

## 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

Course Code	Course Title	AU	Year Taken	Next Offered	Prerequisite
ES1001	E2S2 Environment and Society	4	Year 1	Sem 1	
ES1003	E2S2 Solid Earth	4	Year 1	Sem 2	
ES1006	Introductory Field Experience	4	Year 1	Special Term 1	Limited to Year 1 E2S2 students
ES1007	Climate Change	4	Year 1	Sem 2	ES1001
ES2001	Computational Earth Systems Science	4	Year 2	Sem 1	
ES2003	E2S2 Biosphere	4	Year 1	Sem 2	
ES2802	GIS and the Earth System	3	Year 2	Sem 1	ES1003, Pre or Co-requisite: ES2001
ES3001	Futures in E2S2	1	Year 3	Sem 2	
MH1802	Calculus for the Sciences	4	Year 1	Semester 1	Nil

**Ecology & Earth Systems Specialisation**  
**(Academic Year 2018/19)**  
**Additional Major Core**

Course Code	Course Title	AU	Year Taken	Next Offered	Prerequisite
BS1001	Introductory Biology	3	Year 1	Sem 1	
BS1008	Bioinformatics and Statistics	3	Year 1 or 2	Sem 2	BS1001
BS2002	Microbiology	3	Year 2	Sem 1	BS1001
CM1021	Basic Inorganic Chemistry	4	Year 1 or 2	Sem 1	H2 Chem
CM1031	Basic Organic Chemistry	4	Year 1 or 2	Sem 1	H2 Chem
ES2301	Principles of Heredity and Ecological Genetics	4	Year 2	Sem 2	ES2003, CM1021/CM1031
ES2303	Introduction to Ecology	3	Year 2	Sem 2	BS1001, ES2003
ES2302	Introduction to Field Ecology	2	Year 2	Special Term 2	ES2003
ES3301	Plant and Animal Physiology	4	Year 3	Sem 2	BS1001/CY1001, ES2003, ES2301
ES4301	Conservation Biology and Biodiversity	3	Year 3 or 4	Sem 1	AAB20D/ES2303, ES2301 and ES3301

**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.*

Course Code	Course Title	AU	Next Offered	Prerequisite
BS3024	Evolution in Health and Disease	3	Semester 1	BS1006 or ES2301
CM1041	Basic Physical Chemistry	4	Sem 2	H2 Chem
CM2011	Analytical Chemistry	3	Sem 1	CM1021 or CM1041
EN1001	Environmental Chemistry	3	Sem 2	REQUIRED if no H2 Chemistry

ES2002	Earth Materials	4	Sem 2	ES1003
ES2004	Layers and Landforms	4	Sem 2	ES1003
ES2101	Introduction to Geological Field Mapping	3	Special Term	ES1003
ES2201	Law & Economics, Sustainable Development, and Environmental Protection	3	Sem 2	ES1001
ES2202	Global Environmental Politics and Governance	4	Sem 2	ES1001; ES2003
ES2801	Introduction to Natural Hazards	3	Semester 2	
ES3002	Structural Geology and Tectonics	4	Sem 2	ES1003
ES3003	Introduction to Geochemistry	4	Sem 1	ES1003 or by permission
ES3004	Introduction to Geophysics	4	Sem 2	ES1003 or by permission
ES3005	Advanced Field Course in Geology	5	Special Term	
ES3008	Environmental Earth Systems Science Research	3	Every semester	By permission
ES3101	Petroleum Geology	4	Sem 1	ES2002, ES2004, ES3002
ES3201	Coupled Human and Natural Systems	4	Sem 2	ES1001
ES3302	Tropical Ecology	3	Sem 1	AAB20D or ES2303
ES3303	Environmental Biotechnology	3	Sem 2	BS2002, ES2301, CM1031, MH1800/MH1100/CY1201/CY1601, MH1801/MH1101/CY1202/CY1602
ES3304	Advanced Field Placement in Ecology and Society	5	Special Term 1	ES2003; ES2303
ES3305	Current Issues in Ecology	3	Semester 2	ES2303 Introduction to Ecology
ES3306	Global Change Ecology	3	Semester 1	ES2003, ES2303

ES3307	Experimental Design & Analysis for Ecology	3	Semester 2	BS1008 Bioinformatics and Statistics
ES4002	Final Year Project	10	Sem 1&2	
ES4003	Industrial Attachment	10	Sem 1	By Permission
ES4004	Overseas Entrepreneurship Programme (12-month)	20	Sem 1	20 AUs (10 AUs Major PE + 10 AUs UE)
ES4006	Overseas Entrepreneurship Programme (6-month)	11		For students admitted in AY2016/17 onwards
ES4010	Teaching in E2S2	4		ES1003, ES1001, ES1007, ES2003, Whichever course the student will be a teaching assistant for
ES4302	Environmental Genomics	4	Sem 2	AAB20D/ES2303, ES2301, ES3301
ES4303	Marine and Freshwater Ecology	3	Sem 1	ES2303 Introduction to Ecology
ES4901	Oceanography	3	Sem 1	ES1007
ES4902	Geophysical Data Analysis	3		ES2001; cross-listed with ES7008
ES4904	Volcanology	3		
ES4911	Seismology	3	Semester 2	MH1800 Calculus for the Sciences I OR MH1802 Calculus for the Sciences, ES2001 Computational Earth Systems Science, PH1801 Foundation of Physics I & MH1200 Linear Algebra
MH2500	Probability and Introduction to Statistics	4	Sem 1	MH1800 and MH1801
PH1104	Mechanics	3	Sem 1	A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1011, PH1012, PH1101, PAP111, PH1801, PAP181, PHYS1A, CY1301, CY1305
PH1105	Optics, Vibrations and Waves	3	Sem 1	A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1103, PAP113, EE1002

PH1106	Electricity and Magnetism	3	Sem 2	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
PH1107	Relativity and Quantum Physics	3	Sem 2	A or H2 Physics and Maths; Not available to: Students who have taken/are taking PH1101, PAP111, CY1307
PH1801	Foundations of Physics I	3	Sem 1	Physics and Mathematics at A or H2 level or equivalent
PH1802	Foundations of Physics II	3	Sem 2	PAP181 OR PH1801

### GER Core

Course Code	Course Title	AU	Year Taken	Prerequisite
ES0138	Introduction to Scientific Writing	2	1	must be taken concurrently with ES1001; mutually exclusive with HW0138
GC0001	GC0001 Sustainability: Seeing Through the Haze	1	1	
ES0001	Singapore Studies - The Physical Environments of Singapore	3	2	
HY0001	Ethics and Moral Reasoning	1	2	
ES0238	Writing Science for Non-Scientists	2	2	mutually exclusive with HW0238
ES0002	Fundamentals of Data Science for Earth and Environmental Systems Science	3		
ET0001	Enterprise and Innovation	1	3	