Northern Marianas College
CURRICULUM ACTION REQUEST

Effective Semester / Session: Fall 2020

Type of Action:

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

Course Alpha and Number: PH100

Course Title: Conceptual Physics

Reason for initiating, revising, or canceling:
PH100 is a course designed to help students who are looking into a career in engineering or in the sciences. Since the college currently does not offer a physics course, this course provides a broad introduction to the fundamental principles of physics, ranging from classical mechanics to modern physics.

Tony T. Flores 11/17/2020

Proposer Date

Velma C. Deleon Guerrero

Velma C. De Leon Guerrero 11/16/2020

Department Chair Date

Adam Walsh 11.12.20

Language & Format Review Specialist Date

Ajani Burrell 11.13.2020

Academic Council Chair Date

Charlotte Cepeda 11/18/2020

Dean of Learning & Student Success Date

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

2. **Purpose**
   PH100 is intended to help students with no previous experience in physics but who are interested in civil, electrical, industrial, and mechanical options of pre-engineering. Students will develop a strong conceptual foundation that is necessary for success in subsequent physics courses and for developing a career pathway in the field of engineering. This introductory course is open to all students and can meet the physical science and elective requirement in the Liberal Arts program.

3. **Description**

   A. Required/Recommended Textbook(s) and Related Materials
   Required:
   Hewitt, Paul G. *Conceptual Physics*, 12th ed. Pearson, 2015

   Recommended:
   A TI-84 or equivalent graphing calculator

   B. Contact Hours
   1. **Lecture:** 3 per week / 45 per semester
   2. **Lab:** 3 per week / 45 per semester
   3. **Other:** None

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

   D. Catalogue Course Description
   This course provides a conceptually based exposure to the fundamental principles and processes of the physical world. Topics include basic concepts of motion, forces, energy, heat, electricity, magnetism, and the structure of matter and the universe. Upon completion, students should be able to describe examples and applications of the principles studied. English and Math Placement: EN095; MA 089 (Offered Fall and Spring).

   E. Degree or Certificate Requirements Met by Course
   A grade of “C” or higher earned in this course fulfills an elective requirement for any A.S. degree and satisfies the science elective option for non-majors.

F. Course Activities and Design

This course includes test lectures, group work, discussions, laboratory activities, homework and assignments, viewing audio-visual materials, PowerPoint presentations, quizzes, tests, comprehensive final exam, field-trip, and research projects.

4. Course Prerequisite(s); Concurrent Course Enrollment

Prerequisites: EN095; MA091
Concurrent Course Enrollment: None

Required English/Mathematics Proficiency Level(s):

English Placement Level: EN101
Mathematics Placement Level: MA132

5. Estimated Cost of Course; Instructional Resources Needed

Cost to the Student: Tuition for a 4-credit course, cost of textbook, research activities expenses, and instructional materials.

Cost to NMC: Instructor's salary.

Instructional resources needed for his course include: classroom, instructional and laboratory space; whiteboard and pen; audio-visual programs/software; multimedia projectors; and various laboratory materials and equipment.

6. Method of Evaluation

Student learning will be assessed on the basis of class attendance and participation, homework completion, in-class and online quizzes, midterm and final examinations, and presentations. For laboratory activities, students will be evaluated on the basis of attendance, laboratory exercise completion and laboratory pre- and post- reports. 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 About Science
- 1.1 Scientific Measurements
- 1.2 Scientific Method

2.0 Mechanics
- 2.1 Linear and nonlinear motion
- 2.2 Newton's Laws of Motion
- 2.3 Momentum
- 2.4 Energy
- 2.5 Rotational Motion
- 2.6 Gravity

3.0 Properties of Matter
- 3.1 Atomic nature of matter
- 3.2 Solids
- 3.3 Liquids
- 3.4 Gases and plasmas

4.0 Heat
- 4.1 Temperature, heat, and expansion
- 4.2 Heat transfer
- 4.3 Change of phase
- 4.4 Thermodynamics

5.0 Sound
- 5.1 Vibrations
- 5.2 Properties of sound
- 5.3 Musical sounds

6.0 Electricity and Magnetism
- 6.1 Electrostatics
- 6.2 Electro current
- 6.3 Magnetism
- 6.4 Electromagnetic induction

7.0 Light
- 7.1 Properties of light
- 7.2 Color
- 7.3 Reflection and refraction
- 7.4 Waves, emission, and quanta of light

8.0 Atomic and Nuclear Physics
- 8.1 The atom and the quantum
- 8.2 Atomic nucleus and radioactivity
- 8.3 Nuclear fission and fusion

9.0 Relativity
- 9.1 Special theory of relativity
- 9.2 General theory of relativity

8. Instructional Goals

The course will introduce students to:

1.0 Physical Quantities and Measurement;

2.0 Scalars and Vectors;

3.0 Linear Motion and Freefall;

4.0 Matter and Interactions;

5.0 Newton's Laws of Motion;

6.0 Energy, Work, and Power;

7.0 Thermal Properties of Matter;

8.0 Waves, Sound, and Light;

9.0 Electricity and Magnetism; and

10.0 Modern Physics.

9. Student Learning Outcomes

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

1.0 Compare the nature of science and scientific methods;

2.0 Explain Newton's Laws of Motion, physical conservation, waves, oscillations, sound, and thermal physics in reference to simple physical systems.

3.0 Demonstrate knowledge in the nature of matter, e.g., atomic structure, elasticity, and fluids;

4.0 Demonstrate knowledge in the concepts and phenomena of heat;

5.0 Demonstrate the ability to translate common language descriptions into the language of physics and physical diagrams; and

6.0 Apply the scientific method by collecting, analyzing, and interpreting data models.

10. Assessment Measures of Student Learning Outcomes

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

1.0 Assignments;

2.0 Quizzes, Tests, Midterm, and Final Exams;

3.0 Laboratory Activities and Exercises;

4.0 Pre- and Post- Laboratory Reports;

5.0 Research Project; and

6.0 Student Presentations.