

## COURSE OUTLINE

### **THE PHYSICAL WORLD**

Physics is not a fixed body of knowledge but an ever-evolving attempt to improve our understanding of the world around us. Students explore both the foundations of Classical Physics and some of the discoveries at the frontiers of the subject. They will acquire not only factual knowledge but also the skills to enable them to analyse and solve problems.

Beginning with a study of Newton's Laws of Motion and Universal Gravitation, the course then addresses the theory and application of Electric circuits and Electromagnetism. The course is rounded off with an appreciation of some twentieth and twenty-first century Physics, including an introduction to relativity, quantum mechanics, and cosmology. In the final week of term each student will prepare a presentation on a Physics topic of their choice. There will also be an option to learn about some aspects of the history of Physics aided by visits to some of the excellent local museums.

### **Aims and Objectives**

- To develop an understanding and appreciation of some of the main ideas of Physics.
- To gain knowledge of both Classical and Modern Physics
- To develop the skills needed to solve problems in Physics.
- To develop a knowledge and understanding of some of the major concepts in mechanics and electromagnetism.
- To learn how to solve numerical problems in Physics.
- To gain some knowledge of the history of the theories of mechanics and cosmology.

## **Assessment Process**

### **Grade Breakdown:-**

- 10% Class participation
- 30% Problem solving (private study assignments)
- 20% Test on Mechanics (descriptive and numerical problems)
- 40% Two essays, or one long essay and a presentation

### **Example Private Study Assignments**

- Week 1: Use the Internet and other resources to research the life and work of Archimedes. Solve simple problems on density, pressure, and upthrust.
- Weeks 2 to 5: Solve problems on vectors, kinematics, energy, momentum, Newton's Laws of Motion. Reading from *Galileo's Daughter*.
- Weeks 6 to 7: Use libraries to research the cosmological theories of Aristotle, Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton. Solve simple problems on Newton's Law of Universal Gravitation. Reading from Galileo's *Dialogue on the two world systems*.
- Week 8: Solve problems on electricity and magnetism. Begin essay on either the work of one scientist or on competing theories of cosmology.
- Week 9: More problems on electricity and magnetism. Continuation of essay.
- Week 10: Begin second essay, contrasting Galilean relativity and Einstein's theories of Relativity.
- Weeks 11 and 12: Continue research for essays, finish essays.

## Assessment Criteria

<b>DISTINCTION</b> Grade A	Active participation in class. Has done some own research using libraries and Internet. Shows ability to solve both numerical and descriptive problems on Physics. Shows an excellent understanding of some of the key concepts in Physics, and is able to communicate this understanding.
<b>CREDIT</b> Grade B	Full participation in class. Has done some own research. Can solve most problems set, both numerical and descriptive. Can demonstrate a good understanding of some of the key concepts in Physics.
<b>MERIT</b> Grade C	Good attendance in class. Has done some own research. Can solve some problems, both numerical and descriptive. Can demonstrate an understanding of some of the key concepts in Physics.
<b>PASS</b> Grade D	Regular attendance in class. Has attempted own research. Can solve some problems, either numerical or descriptive. Can demonstrate some understanding of one of the key concepts in Physics.
<b>FAIL</b>	None of the criteria listed above followed.

## Recommended Reading

An Introduction to Newton, William Rankine,

*ISBN: 1874166072*

The Character of Physical Law, Richard Feynman, Penguin Books

*ISBN: 9780140175059*

If you are unable to obtain books locally, they may be ordered from

<http://www.bookshop.blackwell.co.uk>

or [www.Amazon.co.uk](http://www.Amazon.co.uk)