



## ISS Course Syllabus

**Teacher:** Peter  
**Course Title:** Physics

**Grade:**

### Course Description:

This course develops students' understanding of the basic concepts of physics. Students will study the laws of dynamics and explore different kinds of forces, the quantification and forms of energy (mechanical, sound, light, thermal and electrical) and the way energy is transformed and transmitted. They will develop scientific-inquiry skills as they verify accepted laws and solve both assigned problems and those emerging from their investigations. Students will also analyse the interrelationships between physics and technology and consider the impact of technological applications of physics on society and the environment.

### Course Contents:

**Unit 1 Mechanics:** The students will investigate and understand that:

- motion of objects can be described in terms of displacement, time, velocity and acceleration
- the change in motion is the result of unbalanced forces
- work is the transfer of energy
- gravity is related to planetary and satellite motion as well as to various phenomena on earth and in the universe
- uniform circular motion is seen as an example of conservation of energy
- Newton's laws of motion can be used to explain uniform circular motion

**Unit 2 Sound and Light:** The students will investigate and understand that

- waves are means of transmitting energy
- waves interact in different ways (reflection, refraction, interference, diffraction, Doppler effect)
- sound is mechanical wave
- light is an electromagnetic wave
- geometrical optics is used to explain the nature and behaviour of light
- the wave model improve our understanding of the behaviour of light

**Unit 3 Electricity and Magnetism:** The students will investigate and understand that:

- the behaviour of electrical charges at rest is explained by the laws that govern the electrical interactions
- Coulomb's law relates electrical energy and electric charge
- current, voltage and resistance are related
- electric field theory is used to explain interactions among electric charges
- electromagnetism is one of the main phenomena in the universe
- field theory is used to describe magnetic interactions

**Unit 4 Thermodynamics and Nuclear Physics:** The students will investigate and understand that:

- energy cannot be created or destroyed, but during energy transformation some of the energy is released to the environment as heat
- heat can be transferred by conduction, convection and radiation
- phase changes involve loss or gain of heat energy
- laws of thermodynamics apply to closed thermal systems and their unavailability of energy
- thermal energy consists of the random motion of the representative particles; the increase of energy means increase of the motion of particles
- entropy increases when the disorder of the system increases
- models of atoms have involved particles and waves
- radioactive elements have unstable nuclei and emit various nuclear particles
- in Nuclear fusion, hydrogen nuclei fuse to form helium nuclei, releasing large amounts of energy
- alpha, beta and gamma radiation produce different amounts and kinds of damage in matter and have different penetrations

**Resources:**

Paul Hewitt: Conceptual Physics

**Evaluation System:**

<b>Component</b>	<b>%</b>	<b>Comments</b>
Quizzes/Tests		Unit tests and smaller quizzes
Labs and assignments		<ul style="list-style-type: none"> <li>• Formal Lab reports as well as informal write-ups</li> <li>• Oral Presentations</li> <li>• Projects</li> <li>• Posters</li> </ul>
Daily work		Homework, in-class assignments
Exam		Final examination at end of the course
Total		A maximum of 100 % is available

Progress marks will be calculated and reported quarterly. Marks do not close until the final exam has been written.

**Additional Comments:**