NEW JERSEY CENTER
FOR TEACHING & LEARNING

PHYS 6601: Learning & Teaching Algebra-Based Physics

Course Credit: 6.0 NJCTL credits

Dates & Times:

This is a 6-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.

Graduate Student Handbook: njctl.org/graduate-handbook/

COURSE DESCRIPTION:

This introductory course is for teachers to learn the content of PSI Algebra-Based Physics and how to teach that course to students. The student course is for students who are concurrently enrolled in Algebra. This is a mathematically rigorous physics course that reinforces student knowledge of algebra in one dimension while providing the foundation for studying advanced physics, chemistry and biology. Topics include mechanics, electricity and magnetism, waves and modern physics.

STUDENT LEARNING OUTCOMES:

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

1. Demonstrate master of Algebra-Based Physics on a comprehensive exam.
2. Demonstrate mastery of pedagogical content knowledge for teaching Algebra-Based Physics.
3. Identify, understand, and communicate the elements, representations, and models of scientific phenomena to solve scientific problems.
4. Apply basic mathematical tools such as linear algebra and graphical analysis to solve physics problems.

5. Apply the laws of physics in the areas of kinematics, dynamics, uniform circular motion, Newtonian gravitation, conservation of energy and momentum, electromagnetism and modern physics.
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/algebra-based-physics/
- Participants will download SMART Notebook presentations, homework files, labs, and teacher resources from the PSI Algebra-Based Physics Course

Recommended Texts:

Holton, G. J., Brush, S. G., & Holton, G. J. (2001). *Physics, the Human Adventure: From Copernicus to Einstein and Beyond*. New Brunswick, N.J: Rutgers University Press. ISBN-13: 9780813529080

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 the Dean of Students.

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 *Assignments* section of the Class Schedule (below).

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

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, Dr. Jamie Korns, additional information to coordinate reasonable accommodations for students with documented disabilities (Jamie@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	Required Readings	Assignments
0 - Optional Algebra Review	• Presentations. • Recommended:	• Short Answer • Lab • Mastery Exercises • Module Exam
1- Kinematics	• Pages 63-76 in *Physics, the Human Adventure*	• Short Answer • Lab • Mastery Exercises • Module Exam
2 - Dynamics	• Pages 103-122 in *Physics, the Human Adventure*	• Short Answer • Lab • Mastery Exercises • Module Exam
3 – Uniform Circular Motion & Uniform Gravitation	• Pages 123-156 in *Physics, the Human Adventure*	• Short Answer • Lab • Mastery Exercises • Module Exam
4 - Energy	• Pages 219-247 in *Physics, the Human Adventure*	• Short Answer • Lab • Mastery Exercises • Module Exam
5 - Momentum	• Pages 209-215 in Physics, *the Human Adventure*	• Short Answer • Lab • Mastery Exercises • Module Exam
6 – Electric Charge & Force	• Pages 352-361 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
7 – Electric Field, Potential Energy, & Voltage	• Pages 362-363 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam

8 – Electric Current & Circuits	• Pages 364-366 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
9 – Magnetism	• Pages 369-370 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
10 – Electromagnetic Induction	• Pages 371-374 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
11 – Simple Harmonic Motion	• Pages 80-83 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
12 – Waves & Sound	• Pages 341-344 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
13 – Electromagnetic Waves	• Pages 345-351 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
14 – Quantum Physics & Atomic Models	• Pages 388-408 and 427-445 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
15 – Nuclear Physics	• Pages 409-426 in *Physics, the Human* Adventure	• Short Answer • Lab • Mastery Exercises • Module Exam
16 – Final Reflection	• Review topics as desired in *Physics, the Human Adventure* (recommended)	• Reflection Paper • Final Exam