BSc in Chemistry and Biological Chemistry with 2nd Major in Environmental Science (CHES)

AY2022 - 2023 Intake onwards

with Professional Internship

		Number of Academic Units (AU)								
Programme	Year of	Major Re	equirement	Interdisc	ciplinary	Broadening and				
	Study	Core (C)	Major PE (MPE)	Common Core (CC)	Foundational Core (FC)	Deepening Electives (BDE)	Total			
	1	17		9		8	34			
Chemistry and	2	21		8	3	6	38			
Biological	3	18			2	21	41			
Chemistry	4		12		10	6	28			
	Total	56	12	17	15	41	141			

BSc in Chemistry and Biological Chemistry with 2nd Major in Environmental Science (CHES)

Category			AU	Total AU
	Common (Core (University-level)		
	CC0001 In	quiry and Communication in the Interdisciplinary World	2	
	CC0002 Na	avigating the Digital World	2	
	CC0003 Et	hics & Civics in a Multi-Cultural World	2	
	CC0005 He	ealthy Living & Wellbeing		
Interdisciplinary	CC0006 Su	stainability: Society, Economy & Environment	3	17
Collaborative	CC0007 Sc	ience & Technology for Humanity	3	
Core (ICC)	ML0004 Ca World	areer and Entrepreneurial Development for the Future	2	
	Foundatio	nal Core (College-level)		
	HW0218 C	communication Across the Sciences	2	
	PS0002 Int	roduction to Data Science and Artificial Intelligence	3	15
	CM4081 P	rofessional Internship	10	
	1			
	CHEM Cor		T -	
		Foundations of Chemistry I	4	
		Foundations of Chemistry II	4	
	MH1802	Calculus for the Sciences	4	
		Mathematics for Chemistry	2	
	PH1801	Foundations of Physics I	3	
		Inorganic and Bioinorganic Chemistry	3	
		Analytical Chemistry	3	
	CM2061	Chemistry & Biological Chemistry Laboratory 1	3	
	PS0001	Introduction to Computational Thinking	3	
Major	CM2031	Organic and Bioorganic Chemistry	3	56
Requirement		Physical and Biophysical Chemistry 1	3	
	CM2062	Chemistry & Biological Chemistry Laboratory 2	3	
		Chemical Spectroscopy and Applications	3	
		Physical and Biophysical Chemistry 2	3	
	CM3062	Chemistry & Biological Chemistry Laboratory 4	3	
		Organic Reaction Mechanisms and Synthesis	3	
			3	
	CM3061	Chemistry & Biological Chemistry Laboratory 3	3	
	CHEM Maj	or Prescribed Electives (MPE)		
	4 x MPEs		12	12

	Environmental Science Compulsory Courses		
	1) ES1001 E2S2 Environment and Society	4	
	2) ES2003 E2S2 Biosphere	4	
	3) ES3003 Introduction to Geochemistry	3	
	4) ES5001 Natural Hazards, Climate Change and Society	3	
	5) ES5006 Environmental Sustainability	3	
		3	
	Choose 5 Courses from the following list		
	1) ES1007 Climate Change	3	
2nd Major in	2) ES3801 Biogeochemistry	3	
Environmental	3) ES3802 The Urban Environment: Issue, Assessment, and	3	32
Science (CHES)	4) ES5002 Emergent Life	3	32
	5) ES5003 Blue Planet: How the Oceans Work	3	
	6) ES5005 Environmental Earth Systems Science	3	
	7) ES9003 The Genome and Society	3	
	8) EM5101 Environmental Quality	3	
	9) EM5103 Water Resource Management	3	
	10) EM5104 Air Quality Management	3	
	11) EM5105 Energy Resources Management	3	
	12) EM 5107 Environmental Health and Safety Management	3	
	13) EM5109 Environmental Issues and Sustainability	3	
	Students are responsible to plan for their 2nd major courses		
BDE	Any 3 BDE	9	9
Total			141

&CM3011, CM3021. CM3031, CM3041 are offered in both semesters.

with Profes	ssional Internship						
Vear 1 Sen	nester 1			Year 1 Sen	nester 2		
Course	Foundations of Chemistry I Calculus for the Sciences Inquiry and Communication in an interdisciplinary World Navigating the Digital World		AU	Course	lester Z	Туре	ΑU
CM1001	Foundations of Chemistry I	Type C	4	CM1002	Foundations of Chemistry II	C	4
MH1802		c	4	MH1804	Mathematics for Chemistry	C	2
CC0001		66	2	DU11 001	•	6	2
CC0001	interdisciplinary World	CC	2	PH1801	Foundations of Physics I	С	3
CC0002	Navigating the Digital World	CC	2	CC0003	Ethics & Civics in a Multi-Cultural	CC	2
ES1001	E2S2 Environment and Society	BDE	4	CC0005	World Healthy Living & Wellbeing	CC	3
231001	2232 Environment and Society	DDL	-	ES2003	E2S2 Biosphere	BDE	4
HW0001	Introduction to Academic Communicati	ion*					
			16				18
*for studer	nts who have not cleared QET						
Year 2 Sen	nester 1			Year 2 Sen	nester 2		
Course		Туре	AU	Course		Type	AU
CM2011	Analytical and Bioanalytical Chemistry	С	3	CM2031	Organic and Bioorganic Chemistry	С	3
CM2021	Inorganic and Bioinorganic Chemistry	С	3	CM2041	Physical and Biophysical Chemistry 1	С	3
CM2061	Chemistry & Biological Chemistry Laboratory 1	С	3	CM2062	Chemistry & Biological Chemistry Laboratory 2	С	3
PS0001	Introduction to Computational Thinking	С	3	PS0002	Introduction to Data Science and Artificial Intelligence	FC	3
CC0006	Sustainability: Society, Economy & Environment	СС	3	ML0004	Career and Entrepreneurial Development for the Future World	СС	2
CC0007	Science & Technology for Humanity	CC	3	ES5006	Environmental Sustainability	BDE	3
ES5001	Natural Hazards, Climate Change and Society	BDE	3				
			21				17
Year 3 Sen	postor 1			Year 3 Sen	nester 7		
Course	iestei 1	Туре	AU	Course	iestei Z	Туре	AU
CM3xxx ^{&}	CHEM-Core	С	3	CM3xxx ^{&}	CHEM-Core	C	3
CM3xxx ^{&}	CHEM-Core	C	3	CM3xxx ^{&}	CHEM-Core	C	3
CM3062	Chemistry & Biological Chemistry	С	3	CM3061	Chemistry & Biological Chemistry	С	3
	Laboratory 4				Laboratory 3		
ES3003	Introduction to Geochemistry	BDE	3		CHES Elective 4	BDE	3
	CHES Elective 1	BDE	3		CHES Elective 4	BDE	3
	CHES Elective 2 BDE 1	BDE BDE	3	HW0218	CHES Elective 5 Communication Across the Sciences	BDE FC	3 2
			21				20
L _					_		
Year 4 Sen Course	nester 1	Typo	AU	Year 4 Sen	nester 2	Typo	AU
CM4081	Professional Internship	Type FC	10	Course	CHEM MPE1	Type MPE	3
CIVI4U0I	i ioressional internsinp	rC	10		CHEM MPE2	MPE	3
					CHEM MPE3	MPE	3
					CHEM MPE4	MPE	3
					BDE 2	BDE	3
					BDE 3	BDE	3
			10				18
					Total (AU)		141

This study plan is meant as a guide.

 $^{^{\&}amp;}$ CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters

BSc in Chemistry and Biological Chemistry with 2nd Major in Environmental Science (CHES)

AY2022 - 2023 Intake onwards

FYP with Professional Attachment

Programme		Number of Academic Units (AU)								
	Year of	Major Re	quirement	Interdisc	ciplinary	Broadening and				
	Study	Core (C)	Major PE (MPE)	Common Core (CC)	Foundational Core (FC)	Deepening Electives (BDE)	Total			
	1	17		9		8	34			
Chemistry and	2	21		8	3	6	38			
Biological	3	18			7	20	45			
Chemistry	4		22			2	24			
	Total	56	22	17	10	36	141			

BSc in Chemistry and Biological Chemistry with 2nd Major in Environmental Science (CHES)

Category			AU	Total AU
	Common (Core (University-level)		
	CC0001 In	quiry and Communication in the Interdisciplinary World	2	
	CC0002 Na	avigating the Digital World	2	
	CC0003 Et	hics & Civics in a Multi-Cultural World	2	
	CC0005 He	ealthy Living & Wellbeing	3	17
nterdisciplinary	CC0006 Su	stainability: Society, Economy & Environment	3	1/
Collaborative	CC0007 Sc	ience & Technology for Humanity	3	
Core (ICC)	ML0004 C	areer and Entrepreneurial Development for the Future	2	
	Foundatio	nal Core (College-level)		
	HW0218 C	Communication Across the Sciences	2	
	PS0002 Int	troduction to Data Science and Artificial Intelligence	3	10
	CM4082 P	rofessional Attachment	5	
	CHEM Cor	e		
	CM1001	Foundations of Chemistry I	4	
	CM1002	Foundations of Chemistry II	4	
	MH1802	Calculus for the Sciences	4	
	MH1804	Mathematics for Chemistry	2	
	PH1801	Foundations of Physics I	3	
	CM2021	Inorganic and Bioinorganic Chemistry	3	
	CM2011	Analytical Chemistry	3	
	CM2061	Chemistry & Biological Chemistry Laboratory 1	3	
	PS0001	Introduction to Computational Thinking	3	
Major	CM2031	Organic and Bioorganic Chemistry	3	56
Requirement	CM2041	Physical and Biophysical Chemistry 1	3	
Requirement	CM2062	Chemistry & Biological Chemistry Laboratory 2	3	
	CM3011 ^{&}	Chemical Spectroscopy and Applications	3	
	CM3041 ^{&}	Physical and Biophysical Chemistry 2	3	
	CM3062	Chemistry & Biological Chemistry Laboratory 4	3	
	CM3031 ^{&}	Organic Reaction Mechanisms and Synthesis	3	
	CM3021 ^{&}	Organometallic Chemistry	3	
	CM3061	Chemistry & Biological Chemistry Laboratory 3	3	
	CHEM Ma	 jor Prescribed Electives (MPE)	<u> </u>	1
	CM4080	Honours Project 1	10	22
	4 x MPEs		12	22

Compulsory Courses	
nent and Society 4	
re 4	
o Geochemistry 3	
ds, Climate Change and Society 3	
I Sustainability 3	
2003 E2S2 Biosphere 4 2003 Introduction to Geochemistry 3 2001 Natural Hazards, Climate Change and Society 3	
ge 3	
try 3	
vironment: Issue, Assessment, and	
3	32
3	
low the Oceans Work 3	
al Earth Systems Science 3	
and Society 3	
al Quality 3	
rce Management 3	
Management 3	
ources Management 3	
ntal Health and Safety Management 3	
tal Issues and Sustainability 3	
plan for their 2nd major courses	
4	4
4	

&CM3011, CM3021. CM3031, CM3041 are offered in both semesters.

	mistry and Biological Chemistry with 2nd	d Major i	n Environme	ntal Science (CHI	ES)		
-	Study Plan for AY2022-2023 intake rofessional Attachment Option						
Year 1 Sem	nester 1			Year 1 Sen	nester 2		
Course		Туре	AU	Course		Туре	AU
CM1001 MH1802	Foundations of Chemistry I Calculus for the Sciences	C C	4 4	CM1002 MH1804	Foundations of Chemistry II Mathematics for Chemistry	C C	4 2
CC0001	Inquiry and Communication in an interdisciplinary World	CC	2	PH1801	Foundations of Physics I	С	3
CC0002	Navigating the Digital World	CC	2	CC0003	Ethics & Civics in a Multi-Cultural World	CC	2
ES1001	E2S2 Environment and Society	BDE	4	CC0005 ES2003	Healthy Living & Wellbeing E2S2 Biosphere	CC BDE	3 4
HW0001	Introduction to Academic Communicati	on*					
*for studen	nts who have not cleared QET		16				18
Year 2 Sem				Year 2 Sen	nester 2		
Course		Туре	AU	Course		Туре	AU
CM2011	Analytical and Bioanalytical Chemistry	С	3	CM2031	Organic and Bioorganic Chemistry	С	3
CM2021	Inorganic and Bioinorganic Chemistry	С	3	CM2041	Physical and Biophysical Chemistry 1	С	3
CM2061	Chemistry & Biological Chemistry Laboratory 1	С	3	CM2062	Chemistry & Biological Chemistry Laboratory 2	С	3
PS0001	Introduction to Computational Thinking	С	3	PS0002	Introduction to Data Science and Artificial Intelligence	FC	3
CC0006	Sustainability: Society, Economy & Environment	СС	3	ML0004	Career and Entrepreneurial Development for the Future World	СС	2
CC0007	Science & Technology for Humanity Natural Hazards, Climate Change and	CC	3	ES5006	Environmental Sustainability	BDE	3
ES5001	Society	BDE	3				
			21				17
Year 3 Sem	nester 1			Year 3 Sen	nester 7		
Course	10510. 1	Туре	AU	Course	ileste. E	Туре	AU
CM3xxx ^{&}	CHEM-Core	С	3	CM3xxx ^{&}	CHEM-Core	С	3
CM3xxx ^{&}	CHEM-Core	C	3	CM3xxx ^{&}	CHEM-Core	C	3
CM3062	Chemistry & Biological Chemistry Laboratory 4	С	3	CM3061	Chemistry & Biological Chemistry Laboratory 3	С	3
ES3003	Introduction to Geochemistry	BDE	3		CHES Elective 3	BDE	3
	CHES Elective 1	BDE	3		CHES Elective 4	BDE	3
	CHES Elective 2	BDE	3		CHES Elective 5	BDE	3
	BDE 1	BDE	2	HW0218	Communication Across the Sciences	FC	2
				<u>Year 3 Spe</u> CM4082	<u>cial Sem</u> Professional Attachment	FC	5
					Troressional Actaeriment		
			20				25
Year 4 Sem	nester 1			Year 4 Sen	nester 2		
Course		Туре	AU	Course		Туре	AU
	CHEM MPE1	MPE	3	CM4080	Honours Project 1	MPE	10
	CHEM MPE2	MPE	3		BDE 2	BDE	2
	CHEM MPE3	MPE	3				
	CHEM MPE4	MPE	3				
			12				12
					Total (AU)		141

This study plan is meant as a guide.

 $^{^{\&}amp;}$ CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters

BSc in Chemistry and Biological Chemistry with 2nd Major in Food Science and Technology (CHFS)

AY2022 - 2023 Intake onwards

with Professional Internship and FYP

	Year of			Number of Acad) Broadening and	
Programme		iviajor kequirement interdisciplinary					
	Study	Core (C)	Major PE (MPE)	Common Core (CC)	Foundational Core (FC)	Deepening Electives (BDE)	Total
	1	20		11	(: -)	` ,	Total 31 41 42 26 140 Total A 17 15
Chemistry and	2	18		6	3	14	41
Biological	3	18	6		2	16	42
Chemistry	4		16		10		26
Sc in Chemistry ategory nterdisciplinary	Total	56	22	17	15	30	140
Sc in Chemistry	and Biolog	gical Chemistry	with 2nd Majo	r in Food Scienc	e and Technolo	gy (FST)	
Category	_					AU	Total Al
		Core (Universit	-				
		quiry and Com	2				
		avigating the D	2				
			a Multi-Cultura	l World		2	. –
		ealthy Living &	_	0.5		3	17
Chemistry and Biological Chemistry Sc in Chemistry ategory nterdisciplinary Collaborative			ciety, Economy			3	
			ology for Humar	3			
Core (ICC)	ML0004 Ca	areer and Entr	epreneurial Dev	elopment for the	e Future World	2	
		nal Core (Colle					
		Communication	2				
		roduction to D	3	15			
	CM4081 P	rofessional Int	ernship			10	
	CHEM Cor	e					
	CM1001	Foundations of		4			
	CM1002	Foundations of	of Chemistry II	4			
	MH1802	Calculus for th	ne Sciences	4			
	MH1804	Mathematics	for Chemistry	2			
	PH1801	Foundations of	of Physics I	3			
	CM2021	Inorganic and	Bioinorganic Ch	3			
	CM2011	Analytical Che	emistry	3			
	CM2061	Chemistry & E	Biological Chemi	3			
	PS0001	Introduction t	o Computationa	3	56		
Major	CM2031	Organic and B	ioorganic Chem	3	30		
	CM2041	Physical and E	Biophysical Chen	3			
nequirement	CM2062			stry Laboratory 2	2	3	
			ctroscopy and A			3	
	CM3041 ^{&}		Biophysical Chen			3	
	CM3062	Chemistry & E	Biological Chemi	stry Laboratory 4	4	3	
	CM3031 ^{&}	Organic React	ion Mechanisms	s and Synthesis		3	
	CM3021 ^{&}	Organometall	ic Chemistry			3	
	CM3061			stry Laboratory	3	3	
	CHEM Ma	jor Prescribed	Electives (MPE)				
	CM4080	Honours Proje				10	22
	4 x MPEs					12	22
	Food Scien	nce and Techno	ology Compulso	rv Courses			
		Food Chemist		.,		5	
2nd Major in		Food Microbia	•			3	
Food Science	•	Food Process				5	
and Technology		Food Physics	6			3	30
/\						٠	
(FST)	5) CH5204	Quality Syston	ns Operations			2	

140

Total

	mistry and Biological Chemistry with 2nd Study Plan for AY2022-2023 intake	i wajoi ii	TT OOU SCIEN	ice and recimolog	,y (cm 5)		
with Profes	ssional Internship and FYP						
Year 1 Sem Course	iester 1	Туре	AU	Year 1 Sem Course	nester 2	Type	AU
CM1001	Foundations of Chemistry I	С	4	CM1002	Foundations of Chemistry II	С	4
MH1802	Calculus for the Sciences	C	4	MH1804	Mathematics for Chemistry	С	2
CC0001	Inquiry and Communication in the Interdisciplinary World	CC	2	PH1801	Foundations of Physics I	С	3
CC0002	Navigating the Digital World	CC	2	CC0003	Ethics & Civics in a Multi-Cultural World	СС	2
CC0005	Healthy Living & Well-being	CC	3	ML0004	Career and Entrepreneurial Development for the Future World	CC	2
HW0001	HW0001 Introduction to Academic Communi						
			15				13
*for studen	nts who have not cleared QET						
Year 2 Sem	iester 1			Year 2 Sem	nester 2		
Course		Туре	AU	Course		Туре	AU
CM2011	Analytical and Bioanalytical Chemistry	С	3	CM2031	Organic and Bioorganic Chemistry	С	3
CM2021	Inorganic and Bioinorganic Chemistry	С	3	CM2041	Physical and Biophysical Chemistry 1	С	3
CM2061	Chemistry & Biological Chemistry Laboratory 1	С	3	CM2062	Chemistry & Biological Chemistry Laboratory 2	С	3
PS0001	Introduction to Computational Thinking	С	3	PS0002	Introduction to Data Science and Artificial Intelligence	FC	3
CC0006	Sustainability: Society, Economy & Environment	CC	3	CC0007	Science & Technology for Humanity	CC	3
CH5201	Food Chemistry	BDE	5	CH5200	Food Microbiology NTU-FST Prescribed Elective	BDE BDE	3
			20				21
Year 3 Sem	nester 1			Year 3 Sem	nester 2		
Course		Туре	AU	Course		Туре	AU
CM3xxx ^{&}	CHEM-Core	С	3	CM3xxx ^{&}	CHEM-Core	С	3
CM3xxx ^{&}	CHEM-Core	С	3	CM3xxx ^{&}	CHEM-Core	С	3
CM3041	Physical and Biophysical Chemistry 2	С	3	CH5202	Food Physics	BDE	3
CM3062	Chemistry & Biological Chemistry Laboratory 4	С	3	CH5204	Quality Systems Operations	BDE	2
CH5203	Food Process Engineering	BDE	5	HW0218	Communication Across the Sciences	FC	2
	NTU-FST Prescribed Elective	BDE	3		NTU-FST Prescribed Elective	BDE	3
		•	-		NTU-FST Prescribed Elective CHEM MPE 1	BDE MPE	3
			20				22
Year 4 Sem	iester 1			Year 4 Sem	nester 2		
Course		Туре	AU	Course		Туре	AU
CM4081	Professional Internship	FC	10	CM4080	Honours Project 1	MPE	10
					CHEM MPE 2	MPE	3
					CHEM MPE 3 CHEM MPE 4	MPE MPE	3
					_		
			10		=		19
i					Total (AU)		140

This study plan is meant as a guide.

 $^{^{\&}amp;}$ CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters