**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 2  Topic 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 |  |
| 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 |  |  |
| Week 4 | * Inquiry into Earth systems | * Field Investigation: local area Earth Systems Inquiry |  |  |
| 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 2  Week 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 |  |
| 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 3  Week 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 |  |
| 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\* |  |  |
| 9 |  | * Analyse data and complete report |  | **External Earth Systems Study** report due |
| 10 |  |  | * Preparation for SHE investigation | SHE Investigation topic selection |
| Term 4  Week 1 |  |  |  | **SHE Investigation** due |
| Week 2 |  |  |  | **Topic test**: Climate Change |

\*Earth Systems Study may include a class Field camp