Ecology and Ecosystems (Ecology Specialization)

Students who choose the Ecology Specialisation will take an expanded group of courses in biology and ecology to learn more about the biological and environmental aspects of life on Earth. Students who complete this specialisation may choose careers in NGOs that work in Singapore and the region, government agencies, biotechnology firms, and research. Please note that this specialisation requires chemistry courses at NTU that have a prerequisite of H2 Chemistry in A-levels. You may be able to enrol in these required courses without the prerequisites, but these courses may be difficult for you without this background. Please contact us if you have questions regarding your ability to join this specialisation.

All Specialisations
(Academic Year 2018/19)
Major Core

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>AU</th>
<th>Year Taken</th>
<th>Next Offered</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>ES1001</td>
<td>E2S2 Environment and Society</td>
<td>4</td>
<td>Year 1</td>
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<tr>
<td>ES1003</td>
<td>E2S2 Solid Earth</td>
<td>4</td>
<td>Year 1</td>
<td>Sem 2</td>
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<tr>
<td>ES1006</td>
<td>Introductory Field Experience</td>
<td>4</td>
<td>Year 1</td>
<td>Special Term 1</td>
<td>Limited to Year 1 E2S2 students</td>
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<tr>
<td>ES1007</td>
<td>Climate Change</td>
<td>4</td>
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<td>ES1001</td>
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<tr>
<td>ES2001</td>
<td>Computational Earth Systems Science</td>
<td>4</td>
<td>Year 2</td>
<td>Sem 1</td>
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<tr>
<td>ES2003</td>
<td>E2S2 Biosphere</td>
<td>4</td>
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<tr>
<td>ES2802</td>
<td>GIS and the Earth System</td>
<td>3</td>
<td>Year 2</td>
<td>Sem 1</td>
<td>ES1003, Pre or Co-requisite: ES2001</td>
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<tr>
<td>ES3001</td>
<td>Futures in E2S2</td>
<td>1</td>
<td>Year 3</td>
<td>Sem 2</td>
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<tr>
<td>MH1802</td>
<td>Calculus for the Sciences</td>
<td>4</td>
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Ecology & Earth Systems Specialisation  
(Academic Year 2018/19)  
Additional Major Core

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<th>Course Code</th>
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<th>Prerequisite</th>
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<tbody>
<tr>
<td>BS1001</td>
<td>Introductory Biology</td>
<td>3</td>
<td>Year 1</td>
<td>Sem 1</td>
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<tr>
<td>BS1008</td>
<td>Bioinformatics and Statistics</td>
<td>3</td>
<td>Year 1 or 2</td>
<td>Sem 2</td>
<td>BS1001</td>
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<tr>
<td>BS2002</td>
<td>Microbiology</td>
<td>3</td>
<td>Year 2</td>
<td>Sem 1</td>
<td>BS1001</td>
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<tr>
<td>CM1021</td>
<td>Basic Inorganic Chemistry</td>
<td>4</td>
<td>Year 1 or 2</td>
<td>Sem 1</td>
<td>H2 Chem</td>
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<tr>
<td>CM1031</td>
<td>Basic Organic Chemistry</td>
<td>4</td>
<td>Year 1 or 2</td>
<td>Sem 1</td>
<td>H2 Chem</td>
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<tr>
<td>ES2301</td>
<td>Principles of Heredity and Ecological Genetics</td>
<td>4</td>
<td>Year 2</td>
<td>Sem 2</td>
<td>ES2003, CM1021/CM1031</td>
</tr>
<tr>
<td>ES2303</td>
<td>Introduction to Ecology</td>
<td>3</td>
<td>Year 2</td>
<td>Sem 2</td>
<td>BS1001, ES2003</td>
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<tr>
<td>ES2302</td>
<td>Introduction to Field Ecology</td>
<td>2</td>
<td>Year 2</td>
<td>Special Term 2</td>
<td>ES2003</td>
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<tr>
<td>ES3301</td>
<td>Plant and Animal Physiology</td>
<td>4</td>
<td>Year 3</td>
<td>Sem 2</td>
<td>BS1001/CY1001, ES2003, ES2301</td>
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<tr>
<td>ES4301</td>
<td>Conservation Biology and Biodiversity</td>
<td>3</td>
<td>Year 3 or 4</td>
<td>Sem 1</td>
<td>AAB20D/ES2303, ES2301 and ES3301</td>
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Major-PE  
Students from Ecology specialization will choose 23 AUs from the Major-PE. At least two courses must be Tropical Ecology, Marine and Aquatic Ecology, Environmental Genomics or Environmental Biotechnology.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>AU</th>
<th>Next Offered</th>
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<tbody>
<tr>
<td>BS3024</td>
<td>Evolution in Health and Disease</td>
<td>3</td>
<td>Semester 1</td>
<td>BS1006 or ES2301</td>
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<tr>
<td>CM1041</td>
<td>Basic Physical Chemistry</td>
<td>4</td>
<td>Sem 2</td>
<td>H2 Chem</td>
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<tr>
<td>CM2011</td>
<td>Analytical Chemistry</td>
<td>3</td>
<td>Sem 1</td>
<td>CM1021 or CM1041</td>
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<tr>
<td>EN1001</td>
<td>Environmental Chemistry</td>
<td>3</td>
<td>Sem 2</td>
<td>REQUIRED if no H2 Chemistry</td>
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<td>Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Semester</td>
<td>Pre-Requisites</td>
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<tr>
<td>ES2002</td>
<td>Earth Materials</td>
<td>4</td>
<td>Sem 2</td>
<td>ES1003</td>
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<tr>
<td>ES2004</td>
<td>Layers and Landforms</td>
<td>4</td>
<td>Sem 2</td>
<td>ES1003</td>
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<tr>
<td>ES2101</td>
<td>Introduction to Geological Field Mapping</td>
<td>3</td>
<td>Special Term</td>
<td>ES1003</td>
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<tr>
<td>ES2201</td>
<td>Law &amp; Economics, Sustainable Development, and Environmental Protection</td>
<td>3</td>
<td>Sem 2</td>
<td>ES1001</td>
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<tr>
<td>ES2202</td>
<td>Global Environmental Politics and Governance</td>
<td>4</td>
<td>Sem 2</td>
<td>ES1001; ES2003</td>
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<tr>
<td>ES2801</td>
<td>Introduction to Natural Hazards</td>
<td>3</td>
<td>Semester 2</td>
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<tr>
<td>ES3002</td>
<td>Structural Geology and Tectonics</td>
<td>4</td>
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<td>ES1003</td>
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<tr>
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<td>Introduction to Geochemistry</td>
<td>4</td>
<td>Sem 1</td>
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<td>ES3004</td>
<td>Introduction to Geophysics</td>
<td>4</td>
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<td>ES1003 or by permission</td>
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<td>ES3005</td>
<td>Advanced Field Course in Geology</td>
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<tr>
<td>ES3008</td>
<td>Environmental Earth Systems Science Research</td>
<td>3</td>
<td>Every semester</td>
<td>By permission</td>
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<tr>
<td>ES3201</td>
<td>Coupled Human and Natural Systems</td>
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<td>Sem 2</td>
<td>ES1001</td>
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<tr>
<td>ES3302</td>
<td>Tropical Ecology</td>
<td>3</td>
<td>Sem 1</td>
<td>AAB20D or ES2303</td>
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<tr>
<td>ES3304</td>
<td>Advanced Field Placement in Ecology and Society</td>
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<td>ES2003; ES2303</td>
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<tr>
<td>ES3305</td>
<td>Current Issues in Ecology</td>
<td>3</td>
<td>Semester 2</td>
<td>ES2303 Introduction to Ecology</td>
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<tr>
<td>ES3306</td>
<td>Global Change Ecology</td>
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<td>ES2003, ES2303</td>
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<td>Course Title</td>
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<td>Semester</td>
<td>Notes</td>
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<tr>
<td>ES3307</td>
<td>Experimental Design &amp; Analysis for Ecology</td>
<td>3</td>
<td>Semester 2</td>
<td>BS1008 Bioinformatics and Statistics</td>
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<td>ES4002</td>
<td>Final Year Project</td>
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<td>Sem 1&amp;2</td>
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<tr>
<td>ES4003</td>
<td>Industrial Attachment</td>
<td>10</td>
<td>Sem 1</td>
<td>By Permission</td>
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<tr>
<td>ES4004</td>
<td>Overseas Entrepreneurship Programme (12-month)</td>
<td>20</td>
<td>Sem 1</td>
<td>20 AUs (10 AUs Major PE + 10 AUs UE)</td>
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<tr>
<td>ES4006</td>
<td>Overseas Entrepreneurship Programme (6-month)</td>
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<td>For students admitted in AY2016/17 onwards</td>
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<td>ES4010</td>
<td>Teaching in E2S2</td>
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<tr>
<td>ES4302</td>
<td>Environmental Genomics</td>
<td>4</td>
<td>Sem 2</td>
<td>AAB20D/ES2303, ES2301, ES3301</td>
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<tr>
<td>ES4303</td>
<td>Marine and Freshwater Ecology</td>
<td>3</td>
<td>Sem 1</td>
<td>ES2303 Introduction to Ecology</td>
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<tr>
<td>ES4901</td>
<td>Oceanography</td>
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<td>ES1007</td>
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<tr>
<td>ES4902</td>
<td>Geophysical Data Analysis</td>
<td>3</td>
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<tr>
<td>ES4904</td>
<td>Volcanology</td>
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<td>ES4911</td>
<td>Seismology</td>
<td>3</td>
<td>Semester 2</td>
<td>MH1800 Calculus for the Sciences I OR MH1802 Calculus for the Sciences, ES2001 Computational Earth Systems Science, PH1801 Foundation of Physics I &amp; MH1200 Linear Algebra</td>
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<td>MH2500</td>
<td>Probability and Introduction to Statistics</td>
<td>4</td>
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<td>MH1800 and MH1801</td>
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<tr>
<td>PH1104</td>
<td>Mechanics</td>
<td>3</td>
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<td>A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1011, PH1012, PH1101, PAP111, PH1801, PAP181, PHYS1A, CY1301, CY1305</td>
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<tr>
<td>PH1105</td>
<td>Optics, Vibrations and Waves</td>
<td>3</td>
<td>Sem 1</td>
<td>A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1103, PAP113, EE1002</td>
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<td>Course Code</td>
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<td>AU</td>
<td>Year Taken</td>
<td>Prerequisite</td>
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<td>PH1106</td>
<td>Electricity and Magnetism</td>
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<td>Sem 2</td>
<td>A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1011, PH1012, PH1102, PAP112, PH1802, PAP182, EE1002, PHYS1B, CY1302, CY1306</td>
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<tr>
<td>PH1107</td>
<td>Relativity and Quantum Physics</td>
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<td>Sem 2</td>
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<tr>
<td>PH1801</td>
<td>Foundations of Physics I</td>
<td>3</td>
<td>Sem 1</td>
<td>Physics and Mathematics at A or H2 level or equivalent</td>
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<tr>
<td>PH1802</td>
<td>Foundations of Physics II</td>
<td>3</td>
<td>Sem 2</td>
<td>PAP181 OR PH1801</td>
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**GER Core**

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<th>Course Code</th>
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<th>Year Taken</th>
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<tr>
<td>ES0138</td>
<td>Introduction to Scientific Writing</td>
<td>2</td>
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<td>must be taken concurrently with ES1001; mutually exclusive with HW0138</td>
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<tr>
<td>GC0001</td>
<td>GC0001 Sustainability: Seeing Through the Haze</td>
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<td>Singapore Studies - The Physical Environments of Singapore</td>
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<td>2</td>
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<td>HY0001</td>
<td>Ethics and Moral Reasoning</td>
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<td>2</td>
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<td>ES0238</td>
<td>Writing Science for Non-Scientists</td>
<td>2</td>
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<td>ES0002</td>
<td>Fundamentals of Data Science for Earth and Environmental Systems Science</td>
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<td>ET0001</td>
<td>Enterprise and Innovation</td>
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