

# **PHYS 010**

## **Physics Behind the Headlines**

### **Sample Syllabus**

### **Description**

In this class you will learn the conceptual aspects of modern physics with the goal of interpreting and summarizing recent technological advances, scientific breakthroughs and social events related to science as they appear in the news. Real news article will be used in each weekly lesson to introduce the subject. The content objectives will focus primarily on the modern physics of quantum mechanics and relativity. No prior knowledge of physics is assumed and there are not math pre-requisites.

This class is meant to be a fun exploration at the frontier of our knowledge of the natural world! Recent scientific news and social events will be our guides through the landscape of modern physics.

### **Objectives**

On completion of PHYS 010, students will be able to:

- Identify the relevant physics concepts behind current social, political, and economic issues. An understanding of the science behind these issues will help you make informed decisions.
- Draw meaningful conclusions from reading science articles and be able to judge the quality of the scientific reporting.
- Infer ethical issues in scientific research and imagine options for action.
- Articulate solutions to problems in modern physics in terms of a set of concepts and how they apply.
- Collect and consistently assemble multiple concepts to fully analyze a situation (not just get an answer to a specific question) or critique a proposed analysis.
- Draw meaningful conclusions from tables and graphs of data, or from images or videos from which data can be obtained.

### **Textbook**

Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know - By: Richard Muller. (Make sure not to buy the pop-science book called “Physics for Future Presidents” by the same author). There will be some extra reading material that will be posted on Canvas and on the library’s E-reserves.

## Course Schedule

Week	Topic(s)
1	Atoms and Particles
2	Energy, Heat & Momentum
3	Waves
4	Space-time
5	The Life of the Electron
6	Midterm 1 Review Ethics in Science
7	The Life of the Photon
8	How the Photon and Electron Interact
9	High Tech and Radiation
10	Nuclear Forces
11	Midterm 2 Review The Large Hadron Collider
12	The 4 Fundamental Forces of Nature
13	The Theory of Gravity
14	Cosmology
15	Open Problems in Physics

## Homework

There will be roughly 10 homework throughout the semester. Homework will be submitted on Canvas and they aim to test your understanding of the material and to work on practice questions similar to what you will find in the midterms and final. Doing the homework and making sure to go back to understand the questions you missed is one of the best way to do well in class!

## Exams

There will be three exams in the semester (two midterms and a final exam) where you will have the opportunity to show how well you have learned the course material.

Each exam will be delivered through Canvas. There will be a time limit of 50 minutes for each midterm and 75 minutes for the comprehensive final exam. Only one attempt is allowed. You will not need to find a proctor.

## Project: News Article

You will be expected to complete one project related to class material. This will be in the form of a news article on a scientific subject of your choice that is related to the concepts discussed in this class. There will be two components. In the first part, people will work together to do research and produce “index cards” that can then be used to write the news article. Then you will individually write a scientific news article on the subject.

## Grading

Your grade in the course will be based on your performance on the exams, quality of the lab work (reports), performance in homework and the quality of your project, with the following weight:

Assignment	% Score
Midterm Exam 1	20%
Midterm Exam 2	20%

Final Exam	25%
Labs	10%
Homework	10%
Project	10%
Participation	5%
Total	100%

## Grading Scale

Letter Grade	% Score
A	93-100%
A-	91-92%
B+	88-90%
B	84-87%
B-	81-83%
C+	78-80%
C	70-77%
D	60-69%
F	< 59%

## Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code

of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

## **Accommodating Disabilities**

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The [Student Disability Resources \(SDR\) website](#) provides contact information for every Penn State campus . For further information, please visit [Student Disability Resources website](#).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: [See documentation guidelines](#) . If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

## **Counseling and Psychological Services**

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- [Counseling and Psychological Services at University Park \(CAPS\)](#): 814-863-0395
- [Counseling and Psychological Services at Commonwealth Campuses](#)
- Penn State Crisis Line (Available 24 hrs, 7 days a week): 877-229-6400
- Crisis Text Line (Available 24 hrs, 7 days a week): Text LIONS to 741741

## **Educational Equity / Report Bias**

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the [Report Bias website](#).