



**COURSE OUTLINE**  
**YEAR 11 EARTH AND ENVIRONMENTAL SCIENCE ATAR: 2022**  
**UNIT 1 AND UNIT 2**



This course will run the two units, 1 and 2, concurrently. The student Semester 1 grade will therefore be an estimate.

Term	Week	Topic and key teaching points	Syllabus content	Pre reading resources	Assessment
1	1	<ul style="list-style-type: none"><li>Intro to EES</li><li>Intro to Investigations</li><li>Scientific Reports</li><li>Earth's differentiation</li></ul>	Earth has internally differentiated into a layered structure: a solid metallic inner core, a liquid metallic outer core and a silicate mantle and crust; study of seismic waves and meteorites provides evidence for this theory		
1	2	<ul style="list-style-type: none"><li>Evidence for this theory<ul style="list-style-type: none"><li>- Seismic waves</li><li>- Meteorite composition and structure</li></ul></li></ul>	identify the following sedimentary rocks from physical samples, diagrams and photographs – <i>conglomerate, BIF breccia, sandstone, limestone, siltstone, shale, mudstone</i>	Pg 1-21	Task 1: - Density <b>conduct</b>
1	3	<ul style="list-style-type: none"><li>Atmosphere and Water were derived from?</li><li>Current theories – emergence of life</li></ul>	<ul style="list-style-type: none"><li>the atmosphere was derived from volcanic outgassing during cooling and differentiation of Earth, and its composition has been significantly modified by the actions of photosynthesizing organisms</li><li>the modern atmosphere has a layered structure characterized by changes in temp: the troposphere, stratosphere, mesosphere and thermosphere</li><li>current theories state that life emerged under anoxic atmospheric conditions in an aqueous mixture of inorganic compounds, either in a shallow water setting as a result of a lightning strike or in an ocean floor setting due to hydrothermal activity</li></ul>	Pg 21-26	Task 1: Density <b>Validation – 2%</b>

## COURSE OUTLINE

### YEAR 11 EARTH AND ENVIRONMENTAL SCIENCE ATAR: 2022

#### UNIT 1 AND UNIT 2

1	4	<ul style="list-style-type: none"> <li>Relative geological timescale               <ul style="list-style-type: none"> <li>- Relative dating - Index fossils</li> <li>- Stratigraphic Principles</li> </ul> </li> <li>Fossil evidence for life first appeared on Earth</li> </ul>	<ul style="list-style-type: none"> <li>a relative geological timescale can be constructed using stratigraphic principles, including original horizontality, faunal succession, superposition, cross-cutting relationships, inclusions, unconformities and correlation</li> <li>fossil evidence indicates that life first appeared on Earth approximately 4 billion years ago. Index fossils enable correlation of rock strata for relative dating</li> </ul>	Pg 28 - 43 + Internet	
1	5	<ul style="list-style-type: none"> <li>Absolute Dating using radioisotopes</li> </ul>	<ul style="list-style-type: none"> <li>precise dates can be assigned to points on the relative geological timescale using data derived from the decay of radioisotopes in rocks and minerals; this establishes an absolute timescale and places the age of the Earth at approximately 4.5 billion years</li> </ul>	Pg 43 - 55	Task 2: <b>Test</b> – Formation of Earth – 5%
1	6	<ul style="list-style-type: none"> <li>Rock Cycle               <ul style="list-style-type: none"> <li>○ Types of rocks</li> <li>○ Processes</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>rocks are composed of one or more minerals and are formed through igneous, sedimentary and metamorphic processes as part of the rock cycle</li> </ul>	Pg 60-61	Cottesloe Field trip: Sedimentary rocks, structures <b>11<sup>th</sup> Mar Friday</b>  Mass extinctions – hand task sheet
1	7	<ul style="list-style-type: none"> <li>Sedimentary rocks               <ul style="list-style-type: none"> <li>○ Classification</li> <li>○ Composition,</li> <li>○ Texture</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>some sedimentary rocks can be identified according to their composition and texture, including conglomerate, breccia, sandstone, limestone, siltstone, shale, mudstone</li> </ul>	Pg 89-97	Task 3: <b>Validation</b> Field Trip <b>8%</b>

## COURSE OUTLINE

### YEAR 11 EARTH AND ENVIRONMENTAL SCIENCE ATAR: 2022

#### UNIT 1 AND UNIT 2

1	8	<ul style="list-style-type: none"> <li>Sedimentary Structures</li> <li>Compilation of field data and research reports</li> </ul>	<ul style="list-style-type: none"> <li>simple sedimentary structures are used as evidence of past processes and are related to depositional environments, including the use of <b><i>crossbedding, graded bedding</i></b> and <b><i>mud cracks</i></b></li> </ul>	Pg 98 - 101	
1	9	<ul style="list-style-type: none"> <li>Characteristics of past environments and communities</li> <li>Principle of Uniformitarianism</li> </ul>	<ul style="list-style-type: none"> <li>observation of present-day processes can be used to infer past events and processes by applying the Principle of Uniformitarianism</li> <li><i>Sediment layers, Peat bogs, Coral bleaching, sand-dunes, sea level rising</i></li> </ul>	Pg 401-406 (EEES)	Task 4: <b>Validation</b> - Mass extinctions <b>5%</b>
1	10	<ul style="list-style-type: none"> <li>Diversification and proliferation of living organisms - <i>Cambrian period</i></li> <li>Catastrophic collapse of ecosystems – mass extinction event end of <i>Cretaceous period</i></li> </ul>	<ul style="list-style-type: none"> <li>diversification and proliferation of living organisms over time (including increases in marine animals in the Cambrian period), and the catastrophic collapse of ecosystems (including the mass extinction event at the end of the Cretaceous period) inferred from fossil record</li> <li>the characteristics of past environments and communities (including presence of water, nature of the substrate, organism assemblages) can be inferred from the sequence and internal textures of sedimentary rocks and enclosed fossils, including banded iron formations and Ediacara fauna</li> </ul>	Pg 391-401 (EEES)	
2	1	<ul style="list-style-type: none"> <li>Minerals properties</li> <li>Moh's hardness</li> </ul>	<ul style="list-style-type: none"> <li>minerals can be characterised by their colour, streak, lustre, transparency, cleavage, fracture, hardness (Moh's scale), magnetism, density</li> </ul>	Pg 68 - 87	Task 5: <b>Conduct</b> Soil Investigation

## COURSE OUTLINE

### YEAR 11 EARTH AND ENVIRONMENTAL SCIENCE ATAR: 2022

### UNIT 1 AND UNIT 2

2	2	Hydrosphere	<ul style="list-style-type: none"> <li>• water is present on the surface of Earth as a result of volcanic outgassing and impact by icy bodies from space; water occurs in three phases (solid, liquid, gas) on Earth's surface</li> <li>• the water cycle is an important component of Earth system processes</li> </ul>		Task 6: <b>Test</b> : Rocks, and Minerals ID + Past Environments <b>5%</b>
2	3	<ul style="list-style-type: none"> <li>• Soil formation and composition</li> <li>• Weathering</li> </ul>	<ul style="list-style-type: none"> <li>• soil formation requires interaction between atmospheric, geological, hydrological and biotic processes; soil is composed of rock and mineral particles, organic material, water, gases and living organisms</li> <li>• in any one location, the characteristics (including temperature, surface water, substrate, organisms, available light) and interactions of the atmosphere, geosphere, hydrosphere and biosphere, give rise to unique and dynamic communities</li> </ul>	Pg 114-136	Task 5: <b>Validation</b> - Soils <b>6%</b>
2	4	Case Study – Water Catch up			
2	5-6	Review			
2	7-8	Exam			Task 7: <b>Exam</b> – Unit 1 <b>15%</b>

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#### UNIT 1 AND UNIT 2

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2	9	<ul style="list-style-type: none"> <li>Energy Rocks: <i>basalt, dolerite, gabbro, andesite, diorite, rhyolite, pegmatite, granite, pumice, tuff and obsidian</i></li> </ul>	<ul style="list-style-type: none"> <li>energy is neither created nor destroyed, but can be transformed from one form to another (for example, kinetic, gravitational, heat, light) and transferred between objects processes within and between Earth systems require energy that originates either from the Sun or the interior of Earth</li> </ul>	<b>Energy</b> - Internet reading  Pg 138 - 148	Task 8: <b>conduct</b> Impact of surface Albedo Investigation  Task 9: <b>Research</b> - Earth's Climate System Handout
2	10	<ul style="list-style-type: none"> <li>Earth Heat Budgets Greenhouse Effect</li> </ul>	<ul style="list-style-type: none"> <li>most of the thermal radiation emitted from Earth's surface passes back out into space, but some is reflected or scattered by greenhouse gases toward Earth; this additional surface warming produces a phenomenon known as the naturally occurring Greenhouse Effect</li> </ul>	Research Internet	Task 8: <b>Validation</b> Albedo <b>6%</b>
3	1	<ul style="list-style-type: none"> <li>Transfer of solar energy to Earth's surface Albedo</li> </ul>	<ul style="list-style-type: none"> <li>the net transfer of solar energy to Earth's surface is influenced by its passage through the atmosphere, including impeded transfer of ultraviolet radiation to Earth's surface due to its interaction with atmospheric ozone, and by the physical characteristics of Earth's surface, including albedo</li> </ul>	Pg 138 - 153	Task 9: <b>Presentation</b> Earth Climate System - <b>5%</b>

## COURSE OUTLINE

### YEAR 11 EARTH AND ENVIRONMENTAL SCIENCE ATAR: 2022

#### UNIT 1 AND UNIT 2

3	2	<ul style="list-style-type: none"> <li>Atmosphere and Atmospheric circulation</li> <li>Weather and Climate</li> <li>Movement of atmospheric air</li> </ul>	<ul style="list-style-type: none"> <li>the movement of atmospheric air masses due to heating and cooling, and Earth's rotation and revolution, cause systematic atmospheric circulation</li> </ul>	Pg 153 – 155 Internet	
3	3	Global ocean conveyor model	<ul style="list-style-type: none"> <li>the behaviour of the global oceans as a heat sink, and Earth's rotation and revolution, cause systematic ocean currents; these are described by the global ocean conveyor model</li> </ul>	Pg 155 - 161	
3	2	<ul style="list-style-type: none"> <li>El Niño and La Niña</li> <li>Leeuwin Australian climate</li> </ul>	<ul style="list-style-type: none"> <li>the interaction between Earth's atmosphere and oceans changes over time and can result in phenomena, including El Niño and La Niña</li> </ul>	Pg 186 - 200	
3	3 - 4	<ul style="list-style-type: none"> <li>Plate tectonic due to Earth's heat and gravitational energy</li> </ul> <p><b>Reconsidering Convection Cells (<i>Read off internet</i>)</b></p>	<ul style="list-style-type: none"> <li>transfers and transformations of heat and gravitational energy in Earth's interior drive the movement of tectonic plates through processes, including mantle convection, plume formation and slab sinking</li> </ul>	Pg 104 - 111	

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#### UNIT 1 AND UNIT 2

3	5 - 6	<ul style="list-style-type: none"> <li>Igneous rock formation processes</li> <li>Mapping</li> </ul>	<ul style="list-style-type: none"> <li>igneous processes form different igneous rocks which can be identified based on texture and mineralogy, including basalt, dolerite, gabbro, andesite, diorite, rhyolite, pegmatite, granite, pumice, tuff and obsidian</li> </ul>	Pg 164 - 175	
3	7	<ul style="list-style-type: none"> <li>Ecology and biodiversity</li> <li>Energy is stored, transferred/transformed energy and matter flow through the biotic and abiotic components of an ecosystem</li> </ul>	energy is stored, transferred and transformed in the carbon cycle; biological elements, including living and dead organisms, store energy over relatively short time scales, and geological components store energy for extended periods	Pg 175 - 184	Task 10: <b>Test –</b> Igneous Rocks and Plate Tectonics
3	8	<ul style="list-style-type: none"> <li>Biogeochemical cycling of matter,</li> <li>Carbon cycle</li> </ul>	<ul style="list-style-type: none"> <li>biogeochemical cycling of matter - nitrogen, involves the transfer and transformation of energy between the biosphere, geosphere, atmosphere and hydrosphere</li> <li>thermal/light energy from the Sun drives important Earth processes - evaporation and photosynthesis</li> </ul>	Internet  Pg 357-359, 362-382 (EEES)	
3	9	<ul style="list-style-type: none"> <li>Nitrogen cycle</li> <li>Hydrological cycle</li> </ul>	<ul style="list-style-type: none"> <li>biogeochemical cycling of matter - nitrogen, involves the transfer and transformation of energy between the biosphere, geosphere, atmosphere and hydrosphere</li> <li>thermal/light energy from the Sun drives important Earth processes - evaporation and photosynthesis</li> </ul>	Internet  Pg 357-359, 362-382 (EEES)	Task 11: John Forest – <b>Field Trip</b> <b>16<sup>th</sup> Sept</b>



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3	10	<ul style="list-style-type: none"><li>• Photosynthesis</li><li>human activities influence this flow</li></ul>	photosynthesis is the principal mechanism for the transformation of energy from the Sun into energy forms that are useful for living things		Task 11: <b>Validation</b> – John Forest
4	1 - 2	Western Australian Rock Lobster case study	energy and matter flow through the biotic and abiotic components of an ecosystem, and human activities influence this flow; applied to a Western Australian case study		Task 12: <b>Test</b> – Earth's Energy and Cycles <b>5%</b>
4	3 - 5	Revision			
4	6 - 7	Exam			Task 13: <b>Exam</b> : Unit 1 & Unit 2 – <b>25%</b>
4	8	Exam Feedback			