

	Section	Number of Students	Year Level(s)	Subject(s)	Curriculum Relevance
Nuclear	<ul style="list-style-type: none"> •Turntables •Inverse Square Law 	16 (groups of two)	9,10,11	Physics, Chemistry	<u>Year 9</u>
		16 (groups of two)	9,10,11		Science Understanding
					Chemical sciences
					<ul style="list-style-type: none"> • All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms (ACSSU177)
					Science as a Human Endeavour
					Use and influence of science
					<ul style="list-style-type: none"> • People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions (ACSHE160)
					Science Inquiry Skills
					Processing and analysing data and information
					<ul style="list-style-type: none"> • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (AC SIS169) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (AC SIS170)
			<u>Year 10</u>		
			Science as a Human Endeavour		
			Use and influence of science		
			<ul style="list-style-type: none"> • People can use scientific knowledge to evaluate whether they 		

					should accept claims, explanations or predictions (ACSHE194)
					Planning and conducting
					<ul style="list-style-type: none"> • Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS199) • Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (ACSIS200)
					Processing and analysing data and information
					<ul style="list-style-type: none"> • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS203) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS204)
					<u>Year 11</u> Unit 1: Area of Study 1: Nuclear Physics and Radioactivity
					<ul style="list-style-type: none"> • Explain why some atomic nuclei are stable and others are not • Describe the radioactive decay of unstable nuclei in terms of half-life • Describe the detection and penetrating properties of α, β and γ radiation • Describe the effects of α, β and γ radiation on humans • Describe the effects of ionising radiation on living things and the environment • Describe the risks for living things and/or the environment associated with the use of nuclear reactions and radioactivity

Environment	Solar Hot Water	∞	9,10,11	Physics	<u>Year 9</u>
	Cyclone Station	∞/1	9,10,11	Physics	<i>Science Understanding</i>
	Weather Station	1	9,10,11	Physics	Physical sciences
					<ul style="list-style-type: none"> • Energy transfer through different mediums can be explained using wave and particle models (ACSSU182)
					<i>Science as a Human Endeavour</i>
					Use and influence of science
					<ul style="list-style-type: none"> • The values and needs of contemporary society can influence the focus of scientific research (ACSHE228)
					<i>Science Inquiry Skills</i>
					Planning and conducting
					<ul style="list-style-type: none"> • Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (AC SIS200)
					Processing and analysing data and information
					<ul style="list-style-type: none"> • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (AC SIS169) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (AC SIS170)
					<u>Year 10</u>
					<i>Science Understanding</i>

					<p>Physical sciences</p> <ul style="list-style-type: none"> • Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190)
					<p>Science as a Human Endeavour</p>
					<p>Use and influence of science</p> <ul style="list-style-type: none"> • The values and needs of contemporary society can influence the focus of scientific research (ACSHE228)
					<p>Science Inquiry Skills</p>
					<p>Planning and conducting</p> <ul style="list-style-type: none"> • Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (AC SIS200)
					<p>Processing and analysing data and information</p> <ul style="list-style-type: none"> • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (AC SIS169) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (AC SIS170)
					<p>VCE Units 1&2: Detailed study 3.4: Investigations: Flight</p> <ul style="list-style-type: none"> • explain lift in terms of Bernoulli's principle and the rate of change of momentum • model lift and Bernoulli's principle using a wind tunnel • investigate experimentally identified aspects of performance using a model

					<p>VCE Units 1&2: Detailed study 3.5: Investigations: Sustainable Energy Sources</p> <ul style="list-style-type: none"> • explain the terms sustainable and renewable in terms of energy use • compare different renewable energy sources and investigate one experimentally • analyse the potential of the system being investigated to make a significant contribution to the community's energy requirements, including the benefits, limitations and environmental consequences of the system • evaluate the model system in relation to a real-life problem involving energy supply • interpret information sources to evaluate risks in the development and use of an energy supply system <p>Cross-curriculum priorities</p> <p><i>Sustainability (Solar Hot Water)</i></p> <ul style="list-style-type: none"> • <u>World Views</u> <ul style="list-style-type: none"> - World views that recognise the dependence of living things on healthy ecosystems, and value diversity and social justice are essential for achieving sustainability (OI.4). - World views are formed by experiences at personal, local, national and global levels, and are linked to individual and community actions for sustainability (OI.5). • <u>Futures</u> <ul style="list-style-type: none"> - Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments (OI.7). - Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts (OI.8).
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					<p><i>Aboriginal and Torres Strait Islander histories and culture (Weather Station)</i></p> <hr/> <ul style="list-style-type: none">• <u><i>Country/Place</i></u><ul style="list-style-type: none">- Aboriginal and Torres Strait Islander communities maintain a special connection to and responsibility for Country/Place throughout all of Australia (OI.2).- Aboriginal and Torres Strait Islander Peoples have unique belief systems and are spiritually connected to the land, sea, sky and waterways (OI.3).• <u><i>Culture</i></u><ul style="list-style-type: none">- Aboriginal and Torres Strait Islander Peoples' ways of life are uniquely expressed through ways of being, knowing, thinking and doing (OI.5).- Aboriginal and Torres Strait Islander Peoples have lived in Australia for tens of thousands of years and experiences can be viewed through historical, social and political lenses (OI.6).
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Structure	eVBL 3D Imaging Photoelectric Effect	1 ∞/1 8-16 (Groups of two)	11,12 11,12 10,11,12	Physics Physics Physics	Year 10
					Science Understanding
					Physical sciences
					<ul style="list-style-type: none"> • Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190)
					Science Inquiry Skills
					Planning and conducting
					<ul style="list-style-type: none"> • Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (ACSIS200)
					Processing and analysing data and information
					<ul style="list-style-type: none"> • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170)
					VCE Units 1&2: Detailed study 3.6: Medical Physics
<ul style="list-style-type: none"> • describe and evaluate the use of lasers as intense energy sources for medical treatments • describe and compare processes of, and images produced by, medical imaging using two or more of ultrasound, X-rays, CT, MRI and PET 					
VCE Units 3&4: Detailed study 3.4: Synchrotron and its Applications					
<ul style="list-style-type: none"> • compare the characteristics of synchrotron radiation, including brightness, spectrum and divergence with the characteristics of 					

					<p>electromagnetic radiation from other sources including lasers and X-ray tubes</p> <ul style="list-style-type: none"> • explain, using the characteristics of brightness, spectrum and divergence, why for some experiments synchrotron radiation is preferable to laser-light and radiation from X-ray tubes
					<p>Year 12 Unit 4: Area of Study 2: Interactions of Light and Matter</p> <ul style="list-style-type: none"> • Analyse the photoelectric effect in terms of: <ul style="list-style-type: none"> – evidence for the particle-like nature of light – experimental data in the form of graphs of photocurrent versus electrode potential, and of kinetic energy of electrons versus frequency – kinetic energy of emitted photoelectrons, $E_{kmax} = hf - W$, using energy units of joule and electronvolt – effects of intensity of incident irradiation on the emission of photoelectrons • describe why the wave model of light cannot account for the experimental photoelectric effect results • interpret electron diffraction patterns as evidence for the wave-like nature of matter • compare the diffraction patterns produced by photons and electrons • calculate the de Broglie wavelength of matter, $\lambda = h/p$ • compare the momentum of photons and of matter of the same wavelength including calculations using $p = h/\lambda$ • explain the production of atomic absorption and emission spectra, including those from metal vapour lamps • interpret spectra and calculate the energy of photons absorbed or emitted, $\Delta E = hf$

Sources:

Year 9 and 10

<http://www.australiancurriculum.edu.au/Science/Curriculum/F-10>

<http://www.australiancurriculum.edu.au/CrossCurriculumPriorities/Sustainability>

<http://www.australiancurriculum.edu.au/CrossCurriculumPriorities/Aboriginal-and-Torres-Strait-Islander-histories-and-cultures>

VCE Units 1-4

Physics Study Design