VCE Physics: Sample teaching plan

Sample Course Outline – VCE Physics Unit 1: What ideas explain the physical world?

**Note:** This is a sample guide only and indicates one way to present the content from the Study Design over the weeks in each school term. Teachers are advised to consider their own contexts in developing learning activities: Which local fieldwork sites would support learning in the topic area? Which local issues lend themselves to debate and investigation? Which experiments can students complete within the resource limitations of their learning environments?

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| **Week** | **Area** | **Topics** | **Practical work** |
| 1 | **How can thermal effects be explained?** | Temperature; kinetic energy model; Zeroth law; first law; internal energy.  | Measuring temperature |
| 2 | Energy required to change temperature and state (latent and specific heat capacity); evaporative cooling.  | Conduction, convection and radiation; heat capacity |
| 3 | Heat transfers (conduction; convection; radiation); regions of the electromagnetic spectrum; radiation from the sun; Wien’s Law.  | Design-build-test solar hot water system |
| 4 | Stefan-Boltzmann law; modelling tectonic plates; modelling weather; greenhouse effect; greenhouse gases; human activity and the enhanced greenhouse effect.  | Greenhouse effect model |
| 5 | Thermodynamics Investigation (student choice of topics, including: energy use for heating vs cooling; heating and cooling systems; passive house design; thermal imaging; energy ratings; cooking alternatives; automotive fuel sources). | Dependent on student chosen topic and focus area |
| 6 | **How do electric circuits work?** | Charge and current; potential difference and emf; circuit analogies; making measurements (ammeters, voltmeters, multimeters); conductors and insulators. | Basic circuits; conductors and insulators |
| 7 | Resistance; I–V graphs; Ohm’s Law; circuit components (light bulb, resistor, diode, LED, thermistor, LDR, potentiometer); ohmic and non-ohmic devices; energy and power. | Resistance of pencil lines; I–V characteristics |
| 8 | Series and parallel circuit characteristics (voltage, current, energy, power); effective resistance in series and parallel; calculating resistance. | Series and parallel circuits |
| 9 | Voltage dividers; applications of transducers. | Sensing light and temperature |
| 10 | Household circuit components (circuit breakers, switches, loads); parallel circuits; kilowatt-hours; AC and DC. | Appliance energy use |
| 11 | Safety devices (fuses, circuit breakers, RCDs); electric shock (causes, effects, treatments). |  |
| **Week** | **Area** | **Topics** | **Practical work** |
| 12 | **What is matter and how is it formed?** | Origins of the Universe; Big Bang theory; space and time; using scientific notation; the changing Universe (expansion, cooling); changes of matter. | Modelling expansion |
| 13 | Nuclear stability and forces in the nucleus (strong, weak); isotopes and radioisotopes; types of radiation. | Detecting radiation |
| 14 | Radioactive decay and half-life; decay equations and decay series diagrams; stability of isotopes. | Measuring half life |
| 15 | Prediction and discovery (neutron, neutrino, positron, Higgs boson); quarks; leptons, hadrons, mesons and bayrons; anti-matter. |  |
| 16 | Nuclear energy from conversion of mass; fusion and fission; synchrotron radiation; light from electrons transitions. |  |
| 17–18 | All | **Unit revision**. |  |