

# RARITAN VALLEY COMMUNITY COLLEGE ACADEMIC COURSE OUTLINE

## PHYS 150 – ANALYTICAL PHYSICS I

### I. Basic Course Information

A. Course Number and Title: PHYS 150 – Analytical Physics I

B. New or Modified Course: Modified

C. Date of Proposal: Semester: Fall Year: 2024

**D. Effective Term: Fall 2025**

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 4

G. Weekly Contact Hours: 6

Lecture: 3

Laboratory: 3

Out of class student work per week: 7.5

H. ☒ Prerequisite (s): MATH 151 - Calculus I or its equivalent.

☐ Corequisite (s):

I. Additional Fees: No

### II. Catalog Description

Prerequisites: ~~MATH 151~~ - Calculus I or its equivalent. This is the first semester of a three-semester sequence in introductory calculus-based physics, which is required for students majoring in Physics and Engineering Science. It is also highly recommended for transfer students majoring in the physical sciences. Topics include measurements and error analysis, systems of units, vectors, kinematics and dynamics of particles and rigid bodies, Newton's Laws, work and energy, momentum, rotational motion, torque and angular momentum, equilibrium and elasticity, and gravitation.

### III. Statement of Course Need

A. This is a standard course in any calculus-based physics course sequence.

- B. This course requires a lab component for students to employ a scientific approach to the understanding of the physics principles and concepts, and obtain first-hand experience in observation, data collection, analysis, and research.
- C. This course, dependent on the transfer institution, generally transfers as a program requirement, general education course in science with lab, and/or free elective.

#### **IV. Place of Course in College Curriculum**

- A. Free Elective
- B. This course serves as a General Education course in Science with Lab.
- C. This course serves as a program requirement in Physics and Engineering Science. This course may also be used as part of a required physics or science sequence for the following programs: Chemistry, Computer Science, and Mathematics.
- D. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, [www.njtransfer.org](http://www.njtransfer.org); b) for all other colleges and universities, go to the individual websites.

#### **V. Outline of Course Content**

This course explores the following topics:

- A. Measurement and error analysis
- B. Systems of units and vectors
- C. One-dimensional motion
- D. Two-dimensional motion
- E. Newton's Laws
- F. Circular motion
- G. Work and energy
- H. Center of mass
- I. Momentum and collisions
- J. Rotational motion
- K. Torque and angular momentum
- L. Static equilibrium and elasticity
- M. Gravitation

#### **VI. A. Course Learning Outcomes:**

**At the completion of the course, students will be able to:**

1. Analyze and solve mathematically appropriate physics problems (**GE 2, 3\***).

2. Conceive logical inferences to conceptual physics questions using scientific knowledge from the fundamental principles and laws of physics (**GE 2, 3\***).
3. Use technology to identify and collect information (**GE 4**).
4. Collect and interpret data accurately (**GE 3**).

## **B. Assessment Instruments**

Given the outcomes described above, LIST which of the following assessment methods may be used; please note any instruments that will be *required* to assess outcomes as listed above (e.g., research papers for information literacy):

1. Exams
2. Final
3. Lab reports
4. Other, as specified by instructor

## **VII. Grade Determinants**

What factors may enter into the determination of the final? LIST the grade determinants. Please note any grade determinants that will be *required* for the course. For example:

- A. Exams
- B. Final
- C. Lab reports
- D. Extra credit assignments
- E. Other, as specified by instructor

Given the goals and outcomes described above, LIST the primary formats, modes, and methods for teaching and learning that may be used in the course:

- A. Lecture/discussion
- B. Small-group work
- C. Laboratory
- D. Student collaboration
- E. Independent study
- F. Other, as specified by instructor

## **VIII. Texts and Materials**

LIST which of the following types of course materials will be used. Specify title and publication information about textbooks and any other major text sources or other materials.

- A. suggested textbooks
- B. web sources
- C. other computer-based sources
- D. other, as specified by instructor

Textbook Options:

University Physics (**free online**, OpenStax)

Principles of Physics: A Calculus-Based Text (any edition, Cengage-option or Amazon-option)

Fundamentals of Physics by Halliday & Resnick (any edition) (Amazon)

**The following statement should be included in the outline:**

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

**IX. Resources**

- A. Laboratory
- B. Computers
- C. Library

**X. Check One:** ☐ Honors Course ☐ Honors Options ☒ N/A