Double Major Bachelor of Science (Honours) Programme in Biological Sciences and Environmental Earth Systems Science

Home School: Asian School of the Environment

Curriculum Overview

The core courses equip students with a firm foundation in their two majors. Students can then choose from a range of prescribed electives in their interests.

To graduate, students must complete three (3) categories of requirements, totalling at least 143 Academic Units (AUs):

- Major Requirements (104AUs)
- Interdisciplinary Collaborative Core (33AUs)
- Broadening & Deepening Electives (6AUs)

Summary Table of Graduation Requirements

Major	**Major Requirement (AUs)**				**Interdisciplinary Collaborative Core (AUs)**			**Broadening & Deepening Electives (AUs)**	**Total AUs**
	Major Core	Common Core	Major Prescribed Electives	Final Year Project	Common Core	Professional Series	Care, Serve & Learn		
EESS	31	0	18	10	14	16 (11)	3	6 (11)	143 (143)
BS	36		9						

- AU in parentheses indicate AUs for students taking the Professional Attachment (PA) track.

Students to take the following ICC courses	AU
CC0001 Inquiry & Communication in an Interdisciplinary World	2
CC0003 Ethics & Civics in a Multicultural World	2
ML0004 Career Design & Workplace Readiness in the V.U.C.A World	2
CC0015 Health & Wellbeing	2
CC0006 Sustainability: Society, Economy & Environment	3
CC0007 Science & Technology for Humanity	3
CCXXXX Care, Serve, Learn	*3*
MLXXXX Profession Preparation	*1*
ES0002 Fundamentals of Data Science for Earth and Environmental Systems Science	2
ES0238 Scientific Writing for Non-Scientist: ICC	3
ES4003 Professional Internship	10 (5)
Total	**33 (28)**

Students to take the following Major Core courses	AU
Environmental Earth Systems Science Major (31AUs)	
ES0001 The Physical Environments of Singapore	3
ES0138 Introduction to Scientific Writing	2
ES1001 E2S2 Environment and Society	4
ES1003 E2S2 Solid Earth	4
ES1007 Climate Change	3
ES2001 Computational Earth Systems Science	4
ES2003 E2S2 Biosphere	4
ES2802 GIS and the Earth System	3
MH1802 Calculus for the Sciences	4
Biological Sciences Major (36AUs)	
BS1012 Foundations of Chemistry I	3
BS1013 Foundations of Chemistry II	3
BS1016 Physiology	3
BS1008 Biostatistics	3
BS1005 Biochemistry I	3
BS1006 Principles of Genetics	3
BS1007 Molecular and Cell Biology I	3
BS1100 Molecular and Cell Biology Techniques Level 1	3
BS2002 Microbiology	3
BS2003 Biochemistry II	3
BS2028 Biophysical methods applied to biological sciences	3
BS2004 Molecular & Cell Biology II	3
Total	**67**

Students to take the following Major Prescribed Electives	AU
Environmental Earth Systems Science Major: To read 18AUs	
ES2002 Earth Materials	3
ES2004 Sedimentary Geology	3
ES2203 Global Environmental Politics and Governance	3
ES2301 Principles of Heredity and Genetics	3
ES2303 Introduction to Ecology	3
ES3202 Resilient Urban Systems	3
ES3801 Biogeochemistry (alternating years)	3
ES3802 The Urban Environ: Issues, assessment, & management	3
ES4201 Environmental Management and Valuation	3
ES4303 Marine and Aquatic Ecology	3
ES4304 Eyes on Earth – Satellite Remote Sensing	3
ES4901 Oceanography (alternating years)	3
Other advanced ASE MPE with appropriate pre-reqs and instructor approval	3
Biological Sciences Major: To read 9AUs	
BS2010 Bioimaging	3
BS2020 Mathematics and Physics for the Structural Biologist	3
BS2021 RNA Structures & RNA based Drug Development	3
BS2025 One Health	3
BS2011 Equations of Life	3
BS3001 Neurobiology	3
BS3006 Bioentrepreneurship	3
BS3008 Computer Aided Drug Discovery	3
BS3013 Drug discovery & development, biotechnology	3
BS3014 Biological foundations of behavior	3
BS3022 Protein Trafficking	3
BS3025 NMR in Structural Biology	3
BS3028 Natural Products in Medicinal Chemistry	3
BS3036 Fundamentals of Immunology- concepts and experiments	3
BS3104 Pathology (病理学)	3
BS3203 Reshaping Healthcare with Engineering and Digital Revolution	3
BS3332 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series I) – Methods in Histology	3
BS3335 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series I) – Protein behavior in health and disease – biophysical tools	3
BS3340 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series I) – Science of aging and life extension in C. elegans	3
BS4018 Biology of Aging and Neurodegeneration	3
BS4019 Discovery and Development of Therapeutic Antibodies	3
BS4206 Medical Device Related Requirements and Regulations	3
BS1200 Understanding Singapore Healthcare System	3

BS2023 Regulatory Control of Healthcare Products and Medical Devices	3
BS2024 Evolution in Health and Disease	3
BS2100 Molecular and Cell Biology Techniques Level 2	3
BS3003 Developmental biology	3
BS3004 Cancer biology and Therapy	3
BS3018 Plant biology	3
BS3021 Bioimaging Techniques in EM	3
BS3027 Light and Biomolecule Behavior in Health and Disease	3
BS3037 Virology	23
BS3038 Intellectual Property Rights Related to BioBusiness	3
BS3202 Commercialization of Molecular and Cell Biology Techniques	3
BS3331 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series I) – Applied Immunology	3
BS3338 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series II) – Effect of Anti-mitotic Drugs on Cancer Cells	3
BS3342 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series II) – Role of Actin cytoskeleton regulators in metastasis	3
BS3344 Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series II) – Macromolecular X-ray Crystallography	3
BS3354 UAEB- New CRISPR-Cas systems for Precision Genome Engineering	3
BS4002 Current topics in cell biology	3
BS4010 Synthetic Biology	3
BS4014 Molecular Basis of Diseases	3
BS4015 Plant Biotechnology	3
BS4017 High-Throughput Bioinformatics	3
BS2901 Research Experience	3
Total	**27**

Detailed Curriculum Structure

Course Code and Title	Course Type	No. of hours per week				AUs	Prerequisite / Remarks
		Lec	Tut	Lab	Total		
Year 1 Semester 1							
MH1802 Calculus for the Sciences	Core	3	1	-	4	4	
ES0138 Introduction to Scientific Writing	Core	-	2	-	2	2	
ES1001 E2S2 Environment and Society	Core	2	2	-	4	4	
CC0001 Inquiry and Communication in an Interdisciplinary World	ICC-CC	-	2	-	2	2	
CC0003 Ethics & Civics in a Multi-Cultural World	ICC-CC	-	2	-	2	2	
BS1012 Foundations of Chemistry I	Core	3	1	3		3	

BS1016 Physiology	Core	1	2	-	3	3	
BS1008 Biostatistics	Core	2	-	3		3	
HW0001 Introduction to Academic Communication	-					0	For students who fail QET
Total						**23**	
Year 1 Semester 2							
ES1003 E2S2 Solid Earth	Core	3	-	3		4	
ES2003 Biosphere	Core	2	2	-	4	4	
ML0004 Design Your Life & Career	ICC-CC	-	2	-	2	2	
CC0015 Healthy Living & Mental Wellbeing	ICC-CC	-	2	-	2	2	
BS1013 Foundations of Chemistry II	Core	3	1	-	4	3	
BS1005 Biochemistry I	Core	2	1	4		3	
BS1006 Principles of Genetics	Core	2	1	-	3	3	
BS1007 Molecular and Cell Biology I	Core	2	1	-	3	3	
Total						**24**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 2 Semester 1							
ES2001 Computational Earth Systems Science	Core	3	-	3		4	ES1001, ES1003, ES2003, ES1007
ES2802 GIS and the Earth System	Core	-	3	-	3	3	
CC0007 Science & Technology for Humanity	ICC-CC	-	3	-	3	3	
BS2002 Microbiology	Core	2	2	-	4	3	
BS2003 Biochemistry II	Core	2	1	4		3	BS1005
BS2028 Biophysical methods applied to biological sciences	Core	2	1	3		3	BS1012 & BS1013
Total						**19**	
Year 2 Semester 2							
ES0001 The Physical Environments of Singapore	Core	2	-	3		3	
ES1007 Climate Change	Core	2	1	-	3	3	
CC0006 Sustainability: Human, Social, Economic & Environment	ICC-CC	-	3	-	3	3	
CCXXXX Care, Serve, Learn	ICC-CSL					3	
BS1100 Molecular and Cell Biology Techniques Level 1	Core	-	1	6		3	

BS2004 Molecular & Cell Biology II	Core	2	1	-	3	3	BS1007
BDE	BDE					3	
Total						**21**	

Course Code and Title	Course Type	No. of hours per week				AUs	Prerequisite / Remarks
		Lec	Tut	Lab	Total		
Year 3 Semester 1							
MLXXXX Professional Preparation	ICC-PS					1	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
BDE	BDE					3	
Total						**16**	
Year 3 Semester 2							
ES0002 Fundamentals of Data Science for Environmental Earth Systems Science	ICC-PS	1.5	1.5	-	3	3	ES2001
ES0238 Scientific Writing for Non-Scientists	ICC-PS	-	2	-	2	2	ES0138
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
Total						**14**	

Course Code and Title	Course Type	No. of hours per week				AUs	Prerequisite / Remarks
		Lec	Tut	Lab	Total		
Year 4 Semester 1							
ES4003 Professional Internship	ICC-PS					10	
Total						**10**	
Year 4 Semester 2							
ES4002 Final Year Project	Core					10	
MPE	MPE					3	
MPE	MPE					3	
Total						**16**	
Grand Total AU						**143**	