**Sample Course Outline**

Integrated Science

ATAR Year 12

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Sample course outline

Integrated Science – ATAR Year 12

Unit 3 and Unit 4

#### Semester 1 – Water

**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.

| **Week** | **Key teaching points** |
| --- | --- |

|  |  |
| --- | --- |
| 1 | **Importance of water**   * water cycle * effect of changing rainfall patterns on the Earth’s freshwater supply * role of the different states of water in regulating climate |
| 2 | **Aquatic ecosystems**   * properties of water * molecular structure and surface tension * polarity * density * buoyancy * specific heat, including calculations (*Q = mcΔT*) * solubility of salts, nutrients and gases |
| 3–5 | * the effects of salt concentration, phosphate, nitrate, dissolved oxygen, turbidity, pH and temperature on aquatic life * exchange of materials * exchange processes – osmosis, diffusion, active transport * gas exchange in aquatic animals * osmoregulation in salt and freshwater fish   **Task 1:** Science inquiry (practical) – Gas exchange in fish |
| 6–7 | * flow of energy and cycling of matter in aquatic ecosystems * food webs * biomass * energy pyramids * water monitoring * physical monitoring techniques * biological monitoring techniques (macro-invertebrate sampling)   **Commence Task 2:** Science inquiry (investigation) – Comparison of local aquatic ecosystems |
| 8–10 | * human use of aquatic ecosystems for economic and social benefits * impact of human activities on aquatic ecosystems * biomagnification * eutrophication * oil spills * impact of human activities on public drinking water   **Task 2:** Science inquiry (investigation) – Comparison of local aquatic ecosystems  **Task 3:** Test–Importance of water and aquatic ecosystems |
| 11–12 | **Water resources and sustainability**   * potable water in Western Australia * sources * availability * distribution * treatment * treatment of domestic waste water   **Task 4:** Extendedresponse – Water treatment |
| 13–14 | * water resources management * consumption * desalination plants * aquifer recharge * water catchment management strategies to help prevent * dryland salinity * eutrophication * erosion * land use in catchment areas and preservation of natural waterways   **Task 5:** Test – Water resources and sustainability |
| 15 | **Task 6:** Examination – Semester 1 |

#### Semester 2 – Energy

**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.

| **Week** | **Key teaching points** |
| --- | --- |
| 1–2 | **Energy**   * forms of energy * potential: gravitational, chemical, elastic and nuclear * kinetic: mechanical, sound, heat, electrical * light energy * energy transfer and transformation * work * the law of conservation of energy |
| 3–4 | **Transportation**   * energy transformation in the internal combustion engine * developments in engine design to use alternative fuels   **Task 7:** Extended response – Vehicle engine design |
| 5–6 | **Sources of energy**   * the sun as the origin of energy for * fossil fuels as non-renewable sources of energy * wind, biomass, biofuels, hydropower and solar as renewable sources of energy * geothermal (renewable) energy * nuclear (non-renewable) energy * investment in renewable energy technologies * environmental considerations * economic considerations * political considerations   **Task 8:** Test – Energy, transportation and sources of energy |
| 7–8 | **Electricity**   * generation of electrical current * electromagnet induction in generators * electrochemical batteries * photovoltaic effect in soar cells * electrical energy transformation in the home for * lighting * heating/cooling * communication * large-scale electricity generation * fossil fuel (coal and gas) power plants * nuclear power plants |
| 9–10 | **Heating**   * transfer of heat energy * conduction * convection * radiation * evaporation * heating of the home * burning of wood and fossil fuels * consumption of electricity * passive solar design   **Task 9:** Science inquiry (practical) – Heat transfer  **Task 10:** Test – Electricity and heating |
| 11–14 | **Environmental and societal issues**   * electricity generation impacts on society and the environment through * resource extraction disturbing natural ecosystems * land clearing for infrastructure * emissions which contribute to the enhanced greenhouse effect * international agreements and resultant new technologies * production of wastes including nuclear * consumption and pollution of water * impact of increased demand for energy from non-renewable resources * gas extraction by hydraulic fracturing * use of nuclear energy * safeguards against exposure to radioactive substances * effects of radiation on the human body * disposal of radioactive material in geologic storage * energy consumption * appliance power consumption calculations * efficiency and cost * energy efficient appliances * energy efficiency calculations (efficiency = energy out/energy in X 100) * base load supply * environmental, economic and social impact   **Task 11**: Science inquiry (investigation) – Energy efficiency light bulbs  **Task 12:** Test – Environmental and societal issues |
| 15 | **Task 13:** Examination – Semester 2 |