**Stage 2 Earth and Environmental Science: Program 1: 20 credits**

This teaching program articulates with learning and assessment plan 1.

| **Week** | **Science Understandings** | **SIS** | **SHE** | **Assessment Tasks** |
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| Term 1 Week 1-2 | Introduction to Stage 2Topic 1: Introduction to Earth Systems* Components and process of the systems: Hydrosphere, atmosphere, biosphere and geosphere
* Interactions between the systems – carbon, nitrogen, phosphorus and hydrological cycles
 | * Practical Investigation: interaction of Earth Systems in the local area
 | * SHE Investigation: Case study – Cleaning up an oil spill
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| Week 3 | * Identifying and measuring change in in systems
* Patterns and changes over a variety of time scales
* Predicting future changes
 | * Introduction to field skills – sampling techniques, testing equipment, recording devices
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| Week 4 | * Inquiry into Earth systems
 | * Field Investigation: local area Earth Systems Inquiry
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| Week 5-6 | Topic 2: Earth’s Resources* Use of geological resources
* Renewable and non-renewable resources
* Formation of, exploration for and sustainability of energy resources
 |  | * SHE investigation: Issues associated with the extraction of unconventional gas
 | **SAT: Earth Systems poster** |
| Week 7- 8 | * Formation of metallic resources
* Exploration for metallic resources
* Extraction and refining of metallic resources
* Sustainability of metallic resources
 | * Practical investigation: identification of metallic minerals and host rocks
* Practical Investigation: Exploration techniques - What’s inside the Black Box?
* Practical Investigation: Magnetic surveying
 | * SHE Investigation: Recycle, reuse, reduce
 |  |
| Week 9- 11 | * Environmental impacts of the extraction and use of mineral and energy resources
 |  | SHE Investigation: Case study of impacts of mining on ecosystems | **Field Investigation**: Effects of sulfide mining on an ecosystem - Brukunga |
| Term 2Week 1 | Topic 3 Earth’s Sustainable Future* Renewable sources of energy resources
 | * Practical Investigation – generating solar and wind power
 | * Tour of the Adelaide Showgrounds solar project
 | **Topic test** – Earth Resources |
| Week 2 | * Soil formation and structure
* Sustainability of soil and water
 | * Practical investigation – soil composition and structure
 |  | Field Investigation due |
| Week 3- 5 | * Availability and quality of fresh water
* Recycling of stormwater and effluent water
 | * Field Investigation – wetlands (Urrbrae, Salisbury)
 | * SHE Investigation: causes and remediation of algal blooms, sewerage, industrial waster
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| Week 6- 7 | * Pollution of groundwater and waterways
 | * Field Investigation – local catchment area and creek study
* Use a sand tank to investigate groundwater systems
 |  | **Design Practical Investigation**: Exploring Groundwater systems with sand tank model |
| 8 | * Effective use of energy resources
 | * Investigation – estimate individual carbon footprint
 | * SHE investigation – identify ways to reduce our carbon footprint
 |  |
| 9. | * Advantages and disadvantages of using renewable and non-renewable energy resources
 |  | * SHE investigation – impacts of introducing renewable energy to local ecosystems
 |  |
| 10 | Topic 4 Climate Change* Evolution of the Earth’s atmosphere
* Greenhouse effect and greenhouse gases
 | * Practical Investigation: modelling the evolution of the Earth’s atmosphere
 |  |  |
| Term 3Week 1 | * Astronomical cycles and sunspot activity
* Influence of plate tectonics
 | * Investigation: the ‘Little Ice age’
 |  | **Topic test**:Earth’s Sustainable Future |
| 2 | * Oceans absorb large amounts of solar radiation
* Ocean circulation
* Shallow and deep water ocean currents
* Thermohaline circulation
 |  |  |  |
| 3 | * Anthropogenic activities affect climate
* Enhanced greenhouse effect
 | * Investigation: No Zone of Ozone
 |  |  |
| 4 | * Effects of climate change on Earth Systems
 | * Investigation: Modelling the Earth’s Energy balance
 | * SHE Investigation: Managing the health effects of climate change (Lancet)
 |  |
| 5 | * Evidence for climate change
* Climate proxies
 | * Practical investigation: climatic analysis using foraminifera
* Practical investigation: oxygen isotopes – a proxy for sea surface temperatures
 | * Formative SHE task: Climate Change
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| 6 | * Models for predicting climate change
* Local, national and international responses to climate change
 | * Prepare for Earth Systems Study
 | * SHE Investigation: Paris and the IPCC
 | Hypothesis for Earth Systems study due |
| 7 |  | * Design Earth Systems Study
 |  | Design and risk assessment for Earth Systems study due |
| 8 |  | * Conduct Earth Systems Study\*
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| 9 |  | * Analyse data and complete report
 |  | **External Earth Systems Study** report due |
| 10 |  |  | * Preparation for SHE investigation
 | SHE Investigation topic selection |
| Term 4Week 1 |  |  |  | **SHE Investigation** due |
| Week 2 |  |  |  | **Topic test**: Climate Change |

\*Earth Systems Study may include a class Field camp