RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

PHYS 151 – ANALYTICAL PHYSICS II

I. Basic Course Information

A. Course Number and Title: PHYS 151 – Analytical Physics II

B. New or Modified Course: Modified

C. Date of Proposal: Semester: Fall Year: 2020

D. Effective Term: Fall 2020

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. Prerequisites: PHYS 150 - Analytical Physics I and MATH 151 - Calculus I, or their equivalents; Corequisites: MATH 152 - Calculus II or its equivalent

I. Laboratory Fees: Yes

J. Name and Telephone Number or E-Mail Address of Department Chair and Divisional Dean at time of approval:
Department Chair: Marianne Baricevic marianne.baricevic@raritanval.edu
Divisional Dean: Sarah Imbriglio sarah.imbriglio@raritanval.edu

II. Catalog Description

Prerequisites: PHYS 150 - Analytical Physics I and MATH 151 - Calculus I, or their equivalents; Corequisites: MATH 152 - Calculus II or its equivalent. This is the second 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 electric charge and potential, electric forces and fields, magnetic forces and fields, capacitance, current and resistance, induction and inductance, direct and alternating current, circuit analysis, and Maxwell's equations.

III. Statement of Course Need

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

B. This course requires lab component for students to employ a scientific approach to understanding of the physics principles and concepts, and obtain first-hand experience in observation, data collection, analysis, and research.

C. This course 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, Mathematics, and Pre-Medicine and Pre-Pharmacy, AS.

D. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, 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. Electric charge
B. Electric forces and fields
C. Electric flux and Gauss' Law
D. Electric potential energy and voltage
E. Capacitance
F. Current and resistance
G. DC circuits
H. AC circuits
I. Circuit analysis
J. Magnetic forces and fields
K. Induction and inductance

L. Electromagnetic oscillations
M. Maxwell's equations and electromagnetic waves

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes:

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

1. Classify and interpret information (GE-NJ 2, 3).
2. Analyze and solve appropriate physics problems (GE-NJ 2, 3, *).
3. Apply basic laboratory techniques to relevant physics experiments and report on their results (GE-NJ 1, 2, 4, *).
4. Discover information through research and report on their analyses of research information (GE-NJ 1, 3, 4).

(* embedded critical thinking)

B. Course Learning Outcomes:

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

1. Collect and interpret data accurately.
2. Apply theoretical strategies to the analysis of data.
3. Conceive reasonable inferences in response to observations.
4. Analyze and solve physics problems systematically and logically.
5. Apply mathematical techniques and use appropriate computing tools to obtain quantitative solutions to problems in physics and other disciplines.
6. Synthesize for the purposes of discussion and written work.

C. Assessment Instruments

1. Laboratory experimentation
2. Problem solving individually and in peer dialogue
3. Analysis of reading assignments
4. Research projects
5. Other, as specified by instructor

VII. Grade Determinants

A. Discussion questions
B. Homework problems
C. Exams and quizzes
D. Research and/or collaborative projects
E. Oral presentations
F. Laboratory reports
G. Class participation and preparation

The primary formats, modes, and methods for teaching and learning that may be used in the course:

A. Lecture/discussion
B. Laboratory
C. Small group projects
D. Student oral presentations
E. Computer instruction and simulations
F. Independent study

VIII. Texts and Materials

A. Textbooks
B. Primary sources
C. Journals and publications
D. Web sources
E. Databases
F. Audio/visual sources

Samples of specific texts which may be featured:

- Halliday/Resnick/Walker, *Fundamentals of Physics*, Wiley Publishers, (Most Recent Edition).

- Young/Friedman, *University Physics*, Pearson Publishers, (Most Recent Edition).

- Wilson/Hernandez, *Physics Laboratory Experiments*, Houghton-Mifflin Publishers, (Most Recent Edition).

(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. Honors Options: None