Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2014

Type of Action:

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

Course Alpha and Number: NS101

Course Title: Introduction to Physical Science

Reason for initiating, revising, or canceling:
This course guide has been updated to reflect changes in the English Placement requirements (From EN 93/94 to EN 101).

04/21/14

Matthew Crane
Proposer Date

4.24.2014

Velma C. Deleon Guerrero
Acting Department Chair Date

4.24.14

Barbara K. Merfalen
Dean of Academic Programs and Services Date

Northern Marianas College
Course Guide

Course: NS 101 Introduction to Physical Science

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

2. **Purpose**
   NS 101 provides an overview of the fundamental concepts and theories of physical science. Students will gain an understanding of the structure, mechanisms and processes that exist and govern physical world. This course will also enable students to develop analytical and critical thinking skills through the application of the scientific method. The target population is students who have an interest in the physical world or who have the need for such background in their chosen degree program that requires a science credit with lab.

3. **Description**

   A. **Required/Recommended Textbook(s) and Related Materials**
   Required:
   Tillery, B. *Physical Science*. 7th ed. New York. McGraw-Hill, 2007.

   Recommended:
   Kirkpatrick, Larry D., and Gregory E. Francis. *Physics: A Conceptual World of View*. 7th ed. Belmont, CA: Brooks/Cole, 2010.

   Readability level: College

   B. **Contact Hours**
   1. **Lecture:** 3 hours per week / 48 hours per semester
   2. **Lab:** 3 hours per week / 48 hours per semester
   3. **Other:** None

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

   D. **Catalogue Course Description**
   This is a survey course covering the fundamental concepts and methods of physical science such as the scientific method, measurement, motion, force, energy, heat, waves, electricity and magnetism, chemistry, geology and astronomy. Laboratory and field trips are required. A TI-83/89, or equivalent, graphics calculator is recommended. Prerequisite: None. English Placement Level: EN 101. Math Placement Level: MA 132. (Offered Fall and Spring)

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E. **Degree or Certificate Requirements Met by Course**
This course fulfills a general education requirement in the Sciences (Group 2) for the A.A. / Liberal Arts degree emphasis and for the B.A. in Education degree.

F. **Course Activities and Design**
This course includes pretest and posttest, lectures, group work, discussions, laboratory activities, homework and web-based assignments, viewing audio-visual materials, PowerPoint presentations, periodic quizzes, tests, and comprehensive final exam, fieldtrip, and research 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, cost of textbook, laboratory fee, research activities expenses, and instructional materials fee.

Cost to the College: Instructor's salary.

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

6. **Method of Evaluation**
Student performance 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.

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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 Introduction: What is Science?
- 1.1 Objects and properties
- 1.2 The measurement process
- 1.3 The scientific method

2.0 Physics
- 2.1 Motion
- 2.2 Energy
- 2.3 Heat and temperature
- 2.4 Wave motions and sound
- 2.5 Electricity and magnetism
- 2.6 Light

3.0 Chemistry
- 3.1 Atoms and periodic properties
- 3.2 Chemical bonds
- 3.3 Chemical reactions
- 3.4 Water and solutions
- 3.5 Organic chemistry
- 3.6 Nuclear reactions

4.0 Astronomy
- 4.1 The universe
- 4.2 The solar system
- 4.3 Earth on space

5.0 Earth Science
- 5.1 Rocks and minerals
- 5.2 Plate tectonics
- 5.3 Building Earth's surface
- 5.4 Shaping Earth's surface
- 5.5 Geologic time
- 5.6 The atmosphere of Earth
- 5.7 Weather and climate
- 5.8 Earth's waters

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8. Instructional Goals

This course will introduce students to:

1.0 Physical Science as a subject;

2.0 The science process skills;

3.0 Theories and basic concepts in Physics;

4.0 Organic Chemistry and the organic compounds of life;

5.0 Nuclear reactions and natural radioactivity, radiation, nuclear medicine, and nuclear waste;

6.0 Basic elements in Astronomy which includes the Solar system, composition of the celestial objects, and the structure of the universe; and

7.0 Earth's history and its geologic, meteorological, hydrologic and oceanographic processes.

9. Student Learning Outcomes

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

1.0 Apply the scientific method and hypothesis testing in the laboratory;
2.0 Perform simple measurements and measurement conversions between measuring systems;
3.0 Describe the laws and properties of motion and the differences between speed, velocity and acceleration, forces, weights, and momentum;
4.0 Compare inverse and direct proportions, inverse, square relationship, and proportionality constant;
5.0 Describe matter and the different forms of energy, the basic processes of energy conversion, and the law of conversion of energy;
6.0 Compare the different phases and phase changes of matter;
7.0 Explain the kinetic molecular theory and the three laws of thermodynamics and the concepts of heat;
8.0 Evaluate the occurrence of heat transfers such as conduction, convection and radiation;
9.0 Discuss the concepts of waves, motion, and Doppler effect;
10.0 Design a circuit or an electromagnet based on the concepts of electricity and magnetism;

11.0 Describe the properties of light, reflection and refraction, the photoelectric effect. The light quanta and quantum theory;
12.0 Contrast the concepts of atoms, elements, atomic number, atomic mass units, mass number, atomic weight, isotopes, ions, compounds, mixtures, molecular formulas and molecular weights;
13.0 Identify common organic compounds, synthetic polymers, hydrocarbons, and important compounds of life;
14.0 Construct a balanced chemical formula and select the right chemical combinations based on the different types of chemical reactions and bonding, molecular properties of water and solutions, properties of acids, bases, and salts;
15.0 Distinguish the type of nuclear reactions, sources of radioactivity, quantity of radiation, and give examples of how radioactivity is used in medicine and problems of nuclear waste disposal;
16.0 Explain the structure and composition of the solar system and the universe and basic celestial mechanics; and
17.0 Discuss Earth's geologic history and the geologic, hydrologic, meteorological, and oceanographic processes.

10. Assessment Measures

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

1.0 Periodic testing and a comprehensive final examination to evaluate the student's knowledge and abilities in cognitive reasoning and the interpretation, identification, comprehension, calculation and application of the basic concepts in physical science.

2.0 A research project investigating and involving the basic principles and concepts of a particular topic discussed in the physical science classroom or laboratory that demonstrates an understanding of those concepts and principles, and may include graphical models of an interpretive nature; and

3.0 A student presentation that illustrates an understanding of a relationship between topics in physical science and real-life practical application disciplines.