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

Home School: School of Chemistry, Chemical Engineering and Biotechnology

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 144 Academic Units (AUs):

- Major Requirements (105AUs)
- 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		
CHEM	40	4	6	10	14	16	3	6	144
EESS	21		24						

- Common Core: MH1802

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
CM4081 Professional Internship	10
Total	**33**

Students to take the following Major Core and Common Core courses	AU
Chemistry Major (44AUs)	
CM1001 Foundations of Chemistry I	4
CM1002 Foundations of Chemistry II	4
MH1802 Calculus for the Sciences	4
CM1804 Mathematics for Chemistry	2
CM2011 Analytical and Bioanalytical Chemistry	3
CM2021 Inorganic and Bioinorganic Chemistry	3
CM2061 Chemistry & Biological Chemistry I	3
PS0001 Introduction to Computational Thinking	3
CM2031 Organic and Bioorganic Chemistry	3
CM2041 Physical and Biophysical Chemistry 1	3
CM2062 Chemistry & Biological Chemistry II	3
Read any 2 courses: ^CM3011 Chemical Spectroscopy and Applications ^CM3021 Organometallic Chemistry ^CM3031 Organic Reaction Mechanisms and Synthesis ^CM3041 Physical and Biophysical Chemistry 2	6
Read any 1 laboratory course: CM3061 Chemistry & Biological Chemistry III CM3062 Chemistry & Biological Chemistry IV	3
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	**65**

Note:
^ CM3011, CM3021, CM3031, CM3041 are offered in Semesters 1 and 2

Students to take the following Major Prescribed Electives	AU
Chemistry Major: To read 6AUs	
CM4011 Advanced Analytical Chemistry	3
CM4012 Structural Determination	3
CM4013 Current Topics in Analytical Chemistry	3
CM4021 Current Topics in Inorganic Chemistry	3
CM4031 Asymmetric Synthesis	3
CM4032 Current Topics in Synthetic Organic Chemistry	3
CM4033 Metal Mediated Reactions	3
CM4042 Chemical Kinetics and Dynamics	3
CM4043 Molecular Modelling: Principles and Applications	3
CM4044 Artificial Intelligence in Chemistry	3
CM4053 Pharmaceutical Chemistry	3
CM4061 Material Chemistry	3
CM4062 Polymer Chemistry	3
CM4063 Nanoscience and Nanotechnology	3
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	**30**

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							
CM1001 Foundations of Chemistry I	Core	3	-	3	6	4	
PS0001 Introduction to Computational Thinking	Core	-	1	2		3	
CC0001 Inquiry & Communication in an Interdisciplinary World	ICC-CC	-	2	-	2	2	

CC0015 Health & Wellbeing	ICC-CC					2	
MH1802 Calculus for the Sciences	Core	3	1	-	4	4	
ES1001 E2S2 Environment and Society	Core	2	2	-	4	4	
HW0001 Introduction to Academic Communication	-					0	For students who fail QET
Total						**19**	
Year 1 Semester 2							
CM1804 Mathematics for Chemistry	Core	2	-	-	2	2	MH1802
CM1002 Foundations of Chemistry II	Core	3	-	3		4	
PS0002 Introduction to Data Science and Artificial Intelligence	ICC-PS	-	1	1	2	3	PS0001
CC0003 Ethics & Civics in a Multi-Cultural World	ICC-CC	-	2	-	2	2	
ES1003 E2S2 Solid Earth	Core	3	-	3		4	
ES2003 Biosphere	Core	2	2	-	4	4	
Total						**19**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 2 Semester 1							
CM2011 Analytical and Bioanalytical Chemistry	Core	3	-	-	3	3	CM1001
CM2021 Inorganic and Bioinorganic Chemistry	Core	3	-	-	3	3	CM1001
CM2061 Chemistry & Biological Chemistry I	Core	-	-	6	6	3	CM1001 & CM1002
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	
ES2802 GIS and the Earth System	Core	-	3	-	3	3	
Total						**17**	
Year 2 Semester 2							
CM2031 Organic and Bioorganic Chemistry	Core	3	-	-	3	3	CM1002
CM2041 Physical and Biophysical Chemistry 1	Core	3	-	-	3	3	CM1001 and CM1804
CM2062 Chemistry & Biological Chemistry II	Core	-	-	6	6	3	CM1001
CC0007 Science & Technology for Humanity	ICC-CC	-	3	-	3	3	
CCXXXX Care, Serve, Learn	ICC-CSL					3	

ES0001 The Physical Environments of Singapore	Core	2	-	3		3	
ES1007 Climate Change	Core	2	1	-	3	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							
Choose 1: ^CM3011 Chemical Spectroscopy and Applications OR ^CM3021 Organometallic Chemistry OR ^CM3031 Organic Reaction Mechanisms and Synthesis OR ^CM3041 Physical and Biophysical Chemistry 2	Core	3	-	-	3	3	CM3011-pre-req CM2021+CM2031 CM3021-pre-req CM2021 CM3031-pre-req CM2031 CM3041-pre-req CM2041
CM3062 Chemistry & Biological Chemistry IV	Core	-	-	6	6	0[#]/3	CM3062-pre-req CM2062 Choose 1: CM3062 (Sem 1) OR [#]CM3061 (Sem 2)
MLXXXX Profession Preparation	ICC-PS					1	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
BDE	BDE					3	
Total						**19/22**	
Year 3 Semester 2							
Choose 1: ^CM3011 Chemical Spectroscopy and Applications OR ^CM3021 Organometallic Chemistry OR ^CM3031 Organic Reaction Mechanisms and Synthesis OR	Core	3	-	-	3	3	CM3011-pre-req CM2021+CM2031 CM3021-pre-req CM2021 CM3031-pre-req CM2031 CM3041-pre-req CM2041

^CM3041 Physical and Biophysical Chemistry 2							
CM3061 Chemistry & Biological Chemistry III	Core	-	-	6	6	0[#]/3	CM3061 pre-req: CM2061 Choose 1: [#]CM3062 (Sem 1) OR CM3061 (Sem 2)
HW0218 Communication Across the Sciences	-					2	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
MPE	MPE					3	
BDE	BDE					3	
Total						**20/23**	

Course Code and Title	**Course Type**	**No. of hours per week**				**AUs**	**Prerequisite / Remarks**
		Lec	**Tut**	**Lab**	**Total**		
Year 4 Semester 1							
CM4081 Professional Internship	ICC-PS					10	CM3062
Total						**10**	
Year 4 Semester 2							
CM4080 Honours Project 1 (FYP)	Core					10	CM3061+CM3062 or by permission
MPE	MPE					3	
MPE	MPE					3	
Total						**16**	
Grand Total AU						**144**	