

2. Integrate PSI materials (including presentations, labs, practice problems, etc.) to support student learning and deliver effective instruction.
3. Create a social constructivist learning environment through the use of formative assessment questions, interpreting the results of this assessment to effectively facilitate student-led discussions that support deeper understanding of the content.
4. Integrate multiple attempts to demonstrate student mastery of content knowledge, as encouraged/fostered by the PSI pedagogy.
5. Implement learning plans that are aligned to NGSS standards and allow for differentiation based on the needs of learners.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:

Required Texts:

- PSI AP Physics 1 uses a free digital textbook 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 1 Course

Recommended Texts:

- Giancoli (2005). *Physics: Principles with Applications / Edition 6* ISBN-13: 9780130352569
- *The Character of Physical Law*; Richard Feynman; The MIT Press

COURSE REQUIREMENTS:

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

1. Activities: A number of different learning activities will ensure participant engagement and learning in the course. These include:
 - Engage in video module lessons which demonstrate minimized direct instruction followed by frequent formative assessment
 - Completion of formative assessments aligned to learning objectives which include detailed analysis when answered incorrectly.
 - Interaction with module discussion boards that allow conversation with peers and course instructors about the module's content, delivering that content to students. Discussion boards also serve as a place to ask and answer questions related to the module's content.
2. Short Answer Assignment: Each module requires one (1) original response to a given prompt. These prompts are typically based upon course lessons and require teachers to analyze, reflect, and make connections between the module's content and their own classroom practice.
3. Mastery Exercises: For each module, these multiple-choice question quizzes assess the content knowledge gained in a module. Participants have the opportunity to retake; random questions are pulled from a larger question bank on each attempt ensuring varied questions.
4. Virtual Labs: In each module, a virtual lab write-up will be submitted. Virtual Labs are interactive lab simulations that promote a deeper understanding of the content knowledge being learned through real-world applications and analysis.
5. Module Exam: One is completed at the end of each module. It is a culminating exam consisting of multiple choice and free response questions aligned to the standards and objectives of the module.
6. Reflection Paper: At the end of the course, participants are required to reflect on the knowledge taught in the course, make connections, and compare/contrast their current pedagogy with new strategies

gained in this assignment.

7. Final Exam: At the end of the course, a comprehensive exam consisting of Multiple Choice and Free Response questions assesses the content knowledge learned throughout the course and aligns to the AP Collegeboard Exams.

GRADE DISTRIBUTION AND SCALE:

Grade Distribution:

Module Exams	70%
Final Exam	10%
Labs	6%
Short Answer Assignments	6%
Mastery Exercises	6%
Reflection Paper	2%

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

GRADING RUBRIC:

The following rubric is used to score:

- Short Answer Assignment – 6% of grade
- Reflection Paper – 2% of grade

The minimum possible score for this rubric is 4 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score 25 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

	Meets Expectation	Approaches Expectation	Below Expectation	Limited Evidence
	<i>7 points</i>	<i>5 points</i>	<i>3 points</i>	<i>1 point</i>
Content	<ul style="list-style-type: none"> • Demonstrates excellent knowledge of concepts, skills, and theories relevant to topic. 	<ul style="list-style-type: none"> • Demonstrates fair knowledge of concepts, skills, and theories. 	<ul style="list-style-type: none"> • Demonstrates incomplete or insubstantial knowledge of concepts, skills, and theories. 	<ul style="list-style-type: none"> • Demonstrates little or no knowledge of concepts, skills, and theories.
Depth of Reflection	<ul style="list-style-type: none"> • Content is well supported and addresses all required components of the assignment. 	<ul style="list-style-type: none"> • Content is partially supported; addresses most of the required components of the assignment. 	<ul style="list-style-type: none"> • Content contains major deficiencies; addresses some of the required components of the assignment. 	<ul style="list-style-type: none"> • Content is not supported and/or includes few of the required components of the assignment.
Evidence and Practice	<ul style="list-style-type: none"> • Response shows strong evidence of synthesis of ideas presented and insights gained throughout the entire course. The implications of these insights for the respondent's overall teaching practice are thoroughly detailed, as applicable. 	<ul style="list-style-type: none"> • Writing is mostly clear, concise, and well organized with good sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner. There are no more than five spelling, grammar, or syntax errors per page of writing. 	<ul style="list-style-type: none"> • Response is missing some components and/or does not fully meet the requirements indicated in the instructions. Some questions or parts of the assignment are not addressed. Some attachments and additional documents, if required, are missing or unsuitable for the purpose of the assignment. 	<ul style="list-style-type: none"> • Response excludes essential components and/or does not address the requirements indicated in the instructions. Many parts of the assignment are addressed minimally, inadequately, and/or not at all.
	<i>4 points</i>	<i>3 points</i>	<i>2 points</i>	<i>1 point</i>
Writing Quality	<ul style="list-style-type: none"> • Writing is well-organized, clear, concise, and focused; no errors. 	<ul style="list-style-type: none"> • Some minor errors or omissions in writing organization, focus, and clarity. 	<ul style="list-style-type: none"> • Some significant errors or omissions in writing organization, focus, and clarity. 	<ul style="list-style-type: none"> • Numerous errors in writing organization, focus, and/or clarity.

The following rubric is used to score:

- Labs – 6% of grade

The minimum possible score for this rubric is 2 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score 14 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

	Meets Expectation	Approaches Expectation	Below Expectation	Limited Evidence
	<i>7 points</i>	<i>5 points</i>	<i>3 points</i>	<i>1 point</i>
Completeness	<ul style="list-style-type: none"> Lab write-up is complete with no missing fields. 	<ul style="list-style-type: none"> Lab write-up has 1-2 missing fields. 	<ul style="list-style-type: none"> Lab write up has 3-5 missing fields. 	<ul style="list-style-type: none"> There are more than 5 missing fields on the lab write-up.
Calculations	<ul style="list-style-type: none"> All answers are calculated correctly. 	<ul style="list-style-type: none"> Most answers are calculated correctly, but there are 1-2 minor calculation errors. 	<ul style="list-style-type: none"> Most answers are calculated correctly, but there are multiple minor calculation errors, or 1-2 gross miscalculations. 	<ul style="list-style-type: none"> There are calculation errors throughout the lab.

The remaining types of assignments are not scored using a rubric. These assignments are scored using percentage correct to assign a letter grade. The assignments in this manner are as follows:

- Mastery Exercises – 6% of grade
- Module Exams – 70% of grade
- Final Exam – 10% of grade

Mastery Exercises can be retaken as many times as desired to ensure a high score. Due to the nature of these assignments, each time they are taken, they will be comprised of ten unique questions pulled randomly from a larger question bank.

Module and Final Exams are scored using a curve, which allows us to keep content exams rigorous. Module Exams can be retaken one time. Final Exams cannot be retaken.

ACADEMIC STANDING:

NJCTL has established standards for academic good standing within a student's academic program. Students enrolled in any NJCTL online course must receive an 80 or higher to successfully complete a course and receive credit for that course. An 80 is equivalent to a GPA of 2.7 or B-. Additionally, students in an endorsement program must receive a cumulative GPA of 3.0 for all courses combined in order to successfully complete the program.

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 the Dean of Students, Melissa Axelsson, for additional information to coordinate reasonable accommodations for students with documented disabilities (melissa@njctl.org).

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	Module Learning Outcomes	Assignments
1 – Simple Harmonic Motion	<ul style="list-style-type: none">• Understand how restoring forces can result in oscillatory motion.• Understand how a spring exerting a linear restoring force increases with mass and decreases with spring stiffness.• Demonstrate simple pendulum and simple mass spring experiments.• Understand the relationship between pendulum oscillation periods and pendulum length.	<ul style="list-style-type: none">• Short Answer Assignment• Lab• Mastery Exercise• Module Exam
2 – Waves	<ul style="list-style-type: none">• Understand how waves can propagate via different oscillation modes, such as transverse and longitudinal.• Use graphical representation of a periodic mechanical wave to determine the amplitude of the wave.• Explain and predict qualitatively how the energy carried by a wave relates to the amplitude of the wave.• Describe wave refraction, diffraction and interference.	<ul style="list-style-type: none">• Short Answer Assignment• Lab• Mastery Exercise• Module Exam

<p>3 – Sound Waves</p>	<ul style="list-style-type: none"> ● Understand how sound waves can propagate via different oscillation modes, such as transverse and longitudinal. ● Use a graphical representation of a periodic mechanical wave to determine the amplitude of the sound wave. ● Explain and predict qualitatively how the energy carried by a sound wave relates to the amplitude of the wave and apply this concept to a real-world example. ● Apply the Doppler Effect to real-life scenarios. 	<ul style="list-style-type: none"> ● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
<p>4 – Rotational Motion</p>	<ul style="list-style-type: none"> ● Use representations of the relationship between force and torque. ● Compare the torques on an object caused by various forces. ● Estimate the torque on an object caused by various forces in comparison to other situations. ● Design an experiment and analyze data testing a question about torques in a balanced rigid system. ● Calculate torques on a two-dimensional system in static equilibrium, by examining a representation or model (such as a diagram or physical construction). ● Make predictions about the change in the angular velocity about an axis for an object when forces exerted on the object cause a torque about that axis. ● Plan data collection and analysis strategies designed to test the relationship between a torque exerted on an object and the change in angular velocity of that object about an axis. ● Predict the behavior of rotational collision situations by the same processes that are used to analyze linear collision situations using an analogy between impulse and change of linear momentum and angular impulse and change of angular momentum. ● In an unfamiliar context or using representations beyond equations, justify the selection of a mathematical routine to solve for the change in angular momentum of an object caused by torques exerted on the object. ● Plan data collection and analysis strategies designed to test the relationship between torques exerted on an object and the change in angular momentum of that object. 	<ul style="list-style-type: none"> ● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
<p>5 – Electric Charge and Force</p>	<ul style="list-style-type: none"> ● Make claims about natural phenomena based on conservation of electric charge. ● Construct an explanation of the two-charge model of electric charge based on evidence produced through scientific practices. ● Make a qualitative prediction about the distribution of positive and negative electric charges within neutral systems as they undergo various processes. ● Challenge claims that polarization of electric charge or separation of charge must result in a net charge on the object. 	<ul style="list-style-type: none"> ● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam

<p>6 – Electric Currents & Circuits</p>	<ul style="list-style-type: none"> ● Make predictions, using the conservation of electric charge, about the sign and relative quantity of net charge of objects or systems after various charging processes, including conservation of charge in simple circuits. ● Choose and justify the selection of data needed to determine resistivity for a given material. ● Make predictions about the properties of resistors and/or capacitors when placed in a simple circuit when placed in a simple circuit, based on the geometry of the circuit element and supported by scientific theories and mathematical relationships. ● Design a plan for the collection of data to determine the effect of changing the geometry and/or materials on the resistance or capacitance of a circuit element and relate results to the basic properties of resistors and capacitors. ● Make and justify a quantitative and qualitative predictions of the effect of a change in values or arrangements of one or two circuit elements on the currents and arrangements of one or two circuit elements on the currents and potential differences in a circuit containing a small number of sources of emf, resistors, capacitors, and switches in a series and/or parallel. ● Plan data collection strategies and perform data analysis to examine the values of currents and potential differences in an electric circuit that is modified by changing or rearranging circuit elements, including sources of emf, resistors, and capacitors. 	<ul style="list-style-type: none"> ● Short Answer Assignment ● Lab ● Mastery Exercise ● Module Exam
<p>7 – Review & Final Exam</p>	<ul style="list-style-type: none"> ● Review topics in Principles with Applications and The Character of Physical Law; ● Review the AP Physics 1: Algebra-Based course overview: https://apstudent.collegeboard.org/apcourse/ap-physics-1 ● Zoom meetings with instructor and discussion board posts 	<ul style="list-style-type: none"> ● Reflection Paper ● Final Exam