

Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Spring 2012

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 guide revision serves to update required textbook and other materials. In regard to methodologies in the classroom or in the laboratory, there is a need to implement protocols that would minimize the production of hazardous chemical waste. Some new topics should be added in the course outline.

Florita Cabanes
Florita C. Cabanes

2-6-2012

Proposer

Date

[Signature]
Alfredo B. De Torres, Ph.D.

2-6-2012

Department Chair

Date

[Signature]
Barbara K. Merfalen

2-6-12

Dean of Academic Programs and Services

Date

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Course Guide

Course: CH 124 General Chemistry

1. Department

Sciences, 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 to acquire appropriate laboratory and analytical skills. CH 124 is the first of a 2 semester sequence. It is required by Associate in 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: Textbook and Study Guide

Denniston, K. T., J. J. Topping, and R. L. Caret,
General, Organic & Biochemistry, 7th Edition,
New York, McGraw Hill, 2011.
Readability level: Grade 12.5

Henrickson, C.; Byrd, L. C. and N. W. Hunter,
Lab Manual for General, Organic & Biochemistry, 7th Edition,
New York, McGraw Hill, 2011.
Readability level: Grade 12

A calculator is required.

B. Contact Hours

1. **Lecture:** 3 hours per week / 45 hours per semester
2. **Lab:** 3 hours per week/ 45 hours per semester
3. **Other:** Occasional labs will be replaced with field trips or seminars by a guest speaker

C. Credits

1. **Number:** 4
2. **Type:** Regular degree credits

D. Catalogue Course Description

This is a rigorous introductory course covering the principles of chemistry and the application of these principles to technological

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society. Included are the principles of inorganic chemistry, with emphasis on nomenclature, stoichiometry, mathematical calculations and solution chemistry. A weekly laboratory is required. CH 124 is a required course in the Nursing degree program. Prerequisites: None. English Placement Level: EN 101. Math Placement Level: MA 132. (Offered Fall and Spring)

E. Degree or Certificate Requirements Met by Course

This course satisfies:

1. An NMC requirement for a physical science course with lab.
2. An NMC chemistry requirement for an Associate of Science in Nursing.
3. An elective course requirement.

F. Course Activities and Design

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

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

Prerequisites: None

English Placement Level: EN 101

Math Placement Level: MA 132

5. Estimated Cost of Course; Instructional Resources Needed

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

Cost to the College: Instructor's salary. A science lab/classroom; replacement of expendable lab supplies and equipment; hazardous chemical waste collection and disposal service.

Instructional resources needed for this course include classroom and laboratory space; whiteboard and pen; TV and DVD player; Smart Board; audio-visual programs/software; transparency and multimedia projectors; and various laboratory materials.

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6. Method of Evaluation

Student grades will be based on the regular letter grade system as described below:

- A: Excellent – grade points: 4.0;
- B: Above average – grade points: 3.0;
- C: Average – grade points: 2.0;
- D: Below average – grade points: 1.0;
- F: Failure – grade points: 0.0.

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 Methods and Measurement
 - 1.1 Scientific method
 - 1.2 Experimentation
 - 1.3 Measurements
 - 1.4 Significant figures and scientific notation
 - 1.5 Error, accuracy, precision, and uncertainty

- 2.0 The Structure of the Atom
 - 2.1 Matter
 - 2.1.1 Chemical and physical properties
 - 2.1.2 Classification
 - 2.1.3 Mixtures and pure substances
 - 2.1.4 Elements and compounds
 - 2.2 The Atom
 - 2.2.1 Structure
 - 2.2.2 Atomic theory and model
 - 2.2.3 Isotopes and ions

- 3.0 Elements, Atoms, and the Periodic Table
 - 3.1 Periodic law
 - 3.2 Metals and nonmetals
 - 3.3 Atomic number and mass
 - 3.4 Electrons

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4.0 Ionic and Covalent Compounds

- 4.1 Chemical bonding
 - 4.1.1 Types: Ionic and covalent
 - 4.1.2 Lewis symbols
- 4.2 Naming compounds and writing formulas
- 4.3 Properties of ionic and covalent compounds
 - 4.3.1 Physical state
 - 4.3.2 Melting and boiling points
 - 4.3.3 Solid state structure of compounds
 - 4.3.4 Lewis structures of molecules, ions, and polyatomic ions
 - 4.3.5 Molecular geometry; valence shell electron-pair repulsion model
 - 4.3.6 Polarity
 - 4.3.7 Solubility

5.0 Calculations and the Chemical Equation

- 5.1 Moles and Avagadro's number
- 5.2 Chemical formulas
- 5.3 Molar mass
- 5.4 Percent composition
- 5.5 The chemical equation
 - 5.5.1 Reactions
 - 5.5.2 Balancing
 - 5.5.3 Calculations
 - 5.5.4 Limiting reagents

6.0 Solids, Liquids and Gases

- 6.1 Gases
 - 6.1.1 Kinetic theory
 - 6.1.2 Pressure
 - 6.1.3 Gas laws
 - 6.1.4 Ideal gas
 - 6.1.5 Molar volumes
- 6.2 Liquids
 - 6.2.1 Properties
 - 6.2.2 Van der Waal forces
 - 6.2.3 Hydrogen bonding
- 6.3 Solids
 - 6.3.1 Properties
 - 6.3.2 Crystal structures

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- 7.0 Reactions and Solutions
 - 7.1 Reaction classifications
 - 7.2 Reaction types
 - 7.3 Solutions
 - 7.3.1 Properties
 - 7.3.2 Solubility
 - 7.3.3 Equilibrium
 - 7.4 Concentration
 - 7.4.1 Molarity
 - 7.4.2 Concentration-dependent properties
 - 7.5 Solvents
 - 7.6 Electrolytes

- 8.0 Thermodynamics
 - 8.1 Energy of a reaction
 - 8.2 Endothermic and exothermic
 - 8.3 Measuring energy changes
 - 8.4 Kinetics
 - 8.5 Equilibrium

- 9.0 Acids, Bases, and Oxidation-Reduction
 - 9.1 Physical properties, definitions, and theories
 - 9.2 Titration
 - 9.3 pH calculations
 - 9.4 Ionic equations
 - 9.5 Buffers
 - 9.6 Redox reactions

- 10.0 Introduction to Organic Chemistry
 - 10.1 Functional groups

- 11.0 Introduction to Biochemistry
 - 11.1 Carbohydrates, Lipids, Proteins, Nucleic Acids

8. Instructional Goals

This course will introduce students to:

- 1.0 The scientific method;
- 2.0 Various physical models of atomic and molecular structures;

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- 3.0 The periodic table of elements and properties of those elements;
- 4.0 Chemistry in everyday activities;
- 5.0 Specific terminology relevant to the topics covered;
- 6.0 Properties of various classes of substances;
- 7.0 Correct expression of important chemical reactions;
- 8.0 Common analytical tools, equipment and laboratory techniques used in general chemistry and problem solving techniques;
- 9.0 The importance of lab safety procedures; and
- 10.0 Calculations related to chemical reactions, solutions and concentration.

9. Student Learning Outcomes

Upon successful completion of this course the student will be able to:

- 1.0 Apply the scientific method in solving problems;
- 2.0 Explain and draw various models of atoms, compounds and molecules;
- 3.0 Describe patterns in chemical and physical properties of elements with respect to their position on the periodic table and their physical states;
- 4.0 Discuss chemistry as it relates to health, environment and consumer concerns;
- 5.0 Understand and use scientific terminology properly;
- 6.0 Describe properties of the better known classes of chemicals such as acids, bases, salts, ionic and covalent compounds and solutions;
- 7.0 Identify, write and interpret common chemical reactions;

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- 8.0 Demonstrate common measurement skills, laboratory techniques and appropriate use of equipment and instruments;
- 9.0 Practice laboratory safety procedures and techniques; and
- 10.0 Perform calculations related to chemical reactions, gas laws, solutions and concentration, rate of reaction, and mole-mass relationships.

10. **Assessment Measures**

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

- 1.0 Exams and quizzes
- 2.0 Homework, laboratory report sheets
- 3.0 Projects / Topic research paper / Class presentation