



NEW JERSEY CENTER
FOR TEACHING & LEARNING

PHYS-6603: AP Physics I: Mechanics

Instructor: Yuriy Zavorotniy

Address:

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Course Credit: 5.0 CTL credits

Dates & Times:

This is a 5-credit, self-paced course, covering 16 modules of content. The exact number of hours that you can expect to spend on each module will vary based upon the module coursework, as well as your study style and preferences. You should plan to spend 6-12 hours per module, completing the module slides, readings, Short Answer Assignments, labs, Mastery Exercises, practice problems, and module exams.

COURSE DESCRIPTION:

This course is designed for those who are learning to teach Algebra-Based Physics and Trigonometry-Based Physics for middle school or high school students, focusing on conveying physics and mathematical concepts. Underlying themes are physics connections to everyday life, applications of algebra and trigonometry in physics, problem solving, and hands on laboratory experience. The course presents physics as the foundation for studying chemistry, biology and advanced mathematics. Technology serves as a tool to establish these connections through exploration, problem solving, formative assessment, presentation, and communication.

This course focuses on the topics explored in AP Physics I including vector analysis, kinematics in two dimensions, dynamics in two dimensions, Newtonian gravitation, rotational motion, conservation of energy and momentum, and waves. Big ideas investigated include that objects and systems have properties such as mass and charge; the interactions of an object with other objects can be described by forces; interactions between systems can result in changes in those systems; changes that occur as a result of interactions are constrained by conservation laws.

STUDENT LEARNING OUTCOMES:

Upon completion of the course, the student will be able to:

- 1 Apply general principles of physics in the areas of two-dimensional kinematics, dynamics, energy, and momentum, Newtonian gravitation and rotational motion.

- 2 Apply student-centered pedagogy to teach physics to students.
- 3 Apply basic mathematical tools commonly used in physics including algebra, trigonometry, and graphical analysis.
- 4 Identify, understand, and communicate the elements, representations, and models of scientific phenomena to solve scientific problems.
- 5 Support student development of the big ideas in physics outlined in the AP Physics 1 curriculum framework.
- 6 Examine, investigate, and assess the relationships between various physics models and their variables.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:

Required Texts:

- PSI Algebra-Based Physics uses a free digital text book accessible at: <https://njctl.org/courses/science/ap-physics-1/>
- Participants will download SMART Notebook presentations, homework files, labs, and teacher resources from the PSI AP Physics I Course
- Giancoli (2005). *Physics: Principles with Applications / Edition 6* ISBN-13: 9780130352569
- *The Character of Physical Law*; Richard Feynman; The MIT Press

COURSE REQUIREMENTS:

Consistent attendance in your online courses is essential for your success. Failure to verify your attendance within the first 7 days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have assignments and participation requirements just like on-campus classes. Budget your time carefully. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

GRADE DISTRIBUTION AND SCALE:

In order to receive a Passing grade, the participant must complete the following course requirements:

All Short Answer Assignments, Mastery Exercises, Labs, Exams, and the Reflection Paper outlined in the Assignment Section of the Class Schedule Below.

GRADE DISTRIBUTION AND SCALE:

Grade Distribution:

Module Exams	52.5%
Short Answer Assignments	15%

Labs	15%
Mastery Exercises	15%
Reflection Paper	2.5%

Grade Scale:

A	93 – 100
A-	90 – 92
B+	86 – 89
B	83 – 86
B-	80 – 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D	60.0 – 69.9
F	59.9 or below

ACADEMIC INTEGRITY

Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

CITING SOURCES WITH APA STYLE

All students are expected to follow proper writing and APA requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments.

DISABILITY SERVICES STATEMENT

We are committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact Jamie@njctl.org for additional information to coordinate reasonable accommodations for students with documented disabilities.

NETIQUETTE

Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

Module	Required Readings	Assignments
1	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 2 <p>Topic: Describing Motion: Kinematics in One Dimension</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
2	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 3 <p>Topic: Kinematics in Two Dimensions; Vectors</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
3	<ul style="list-style-type: none"> • The Character of Physical Law – pages 35-58 <p>Topic: The Relation of Mathematics to Physics</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
4	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 4 <p>Topic: Newton's laws of Motion</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
5	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 5 <p>Topic: Circular Motion</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
6	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 5 <p>Topics: Gravitation</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
7	<ul style="list-style-type: none"> • The Character of Physical Law – pages 59-83 <p>Topics: The Great Conservation Principles</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)

8	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 6 <p>Topic: Work and Energy</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
9	<ul style="list-style-type: none"> • <i>Physics, the Human Adventure</i> - pages 209 - 215 <p>Topic: The Law of Conservation of Momentum</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
10	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 7 <p>Topic: Linear Momentum</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
11	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 11 <p>Topic: Vibrations</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
12	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 11 <p>Topic: Waves</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
13	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 12 <p>Topic: Sound</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
14	<ul style="list-style-type: none"> • <i>Physics, the Human Adventure</i> – pages 123-130 <p>Topic: Rotational Motion</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)
15	<ul style="list-style-type: none"> • <i>Physics: Principles with Applications / Edition 6</i> Chapter 8 <p>Topic: Rotational Motion</p>	<ul style="list-style-type: none"> • Short Answer Assignment (10 points) • Lab (10 points) • Mastery Exercise (10 points) • Module Exam (30 points)

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- Review topics as desired in *Physics, the Human Adventure* (recommended)

- Reflection Paper (25 points)
- Module Exam (75 points)