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

Home School: School of Physical and Mathematical Sciences

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 142 Academic Units (AUs):

- Major Requirements (103AUs)
- 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		
MATH	43	0	7	8	14	16	3	6	142
EESS	21		24						

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*
PS0002 Introduction to Data Science and Artificial Intelligence	3
HW0218 Communication Across the Sciences	2
MH4912 Professional Internship	10
Total	**33**

Students to take the following Major Core courses	AU
Mathematical Sciences Major (43AUs)	
MH1100 Calculus I	4
MH1200 Linear Algebra I	4
MH1300 Foundations of Mathematics	4
MH1101 Calculus II	4
MH1201 Linear Algebra II	4
MH2100 Calculus III	4
PS0001 Introduction to Computational Thinking	3
MH2500 Probability	4
MH2510 Statistics I	4
MH3100 Real Analysis I	4
MH3110 Ordinary Differential Equations	4
Environmental Earth Systems Science Major (21AUs)	
ES0001 The Physical Environments of Singapore	3
ES1001 E2S2 Environment and Society	4
ES1003 E2S2 Solid Earth	4
ES1007 Climate Change	3
ES2003 E2S2 Biosphere	4
ES2802 GIS and the Earth System	3
Total	**64**

Students to take the following Major Prescribed Electives		AU
Mathematical Sciences Major: To read 7AUs (A specialisation area is fulfilled by completing at least 7 AU from the respective list of courses.)		
Computational Mathematics and Modelling Specialisation	MH3101 Complex Analysis	4
	MH3300 Graph Theory	4
	MH3320 Dynamical System Theory with Chaos and Fractals (NEW)	4
	MH3400 Algorithms for the Real World	4
	MH3401 Signal and Noise in Biology	3
	MH3512 Stochastic Processes	4
	MH3515 Stochastic Geometry (NEW)	4
	MH3520 Mathematics of Deep Learning	4
	MH3700 Numerical Analysis I	4
	MH3701 Basic Optimization	4
	MH4100 Real Analysis II	4
	MH4110 Partial Differential Equations	4
	MH4302 Theory of Computing	4
	MH4310 Coding Theory	4
	MH4311 Cryptography	4
	MH4514 Financial Mathematics	4
	MH4517 Data Applications in Natural Sciences	4
	MH4518 Simulation Techniques in Finance	4
	MH4520 High Dimensional Probability	4
	MH4521 Reinforcement Learning	4
	MH4601 Differential Geometry	4
	MH4700 Numerical Analysis II	4
	MH4701 Mathematical Programming	4
	MH4712 Geometric Methods in Mathematical Physics (NEW)	4
Cryptography and Cybersecurity Specialisation	MH3400 Algorithms for the Real World	4
	MH3511 Data Analysis with Computer	3
	MH3701 Basic Optimization	4
	MH4110 Partial Differential Equations	4
	MH4300 Combinatorics	4
	MH4311 Cryptography	4
	MH4500 Time Series Analysis	4
	MH4700 Numerical Analysis II	4
Data Analytics and Statistical Learning Specialisation	MH3400 Algorithms for the Real World	4
	MH3510 Regression Analysis	4
	MH3511 Data Analysis with Computer	3
	MH3512 Stochastic Processes	4
	MH3515 Stochastic Geometry (NEW)	4
	MH3520 Mathematics of Deep Learning	4

	MH4320 Computational Economics	4
	MH4500 Time Series Analysis	4
	MH4501 Multivariate Analysis	4
	MH4510 Statistical Learning and Data Mining	4
	MH4511 Sampling & Survey	4
	MH4512 Clinical Trials	4
	MH4513 Survival Analysis	4
	MH4514 Financial Mathematics	4
	MH4515 Applied Bayesian Statistics	4
	MH4516 Applied Categorical Data Analysis	4
	MH4517 Data Applications in Natural Sciences	4
	MH4518 Simulation Techniques in Finance	4
	MH4519 Financial Econometrics	4
	MH4520 High Dimensional Probability	4
	MH4701 Mathematical Programming	4
	MH4702 Probabilistic Methods in OR	4
Financial Technology with Quantitative Analysis Specialisation	MH3512 Stochastic Processes	4
	MH3520 Mathematics of Deep Learning	4
	MH3700 Numerical Analysis I	3
	MH3701 Basic Optimization	4
	MH4110 Partial Differential Equations	4
	MH4320 Computational Economics	4
	MH4500 Time Series Analysis	4
	MH4514 Financial Mathematics	4
	MH4518 Simulation Techniques in Finance	4
	MH4519 Financial Econometrics	4
	MH4520 High Dimensional Probability	4
	MH4700 Numerical Analysis II	4
	MH4702 Probabilistic Methods in OR	4
	MH4712 Geometric Methods in Mathematical Physics (NEW)	4
Pure Mathematics Specialisation	MH2220 Algebra I	3
	MH3101 Complex Analysis	4
	MH3210 Number Theory	4
	MH3220 Algebra II	4
	MH3300 Graph Theory	4
	MH3515 Stochastic Geometry (NEW)	4
	MH4100 Real Analysis II	4
	MH4200 Abstract Algebra II	4
	MH4300 Combinatorics	4
	MH4301 Set Theory and Logic	4
	MH4302 Theory of Computing	4
	MH4310 Coding Theory	4

	MH4311 Cryptography	4
	MH4520 High Dimensional Probability	4
	MH4601 Differential Geometry	4
Environmental Earth Systems Science Major: To read 24AUs		
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
	Total	**31**

- Specialisation can be fulfilled through Major Prescribed Electives and/or BDEs. FGO is not applicable to courses that count towards the requirement for specialisation. The same course cannot be used to count towards two different specialisations.

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							
MH1100 Calculus I	Core	3	1	-	4	4	
MH1200 Linear Algebra I	Core	3	1	-	4	4	
MH1300 Foundations of Mathematics	Core	3	1	-	4	4	
PS0001 Introduction to Computational Thinking	Core	-	1	2		3	
CC0003 Ethics & Civics in a Multicultural World	ICC-CC	-	2	-	2	2	
ES1001 E2S2 Environment and Society	Core	2	2	-	4	4	
HW0001 Introduction to Academic Communication	-					0	For students who fail QET
Total						**21**	
Year 1 Semester 2							
MH1101 Calculus II	Core	3	1	-	4	4	MH1100 or CY1601
MH1201 Linear Algebra II	Core	3	1	-	4	4	MH1200

CC0001 Inquiry & Communication in an Interdisciplinary World	ICC-CC	-	2	-	2	2	
CC0015 Health & Wellbeing	ICC-CC	-	2	-	2	2	
ES1003 E2S2 Solid Earth	Core	3	-	3		4	
ES2003 Biosphere	Core	2	2	-	4	4	
Total						**20**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 2 Semester 1							
MH2100 Calculus III	Core	3	1	-	4	4	MH1101 or MH1802 or MH1805
MH2500 Probability	Core	3	1	-	4	4	MH1100 AND MH1101 or MH1802 or CY1601 or MH1805
ML0004 Career Design & Workplace Readiness in the V.U.C.A World	ICC-CC	-	2	-	2	2	
CC0006 Sustainability: Society, Economy & Environment	ICC-CC	-	3	-	3	3	
CCXXXX Care, Serve, Learn	ICC-CSL					3	
ES2802 GIS and the Earth System	Core	-	3	-	3	3	
Total						**19**	
Year 2 Semester 2							
MH2510 Statistics I	Core	3	-	2		4	MH2500
MH3110 Ordinary Differential Equations	Core	3	1	-	4	4	MH2100 or CY1602
PS0002 Introduction to Data Science and Artificial Intelligence	ICC-PS	2	1	1		3	PS0001
CC0007 Science & Technology for Humanity	ICC-CC					3	
ES0001 The Physical Environments of Singapore	Core	2	-	3		3	
ES1007 Climate Change	Core	2	1	-	3	3	
Total						**20**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 3 Semester 1							

MH3100 Real Analysis I	Core	3	1	-	4	4	MH1100 AND MH1101 or CY1601 or MH1802
HW0218 Communication Across the Sciences	ICC-PS					2	
MLXXXX Profession Preparation	ICC-PS					1	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
BDE	BDE					3	
Total						**19**	
Year 3 Semester 2							
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
BDE	BDE					3	
Total						**18**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 4 Semester 1							
MH4912 Professional Internship	ICC-PS					10	
Total						**10**	
Year 4 Semester 2							
MH4XXX Final Year Project	Core					8	
MPE	MPE					3	
MPE	MPE					4	
Total						**15**	
Grand Total AU						**142**	