



## SAMPLE COURSE OUTLINE

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PHYSICS  
GENERAL YEAR 12

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## Sample course outline

### Physics – General Year 12

#### Unit 3 and Unit 4

#### Science Inquiry Skills

Science Inquiry Skills align with the Science Understanding and Science as a Human Endeavour content of the unit and are integrated into the learning experiences for Units 3 and 4.

- identify, research, construct and refine questions for investigation; propose hypotheses; and predict possible outcomes
- plan, select and use appropriate investigation methods, including preliminary trials, laboratory experimentation and controlling variables to collect reliable data
- assess risk and address ethical issues associated with these methods
- work collaboratively and individually to conduct investigations using appropriate measuring devices, safely, competently and methodically for the collection of valid and reliable data
- organise and clearly represent data in tables and appropriate graphs to identify trends, patterns and relationships
- describe sources of experimental error
- use appropriate SI units and symbols
- use evidence to make and justify conclusions
- evaluate conclusions by considering the quality of available evidence and make recommendations for improving experimental method
- communicate scientific ideas and information using appropriate scientific language, conventions and representations

## Semester 1 – Unit 3 – Moving

Week	Key teaching points
1–3	<ul style="list-style-type: none"> <li>displacement, velocity, speed, distance, momentum</li> <li>acceleration is the rate of change of velocity</li> <li>solve simple problems using the equations:  <math display="block">v = \frac{s}{t}, \quad a = \frac{v-u}{t}, \quad s = ut + \frac{1}{2}at^2, \quad v^2 = u^2 + 2as, \quad p = mv</math> </li> <li>uniform motion in one dimension can be represented graphically</li> <li>data used to describe motion can be collected using a range of technologies (SHE)</li> </ul> <p><b>Task 1:</b> Investigation: Measuring speed and acceleration</p>
4–6	<ul style="list-style-type: none"> <li>forces and their effects, including pushes and pulls</li> <li>contact forces, including friction; and non-contact forces, including gravity</li> <li>forces have magnitude and direction</li> <li>free body diagrams show the forces acting on objects in one or two dimensions</li> </ul> <p><b>Task 2:</b> Test: Movement: velocity, acceleration, forces</p>
7–9	<ul style="list-style-type: none"> <li>Newton’s First Law (also called the law of inertia)</li> <li>Newton’s Second Law explains the relationship between force and rate of change in momentum according to the equation <math>Ft = \Delta p = m(v-u)</math></li> <li>Newton’s Second Law also relates force and acceleration according to the equation  <math display="block">F = ma</math> </li> <li>The relationships above can be used to explain behaviour of objects in practical situations</li> <li>Newton’s Third Law of motion</li> <li>the effects of friction in everyday life (SHE)</li> <li>traffic accidents can be investigated to determine how road and weather conditions, driver reaction times and speed affect the severity of vehicle collisions (SHE)</li> <li>the principles behind safety measures, such as crash barriers, seatbelts, crumple zones (SHE)</li> </ul> <p><b>Task 3:</b> Investigation: Factors affecting the severity of collisions</p>
10–11	<ul style="list-style-type: none"> <li>principles of physics can be applied to understand movement in sport (SHE)</li> <li>the force of gravity causes objects close to the Earth to accelerate at the same rate</li> <li>distinguish between mass and weight: This will include applying the relationship:  <math display="block">F_{\text{weight}} = mg</math> </li> <li>objects in free fall due to gravity experience apparent weightlessness</li> </ul> <p><b>Task 4:</b> Investigation: Factors affecting the flight of a water rocket</p> <p><b>Task 5:</b> Extended response: Physics of a sport</p>
12–13	<ul style="list-style-type: none"> <li>work done is equal to energy transferred: This will include applying the relationship:  <math display="block">W = Fs</math> </li> <li>kinetic energy is the energy of motion</li> </ul> <p><b>Externally set task</b></p>
14–15	<ul style="list-style-type: none"> <li>gravitational potential energy is the energy of position</li> <li>conservation of energy</li> </ul> <p><b>Task 6:</b> Test: Movement: Newton’s laws, work, energy</p>

## Semester 2 – Unit 4 – Electricity

Week	Key teaching points
1	<ul style="list-style-type: none"> <li>static electricity – atoms can gain or lose electrons, so gaining a net charge; and like charges repel and unlike charges attract</li> <li>lightning as a natural example of charge build-up and discharge (SHE)</li> </ul>
2–3	<ul style="list-style-type: none"> <li>electric current is the rate of flow of electric charge</li> <li>the direction of conventional current is that in which the flow of positive charge is considered to take place, while the electron flow is in the opposite direction</li> <li>electrical properties of conductors and insulators</li> <li>construct simple electrical circuits and measure current and potential difference at various points around the circuit using ammeters, voltmeters and multimeters</li> <li>draw and interpret simple circuit diagrams, including the standard symbols for resistor (fixed and variable), light globe, switch, ammeter, voltmeter, cell/battery, and power supply</li> </ul>
4–5	<ul style="list-style-type: none"> <li>energy transformations, such as heating and lighting effects in electrical circuits</li> <li>current, voltage and resistance are related as shown in Ohm’s law: <math>V = IR</math>; as resistance increases, current decreases if voltage remains the same</li> <li>factors affecting resistance of a conductor – type of material, length, cross-sectional area</li> <li>high resistance conductors can be used to produce heat as in heating elements</li> </ul> <p><b>Task 7:</b> Investigation: The relationship between current and potential difference, factors affecting resistance</p>
6–7	<ul style="list-style-type: none"> <li>the concepts of electrical current, potential difference and resistance in series and parallel circuits</li> <li>the effects of having resistors connected in series</li> <li>the effects of having resistors connected in parallel</li> </ul> <p><b>Task 8:</b> Test: Electricity: Ohm’s law, series and parallel circuits</p>
8–9	<ul style="list-style-type: none"> <li>power is related to voltage and current. This will include applying the relationship: <math>P = VI</math></li> <li>the kilowatt hour is a unit of energy and is used to determine the cost of running electrical appliances</li> <li>efficient use of household electricity (SHE)</li> </ul>
10–11	<ul style="list-style-type: none"> <li>magnetism and magnetic fields; like poles repel, unlike poles attract</li> <li>Earth’s magnetic field</li> <li>use of compass to plot magnetic fields</li> <li>origin of Earth’s magnetic field and its use for navigation (SHE)</li> <li>moving charges have magnetic fields</li> <li>a current carrying wire in a magnetic field has a force acting on it when it cuts flux lines. This is the principle behind the electric motor</li> </ul> <p><b>Task 9:</b> Investigation: The magnetic fields of magnets, wires, coils</p>
12–13	<ul style="list-style-type: none"> <li>current is generated in a moving conductor when it cuts magnetic flux lines. This is the principle behind the generator</li> <li>the cause of short circuits and electric shock</li> <li>the protective role of earthing electrical circuits (SHE)</li> <li>identification of hazardous situations and the necessary safety precautions in everyday uses of electrical energy</li> <li>the principles behind the operation of various safety devices, such as fuses, RCDs,</li> </ul>

Week	Key teaching points
	circuit breakers <b>Task 10:</b> Extended response: Research your household's use of electricity
14–15	<ul style="list-style-type: none"><li>production of electric power using coal, gas, oil, solar furnace, wind, nuclear, geothermal, tidal, photovoltaics; and advantages and disadvantages of these methods (SHE)</li></ul> <b>Task 11:</b> Test: Electric power, safety, magnetism