SAMPLE COURSE OUTLINE

INTEGRATED SCIENCE
GENERAL YEAR 12
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### Sample course outline

**Integrated Science – General Year 12**

**Unit 3 and Unit 4**

**Semester 1 – Unit 3 – Local ecosystems**

<table>
<thead>
<tr>
<th>Week</th>
<th>Key teaching points</th>
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| 1    | - Characteristics of different ecosystems found in a local community  
      - Features of natural, urban, agricultural, aquacultural, freshwater and marine ecosystems |
| 2    | - Abiotic factors of a local ecosystem  
      - Impacts of temperature, pH, salinity, light, water and atmospheric gases on the survival of organisms living in that ecosystem  
      **Task 1:** Science inquiry (practical and investigation) – Measuring and comparing the abiotic factors of two aquatic ecosystems |
| 3    | - Abiotic factors and their interaction with biotic factors  
      - The sun as the original source of energy for ecosystems  
      - Transfer of energy through food webs  
      **Task 2:** Science inquiry (investigation) – Monitoring a local ecosystem |
| 4–5  | - Biogeochemical cycles as a natural circulation of essential elements  
      - The flow of elements from the abiotic to the biotic components of the biosphere and back again  
      - Examples of gaseous and sedimentary biogeochemical cycles, including carbon, nitrogen, water and phosphorus |
| 6–7  | - Role of producers, consumers and decomposers in ecosystems  
      - Transfer of energy through ecosystems  
      - Food chains and food webs  
      - Pyramids of numbers and biomass  
      - Trophic levels and diminishing energy transfer  
      **Task 3:** Test – Earth systems/cycles in nature and structure and function of biological systems |
| 8    | - Competition, predation, symbiosis, mutualism, commensalism and parasitism  
      **Task 2 excursion** |
| 9    | - Population density  
      - Factors affecting population density  
      - Factors affecting community structure and composition  
      **Task 2:** Science inquiry (investigation) – Monitoring a local ecosystem submission |
| 10   | - Carrying capacity of an ecological population  
      - Factors affecting carrying capacity  
      **Task 4:** Extended response (research and validation) – Climatic events impacting on the carrying capacity of a population |
| 11   | - Comparison of biodiversity between endemic and urban ecosystems  
      - Comparison of biodiversity between terrestrial and aquatic ecosystems |
| 12–13| - Urban sprawl and the effects on ecosystems and biodiversity  
      - Extinction of flora and fauna in built-up areas  
      - Human impact in ecosystems and the effect on biodiversity  
      **Task 5:** Externally set task |
| 14–15| - Natural selection, including: variation, changes in the environment, selection pressures, survival and change in characteristics  
      - Behavioural, functional and structural adaptations of endemic flora and fauna  
      - Behavioural, functional and structural adaptations of invasive species (case study: cane toad)  
      **Task 6:** Test – Ecosystems, sustainability and species continuity and change |
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| 1–3  | • Physical and chemical properties of matter  
|      | • Materials used in vehicle production  
|      | • The different elements and chemicals that make up materials such as metal alloys, plastics and rubber  
|      | • The use of materials depends on the physical and chemical properties of that material  
|      | • Comparison of diesel and petrol fuels  
|      | **Task 7: Extended response (research and validation) – Materials used in the manufacture of safety design features in vehicles** |
| 4    | • Concepts of chemical change and chemical reactions  
|      | • Reactants and products  
|      | • Simple word equations  
|      | • The burning of petrol and the formation of rust on older vehicles as examples of chemical changes in vehicles |
| 5–6  | • Combustion reactions  
|      | • Relate energy production or consumption to chemical reactions  
|      | • Chemical reactions – fuel in combustion engines, acid in batteries and cellular respiration  
|      | • The effect of drugs and alcohol on the central nervous system  
|      | • The breakdown of drugs and alcohol by the human body  
|      | **Task 8: Science inquiry (practical) – Chemical reactions** |
| 7–8  | • Mixtures and solutions  
|      | • Types of mixtures found in cars – solids (alloys) and liquids (petrol)  
|      | • Comparison of ethanol fuel mixtures  
|      | • Separation techniques used to separate mixtures  
|      | **Task 9: Test – Chemical reactions, mixtures and solutions** |
| 9    | • Motion (distance/speed/time graphs)  
|      | • Speed and velocity  
|      | • Velocity calculations  
|      | **Task 10: Science inquiry (practical) – Objects in motion** |
| 10–11| • Newton’s laws of motion  
|      | • The application of Newton’s laws to vehicles and drivers  
|      | • Practical exercises on Newton’s laws  
| 12   | • Types of forces acting on contact and at a distance  
|      | • Types of forces acting on a vehicle and the driver  
|      | **Task 11: Science inquiry (investigation) – Factors affecting the severity of collisions** |
| 13   | • Kinetic, potential and heat energy  
|      | • Techniques and equipment used to measure types of energy  
|      | • Examples of kinetic, potential and heat energy in vehicles  
|      | **Task 12: Extended response (research and validation) – Energy changes in vehicles** |
| 14–15| • Law of conservation of energy  
|      | • Energy transformations in vehicles  
|      | **Task 13: Test – Motion, forces and energy** |