



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	<p>Importance of water</p> <ul style="list-style-type: none"> • water cycle • effect of changing rainfall patterns on the Earth’s freshwater supply • role of the different states of water in regulating climate
2	<p>Aquatic ecosystems</p> <ul style="list-style-type: none"> • properties of water <ul style="list-style-type: none"> ▪ molecular structure and surface tension ▪ polarity ▪ density ▪ buoyancy ▪ specific heat, including calculations ($Q = mc\Delta T$) ▪ solubility of salts, nutrients and gases
3–5	<ul style="list-style-type: none"> • the effects of salt concentration, phosphate, nitrate, dissolved oxygen, turbidity, pH and temperature on aquatic life • exchange of materials <ul style="list-style-type: none"> ▪ exchange processes – osmosis, diffusion, active transport ▪ gas exchange in aquatic animals ▪ osmoregulation in salt and freshwater fish <p>Task 1: Science inquiry (practical) – Gas exchange in fish</p>
6–7	<ul style="list-style-type: none"> • flow of energy and cycling of matter in aquatic ecosystems <ul style="list-style-type: none"> ▪ food webs ▪ biomass ▪ energy pyramids • water monitoring <ul style="list-style-type: none"> ▪ physical monitoring techniques ▪ biological monitoring techniques (macro-invertebrate sampling) <p>Commence Task 2: Science inquiry (investigation) – Comparison of local aquatic ecosystems</p>
8–10	<ul style="list-style-type: none"> • human use of aquatic ecosystems for economic and social benefits • impact of human activities on aquatic ecosystems <ul style="list-style-type: none"> ▪ biomagnification ▪ eutrophication ▪ oil spills • impact of human activities on public drinking water <p>Task 2: Science inquiry (investigation) – Comparison of local aquatic ecosystems</p> <p>Task 3: Test – Importance of water and aquatic ecosystems</p>
11–12	<p>Water resources and sustainability</p> <ul style="list-style-type: none"> • potable water in Western Australia <ul style="list-style-type: none"> ▪ sources ▪ availability

	<ul style="list-style-type: none">▪ distribution▪ treatment <ul style="list-style-type: none">• treatment of domestic waste water <p>Task 4: Extended response – Water treatment</p>
13–14	<ul style="list-style-type: none">• water resources management<ul style="list-style-type: none">▪ consumption▪ desalination plants▪ aquifer recharge• water catchment management strategies to help prevent<ul style="list-style-type: none">▪ dryland salinity▪ eutrophication▪ erosion• land use in catchment areas and preservation of natural waterways <p>Task 5: Test – Water resources and sustainability</p>
15	<p>Task 6: Examination – Semester 1</p>

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	<p>Energy</p> <ul style="list-style-type: none"> • forms of energy <ul style="list-style-type: none"> ▪ 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	<p>Transportation</p> <ul style="list-style-type: none"> • energy transformation in the internal combustion engine • developments in engine design to use alternative fuels <p>Task 7: Extended response – Vehicle engine design</p>
5–6	<p>Sources of energy</p> <ul style="list-style-type: none"> • the sun as the origin of energy for <ul style="list-style-type: none"> ▪ 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 <ul style="list-style-type: none"> ▪ environmental considerations ▪ economic considerations ▪ political considerations <p>Task 8: Test – Energy, transportation and sources of energy</p>
7–8	<p>Electricity</p> <ul style="list-style-type: none"> • generation of electrical current <ul style="list-style-type: none"> ▪ electromagnet induction in generators ▪ electrochemical batteries ▪ photovoltaic effect in solar cells • electrical energy transformation in the home for <ul style="list-style-type: none"> ▪ lighting ▪ heating/cooling ▪ communication • large-scale electricity generation <ul style="list-style-type: none"> ▪ fossil fuel (coal and gas) power plants ▪ nuclear power plants
9–10	<p>Heating</p> <ul style="list-style-type: none"> • transfer of heat energy <ul style="list-style-type: none"> ▪ conduction ▪ convection ▪ radiation ▪ evaporation • heating of the home <ul style="list-style-type: none"> ▪ burning of wood and fossil fuels ▪ consumption of electricity ▪ passive solar design

Week	Key teaching points
	<p>Task 9: Science inquiry (practical) – Heat transfer Task 10: Test – Electricity and heating</p>
11–14	<p>Environmental and societal issues</p> <ul style="list-style-type: none"> • electricity generation impacts on society and the environment through <ul style="list-style-type: none"> ▪ resource extraction disturbing natural ecosystems ▪ land clearing for infrastructure ▪ emissions which contribute to the enhanced greenhouse effect <ul style="list-style-type: none"> ○ 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 <ul style="list-style-type: none"> ▪ gas extraction by hydraulic fracturing ▪ use of nuclear energy <ul style="list-style-type: none"> ○ safeguards against exposure to radioactive substances ○ effects of radiation on the human body ○ disposal of radioactive material in geologic storage • energy consumption <ul style="list-style-type: none"> ▪ appliance power consumption calculations $\left(P = \frac{E}{t}\right)$ ▪ efficiency and cost <ul style="list-style-type: none"> ○ energy efficient appliances ○ energy efficiency calculations (efficiency = energy out/energy in X 100) ▪ base load supply ▪ environmental, economic and social impact <p>Task 11: Science inquiry (investigation) – Energy efficiency light bulbs Task 12: Test – Environmental and societal issues</p>
15	Task 13: Examination – Semester 2