

	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 (ACSIS200)
					<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 (ACSIS169) • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170)
					<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

					<p>the community's energy requirements, including the benefits, limitations and environmental consequences of the system</p> <ul style="list-style-type: none"> • 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> <hr/> <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).
					<p><i>Aboriginal and Torres Strait Islander histories and culture (Weather Station)</i></p> <hr/> <ul style="list-style-type: none"> • <u>Country/Place</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,

					<p>sky and waterways (OI.3).</p> <ul style="list-style-type: none">• <u>Culture</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