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 laboratory as well as the NMC chemistry requirement for an Associate of Science in Nursing.

F. Course Activities and Design

Course activities include lectures, discussions, homework assignments, laboratory investigations, tests and quizzes, oral reports, field trips or seminars presented by guest speakers, peer presentations, topic research, and written projects.

4. Course Prerequisite(s); Concurrent Course Enrollment; Required English/Mathematics Proficiency Level(s):

Prerequisites: None

Concurrent Course Enrollment: None

English Placement Level: EN 101

Mathematics Placement Level: MA 132

5. Estimated Cost of Course; Instructional Resources Needed:

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

Cost to the College: Instructor's salary.

Instructional resources needed for this course include classroom and laboratory space, whiteboard and whiteboard markers, television and multi-media projectors, audio-visual programs and software, access to photocopying, and laboratory materials.

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6. Method of Evaluation

Evaluation methods will include quizzes, tests, homework assignments, laboratory reports, research projects, and oral presentations. NMC's grading and attendance policies will be followed.

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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 Introduction to the study of chemistry
 - 1.2 Matter and properties
 - 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 the atom
 - 2.3 The periodic table
 - 2.4 Writing electronic configuration
 - 2.5 Valence electrons and the octet rule

- 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 formulas of ionic and covalent compounds
 - 3.5 Properties of ionic and covalent compounds

- 4.0 Calculations and the chemical equation
 - 4.1 The mole concept
 - 4.2 Calculation of formula weight and molecular weight
 - 4.3 Kinds of chemical equations
 - 4.4 Balancing chemical equations
 - 4.5 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

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- 5.1.7 Amagat's Law
- 5.1.8 Avogadro's Law
- 5.2 Liquids
 - 5.2.1 Properties
 - 5.2.2 Hydrogen bonding
- 5.3 Solids
 - 5.3.1 Properties and structures

- 6.0 Solutions
 - 6.1 Properties of Solutions
 - 6.2 Concentration based on % by mass, ppt, ppm, and ppb
 - 6.3 Concentration based on % by volume
 - 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
 - 9.4 Measurement of radiation

- 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

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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. Instructional Goals

This course will introduce students to:

- 1.0 Interrelationship of chemistry with other fields of science;
- 2.0 The scientific method;
- 3.0 Various physical models of atomic and molecular structures;
- 4.0 The periodic table of elements;
- 5.0 Nomenclature of ionic and covalent compounds;
- 6.0 Properties of various classes of substances;
- 7.0 Chemistry in everyday activities;
- 8.0 Calculations related to chemical reactions, gas laws, solution concentration, acids and bases, and equilibrium constants;
- 9.0 Laboratory safety procedures, apparatus, 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 units;
- 4.0 Demonstrate safe laboratory techniques and appropriate use of common laboratory apparatus;
- 5.0 Explain the composition of the atom and the development of the atomic structure;
- 6.0 Use the periodic table to obtain information about an element;
- 7.0 Describe the relationship between the electronic structures of an element and its position in the periodic table;
- 8.0 Explain the major types of chemical bonds and nomenclature of ionic and covalent bonds;
- 9.0 Draw the Lewis structure of molecules and polyatomic ions;
- 10.0 Perform the Lewis structure of molecules and polyatomic ions;
- 11.0 Perform calculations using Avogadro's number, molar mass, and the mole;
- 12.0 Solve problems involving gas laws;
- 13.0 Describe the parts and properties of solutions and solve solution concentration;
- 14.0 Write equilibrium constant expressions and calculate equilibrium constants;
- 15.0 Calculate pH, pOH, hydrogen ion concentration, and hydroxide ion concentration; and

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- 16.0 Identify the types of nuclear reactions and the major groups of organic compounds and biomolecules.

10. Assessment Measures of Student Learning Outcomes

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

- 1.0 Homework and assignments;
- 2.0 Experiment and laboratory report sheets;
- 3.0 Research projects;
- 4.0 Class presentation;
- 5.0 Quizzes and tests; and
- 6.0 Final exam.