Northern Marianas College

CURRICULUM ACTION REQUEST

Course: PH 201 Physics I Mechanics

Effective Semester / Session: Fall 2023

Type of Action:

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

Course Alpha and Number: PH 201

Course Title: Physics I Mechanics

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.

Borja (Sep 12, 2023 16:09 GMT+10)

Emanuel Borja — Sep 12, 2023

Proposer(s) — Date

Velma C. Deleon Guerrero (Sep 12, 2023 16:10 GMT+10)

Velma C. Deleon Guerrero — Sep 12, 2023

Department Chair — Date

Adam M. Walsh (Sep 13, 2023 22:19 GMT+10)

Adam Walsh — Sep 13, 2023

Language & Format Review Specialist — Date

Velma C. Deleon Guerrero (Sep 12, 2023 16:10 GMT+10)

Velma C. Deleon Guerrero — Sep 12, 2023

Academic Council Vice Chair — Date

Lorraine Maui (Sep 13, 2023 23:45 GMT+10)

Lorraine C. Maui — Sep 13, 2023

Interim Dean of Academic Programs and Services — Date

Course: PH 201 Physics I Mechanics

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

2. **Purpose**
   PH201 introduces classical mechanics and the laws of conservation. Historically, a set of core concepts—space, time, mass, force, momentum, torque, and angular momentum—were introduced in classical mechanics in order to solve the most famous physics problem, the motion of the planets, but these concepts apply to most natural phenomena. Students who are interested in engineering and/or more advanced studies in the sciences will develop conceptual understanding of these core concepts, a familiarity with the experimental verification of theoretical laws, and an ability to apply the theoretical framework to describe and predict the motions of bodies that is necessary for success in subsequent physics courses. This course is open to all students and can meet the physical science and/or elective requirements in the Liberal Arts program.

3. **Description**

   A. Required/Recommended Textbook(s) and Related Materials
   Required:
   Serway, Raymond A. and Vuille, Chris. College Physics. Cengage Learning, 2018.

   Recommended: None

   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
   A combined lecture and laboratory course covering mechanics and conservation laws. This is a non-calculus-based course. Labs associated with this course contain experiments and exercises that reinforce the principles introduced in lecture classes. Topics include vectors and kinematics, Newton's Laws of motion, momentum and impulse, circular motion, kinetic energy and work, torque, and rotational motion. Upon completion, students should be able to apply the theoretical framework to describe and predict the motions of bodies. Prerequisites: EN101, MA162, NS101 (Offered Fall).

   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: EN101, MA162, NS101
Concurrent Course Enrollment: None

Required English/Mathematics Proficiency Level(s)

English Placement Level: EN 202
Mathematics Placement Level: MA 203

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 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: classroom, instructional and laboratory space; whiteboard and markers; 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, problem-set 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 an outline of possible topics. This does not necessarily indicate the sequence in which the material will be presented, nor the depth in which topics will be covered.

1.0 Describing Motion—1D & 2D Kinematics
- 1.1 Vectors
- 1.2 Positions and velocity
- 1.3 Acceleration
- 1.4 Newton's Laws of Motion

2.0 Types of Forces
- 2.1 Gravity
- 2.2 Contact forces
- 2.3 Tension and springs
- 2.4 Friction

3.0 Circular Motion
- 3.1 Uniform circular motion
- 3.2 Circular motion—acceleration
- 3.3 Newton's 2nd Law of circular motion

4.0 Forces, Energy, & Systems
- 4.1 Pulleys and constraints
- 4.2 Massive rope
- 4.3 Resistive forces

5.0 Momentum & Collision Theory
- 5.1 Types of collision
- 5.2 Elastic collisions
- 5.3 Center of mass and reference frames
- 5.4 Momentum and impulse
- 5.5 Center of mass and motion
- 5.6 Conservation of momentum

6.0 Torque
- 6.1 Velocity and recoil
- 6.2 Continuous mass transfer
- 6.3 Electricity and magnetism

7.0 Kinetic Energy and Work
- 7.1 Conservative and non-conservative forces

8.0 Potential Energy & Conservation
- 8.1 Potential energy
- 8.2 Conservation of energy
- 8.3 Potential energy diagrams

9.0 Rotational Motion
- 9.1 Motion of a rigid body
- 9.2 Moment of inertia
- 9.3 Torque
- 9.4 Rotational dynamics

10.0 Angular Momentum
- 10.1 Angular momentum of a point particle
- 10.2 Angular momentum of a rigid body
- 10.3 Torque and angular impulse

11.0 Rotations & Translation
- 11.1 “Rolling” kinematics and dynamics
- 11.2 “Rolling” angular momentum
- 11.3 Gyroscopes

8. Instructional Goals

The course will introduce students to:

1.0 Vectors & Kinematics;
2.0 Newton’s Laws of Circular Motion;
3.0 Momentum & Impulse;
4.0 Drag Forces, Constraints, Continuous Systems; Work & Mechanical Energy;
5.0 Momentum & Impulse Collision Theory;
6.0 Continuous Mass Transfer Torque;
7.0 Kinetic Energy & Work;
8.0 Potential Energy & Conservation;
9.0 Collision Theory; and
10.0 Rotational Motion & Translation—Rolling

9. Student Learning Outcomes

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

1.0 Formulate physical descriptions of natural phenomena observed in everyday life using core classical physics concepts;
2.0 Communicate physics reasoning in oral and in written form;
3.0 Solve basic mechanics problems; and
4.0 Demonstrate through experimentation that theory (theoretical law) is verifiable.

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, Final Exam;
3.0 Laboratory Activities & Exercise;
4.0 Pre- & Post- Laboratory Reports;
5.0 Research Project; and
6.0 Student Presentations.

PH 201_FA 2023

Final Audit Report 2023-09-13

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