(V.1)

NUI Galway
OÉ Gaillimh

College of Science and Engineering
2022/2023

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BACHELOR OF SCIENCE DEGREE

www.nuigalway.ie/science-engineering

OVERVIEW

Year 1	Year 2	Year 3	Year 4
[60 Credits]	**[60 credits]**	**[60 credits]**	**[60 credits]**
Choose four of the following modules: Each module is 15 Credits. At least one of: Applied Mathematics Mathematics Mathematical Studies At least two of: Biology Chemistry Computer Science Physics	Choose three pathways (or two pathways plus electives. Please refer to Page 3 for instructions on Pathway Selection) Anatomy Applied Mathematics Biochemistry Botany and Plant Science Chemistry Computing Data Science Earth and Ocean Sciences Mathematics Mathematics and Applied Mathematics; Mathematics and Computing; Mathematical Studies and Computing Medicinal Chemistry Microbiology Pharmacology Physics and Applied Physics Physics and Climate Physics Physiology Plant and AgriBiosciences Zoology Electives: A variety of electives are offered.	Choose two pathways: (Please refer to Page 3 for instructions on Pathway Selection): Anatomy Applied Mathematics (Honours) Biochemistry Botany and Plant Science Chemistry Computing Data Science Earth and Ocean Sciences Mathematics (Honours) Mathematics and Applied Mathematics Mathematics and Computing Mathematical Studies and Computing Medicinal Chemistry Microbiology Pharmacology Physics and Applied Physics Physics and Climate Physics Physiology Plant and AgriBiosciences Zoology	Choose your honours degree: (Please refer to Page 4 for details on Progression to 4th Year) Anatomy Applied Mathematics Biochemistry Botany and Plant Science Chemistry Computing Data Science Earth and Ocean Sciences Mathematics Mathematics and Applied Mathematics Mathematics and Computing Mathematical Studies and Computing Medicinal Chemistry Microbiology Pharmacology Physics and Applied Physics Physics and Climate Physics Physiology Plant and AgriBiosciences Zoology

PATHWAY SELECTION

Year 1	Year 2	Year 3	Year 4
[60 Credits]	**[60 credits]**	**[60 credits]**	**[60 credits]**
Choose **four** 15-credit modules. 4 x 15 = 60 Credits.	Choose **three** 20-credit 2nd Year degree pathways 3 x 20 = 60 Credits **OR** Choose **two** 20- (or 35- or 40-) credit 2nd Year degree pathways **plus** electives 2 x 20 + 20 = 60 Credits / 1 x 20 + 1 x 35 + 5 = 60 Credits / 1 x 20 + 1 x 40 = 60 Credits **Electives Notes:** 1. Some pathways share modules (eg, BO201, BO202). These shared modules can only be counted once in credit accumulation. When choosing two or more pathways containing these shared modules, please select additional elective(s) to compensate for this double counting. 2. Similarly, credit cannot be accumulated for elective modules that are also included as part of a pathway. 3. Electives that are offered in both 2nd and 3rd year can only be taken once. Credit cannot be obtained again for a module previously taken and passed.	Select **OPTION A or B** *OPTION A is REQUIRED if taking a 3rd Year Biology Subject, i.e. Anatomy, Biochemistry, Botany and Plant Science, Microbiology, Pharmacology, Physiology, Plant and AgriBiosciences, or Zoology* **Option A – Dual Pathways** Choose **TWO** 20-, 30-or 40 credit 3rd Year degree pathways and 0-20 credits of electives, to bring total to 60 credits, i.e. • 2 x 30-credit pathways **OR** • 2 x 20-credit pathways + 20 credits of electives **OR** • 1 x 20-credit pathway + 1 x 30-credit pathway + 10 credits of electives **OR** • 1 x 20-credit pathway + 1 x 40-credit pathway **Option B – Single Pathway** Choose **ONE** 30-,40- or 60-credit 3rd Year degree pathway and 0-30 credits of electives, to bring total to 60 credits, i.e. • 1 x 30-credit pathway + 30 credits of electives **OR** • 1 x 40-credit pathway + 20 credits of electives **OR** • 1 x 60-credit pathway ***Option B Single Pathways** are required if taking: Chemistry (40 Credits), Data Science (60 credits), Mathematics and Applied Mathematics (60 Credits), Mathematics and Computing (60 Credits), Mathematical Studies and Computing (60 Credits), Medicinal Chemistry (60 Credits), Physics and Applied Physics (40 Credits).* *Students taking Applied Mathematics (30 Credits), Computing (30 credits), Earth and Ocean Science (40 Credits) or Mathematics (40 Credits) can choose either Option A or B.*	Choose one 60-Credit degree pathway (single degree option or a joint degree option) 1 x 60 = 60 Credits **Joint Degree Options:** Mathematics and Computing; Mathematical Studies and Computing; Mathematics and Applied Mathematics **Single Degree Options:** Anatomy, Applied Mathematics, Biochemistry, Botany and Plant Science, Chemistry, Computing, Data Science, Earth and Ocean Science, Mathematics, Medicinal Chemistry, Microbiology, Pharmacology, Physics and Applied Physics, Physiology, Plant and AgriBiosciences, Zoology
	Module Options within Pathways: Where module options are indicated within a pathway, these modules are highlighted in colour.		

Allocation of 2nd Year Pathway/Elective Places:

In 2nd Year, there is a capacity limit on the places available in each pathway/elective. Students are allocated their pathways based on their overall 1st Year results and submitted pathway preferences for 2nd Year.

Details on the Procedure/Guidelines for allocating places is in the Student Guide issued to all 1st Year students and available on the web:
http://www.nuigalway.ie/science-engineering/studentinformation/undergraduatestudentinformation/undergraduatestudenthandbooks/

Compatible Pathways in Years 2 and 3:

Please refer to the list of compatible pathways available at:
http://www.nuigalway.ie/science/2nd_year_science.html

Progression to 4th Year:

Every student who achieves an overall result of pass in their third year examinations will be guaranteed a place in the fourth year of the programme. However, students are not necessarily guaranteed their first choice of subject.

If a student achieves 45% overall in his/her third year examinations at the first sitting, he/she will be guaranteed his/her first choice of pathway.
If a student achieves less than 45% overall in his/her third year examinations, he/she will be allocated a pathway from the major pathways taken in third year.

Module Descriptors:
Module descriptors are available at:
Years 1 and 2: https://www.nuigalway.ie/course-information/programme/BS1
Year 3: https://www.nuigalway.ie/course-information/programme/BS9
Year 4: https://www.nuigalway.ie/course-information/programme/BS2

Module Codes

AN	Anatomy	EV	Environmental Science	PM	Pharmacology
BG	Biotechnology	FR	French	SI	Physiology
BI	Biochemistry	GR	German	PAB	Plant and AgriBiosciences
BM	Biomedical Science	HP	Occupational Health	ST	Statistics
BO	Biology	IE	Engineering	TI	Geography
BPS	Botany & Plant Science	MA	Mathematics / Mathematical Studies	ZO	Zoology
CH	Chemistry	MI	Microbiology		
CS	Computer Science	MP	Applied Mathematics		
EC	Economics	MR	Marine Science		
EOS	Earth & Ocean Sciences	PH	Physics & Applied Physics		

ANATOMY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 30 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2	***Semester 1***	***Semester 1***	***Semester 1***
BO101 **Biology [15]**	AN2101 **Cells and Tissues [10]**	AN3105 **Gross Anatomy I [10]**	AN4105 **Current Concepts in Anatomy 1 [5]**
CH101 **Chemistry [15]**	***Semester 2***	AN326 **Neuroanatomy [5]**	AN4108 **Head, Neck and Advanced Neuroanatomy [5]**
PH101 **Physics [15]**	AN223 **Embryology & Development [5]**	***Semester 2***	AN4101 **Gross Anatomy III [10]**
	AN226 **Systems Histology [5]**	AN3106 **Gross Anatomy II [10]**	AN4103 **Microscopy and Imaging [10]**
		AN3109 **Human Reproductive Anatomy [5]**	***Semester 2***
			AN4106 **Current Concepts in Anatomy 2 [5]**
			AN441 **Physical Anthropology [5]**
			AN444 **Research Project [20]**

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

APPLIED MATHEMATICS PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 30 credits]	[Core: 55 credits; Options: 5 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 MP180 **Applied Mathematics [15]**	*Semester 1* MP231 **Mathematical Methods I [5]** MP236 **Mechanics I [5]** *Semester 2* MP232 **Mathematical Methods II [5]** MP237 **Mechanics II [5]**	*Semester 1* MP345 **Mathematical Methods I [5]** MP410 **Non Linear Elasticity [5]^** MP356 **Quantum Mechanics I [5]^** *Semester 2* MP357 **Quantum Mechanics II [5]^** MP346 **Mathematical Methods II [5]** MP491 **Non Linear Systems [5]**	*Full Year - Semester 1 and Semester 2* MA4101 **Teaching and Learning in Mathematics [5]*** MM4000 **Final Year Project [10]** *Semester 1* MP403 **Cosmology And General Relativity [5]** MA3101 **Euclidean and Non-Euclidean Geometry [5]** MP305 **Modelling I [5]** MP410 **Non Linear Elasticity [5]^** MA385 **Numerical Analysis I [5]** MP356 **Quantum Mechanics I [5]^** MA4102 **Algebraic Foundations of Quantum Computing [5]*** MA335 **Algebraic Structures [5]*** ST313 **Applied Regression Models [5]*** ST311 **Applied Statistics I [5]*** PH466 **Astrophysics [5]*** MA302 **Complex Variable [5]*** PH334 **Computational Physics [5]*** MA3343 **Groups [5]*** ST417 **Introduction to Bayesian Modelling [5]*** MA313 **Linear Algebra I [5]*** CS3304 **Logic [5]*** *Continued…*

Applied Mathematics Pathway – *Continued*

			MA490 **Measure Theory [5]***
			MA341 **Metric Spaces [5]***
			PH328 **Physics of the Environment I [5]***
			MA416 **Rings [5]***
			PH422 **Solid State Physics [5]***
			ST413 **Statistical Modelling [5]***

			Semester 2
			MP307 **Modelling II [5]**
			MA378 **Numerical Analysis II [5]**
			MP357 **Quantum Mechanics II [5]^**
			MA4344 **Advanced Group Theory [5]***
			ST312 **Applied Statistics II [5]***
			CS402 **Cryptography [5]***
			MA3491 **Fields and Applications [5]***
			MA482 **Functional Analysis [5]***
			PH329 **Physics of the Environment II [5]***
			CS319 **Scientific Computer [5]***
			ST4120 **Causal Inference [5]***
			MA342 **Topology [5]***
		^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.	* Select one 5-credit module. ^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

BIOCHEMISTRY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 30 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2	*Semester 1*	*Semester 1*	*Full Year – Semester 1 and Semester 2*
BO101 **Biology [15]**	BO201 **Molecular and Cellular Biology (MCB) [5]**	BI309 **Cell Biology [5]**	BI453 **Biochemistry Research Project [15]**
CH101 **Chemistry [15]**	BI208 **Protein Structure and Function (PSF) [5]**	BO3101 **Developmental Biology [5]**	BI446 **Current Topics in Bioscience [5]**
PH101 **Physics [15]**	*Semester 2*	BI319 **Molecular Biology [5]**	BI447 **Literature Review and Presentation [10]**
	BI206 **Gene Technologies and Molecular Medicine [5]**	*Semester 2*	BI451 **Research Paper Analysis [5]**
	BI207 **Metabolism and Cell Signalling [5]**	BI313 **Cell Signalling [5]**	*Semester 1*
		BI317 **Human Molecular Genetics [5]**	BI452 **Biochemistry Principles and Experimental Design [5]**
		BI321 **Protein Biochemistry [5]**	BI445 **Biomolecules [5]**
			BI448 **Modern Biotechnologies [5]**
			Semester 2
			BI429 **Advanced Chromosome Biology [5]**
			BI449 **Molecular and Cellular Biology [5]**

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

BOTANY AND PLANT SCIENCE PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 20 credits]	[Core: 50 credits; Options: 10 credits]
Full Year – Semester 1 and Semester 2	*Semester 1*	*Semester 1*	*Full Year – Semester 1 and Semester 2*
BO101 **Biology [15]**	BO202 **Evolution and the Tree of Life [5]**	BPS3102 **Plant Resources and Ecosystems [5]**	BPS4101 **Major Research Project [20]**
	BPS202 **Fundamentals in Aquatic Plant Science [5]**	BPS3103 **Plant Function [5]**	ZO414 **Advanced Zoology Topics [5]***
	BO201 **Molecular and Cellular Biology (MCB) [5]**	*Semester 2*	ZO418 **Phylogenetics & Conservation [5]***
	Semester 2	BPS3107 **Plants, Atmosphere and Environment throughout Earth History [5]**	*Semester 1*
	BPS203 **Plant Diversity, Physiology and Adaptation [5]**	BPS3104 **Plant Interactions [5]**	ZO415 **Biometry [5]**
		* Note that BPS3101 is recommended for students taking the 3rd Year Botany and Plant Science pathway.	BPS4106 **Botany and Plant Science Literature Review and Presentation [5]**
			BPS402 **Current Topics in Algal Research [5]**
			BPS4107 **Plant Cell Biology and Biochemistry [5]**
			EOS418 **Applied Field Hydrogeology [5]***
			BI445 **Biomolecules [5]***
			EOS402 **Global Change [5]***
			ZO417 **Marine & Coastal Ecology [5]***
			BI448 **Modern Biotechnologies [5]***
			Semester 2
			BPS405 **Ecology and Conservation Issues [5]**
			BPS4104 **Primary Productivity and Global Change [5]**
			AR347 **Palaeoecology - Reconstructing Past Environments [5]***
			EOS409 **Biophysical Interactions in the Ocean [5]***
			EOS407 **History of Life [5]***

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Botany and Plant Science Pathway – *Continued*

			ZO416 **Integrative Zoology [5]***
			BI449 **Molecular and Cellular Biology [5]***
			EOS422 **Sedimentary Basins [5]***
		BPS3101 is *recommended* for students taking the 3rd Year Botany and Plant Science pathway.	* Select remaining modules to a value of 10 credits.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

CHEMISTRY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 40 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2 CH101 **Chemistry [15]**	*Semester 1* CH204 **Inorganic Chemistry [5]** CH203 **Physical Chemistry [5]** *Semester 2* CH205 **Analytical and Environmental Chemistry [5]** CH202 **Organic Chemistry [5]**	*Semester 1* CH326 **Analytical Chemistry & Molecular Structure [5]** CH333 **Experimental Chemistry I [5]** CH311 **Organic Chemistry [5]** *Semester 2* CH3101 **Computers and Chemical Research [10]** CH334 **Experimental Chemistry II [5]** CH307 **Inorganic Chemistry [5]** CH313 **Physical Chemistry [5]**	*Full Year – Semester 1 and Semester 2* CH4101 **Research - Independent Investigation [20]** CH4102 **Synthesis, Organometallic & Analytical Chemistry [10]** CH4103 **Physical and Biophysical Chemistry [10]** CH4104 **Organic and Bioorganic Chemistry [10]** CH4105 **Inorganic and Bioinorganic Chemistry [10]**

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

COMPUTING PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 20 credits; Options: 10 credits]	[Core: 40 credits; Options: 20 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 CS102 **Computer Science** [15]	*Semester 1* CT2101 **Object Oriented Programming 1** [5] CS2101 **Programming for Science and Finance** [5] *Semester 2* CT2102 **Object Oriented Programming 2** [5] CS211 **Programming and Operating Systems** [5]	*Semester 1* CS3304 **Logic** [5] CT3535 **Object Oriented Programming** [5] CT511 **Databases** [5]* MA215 **Mathematical Molecular Biology I** [5]* MP305 **Modelling I** [5]* CT331 **Programming Paradigms** [5]* *Semester 2* CT2108 **Networks and Data Communications I** [5] CS319 **Scientific Computing** [5] MA216 **Mathematical Molecular Biology II** [5]* MP307 **Modelling II** [5]* CT411 **Multimedia Development** [5]*	*Full Year – Semester 1 and Semester 2* MM4000 **Final Year Project** [10] *Semester 1* CS4102 **Geometric Foundations in Data Analysis I** [5] CT336 **Graphics And Image Processing** [5] CT4101 **Machine Learning** [5] MA4102 **Algebraic Foundations of Quantum Computing** [5]* CT421 **Artificial Intelligence** [5]* CT318 **Human Computer Interaction** [5]* MP305 **Modelling I** [5]* CT4100 **Information Retrieval** [5]* MA385 **Numerical Analysis I** [5]* CT331 **Programming Paradigms** [5]*

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Computing Pathway – *Continued*

			Semester 2 CS402 **Cryptography [5]** CS4103 **Geometric Foundations in Data Analysis II [5]** CS4423 **Networks [5]** CT414 **Distributed Systems and Cooperative Computing [5]*** MP307 **Modelling II [5]*** MA378 **Numerical Analysis II [5]*** CT548 **Object Oriented Software Design & Development [5]***
		* Select two 5-credit modules	* Select four 5-credit modules

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

DATA SCIENCE PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 40 credits]**	**[[Core: 30 credits; Options: 30 credits]**	**[Core: 50 credits; Options: 10 credits]**
Optional Modules to be chosen in consultation with the School of Mathematics, Statistics and Applied Mathematics			
Full Year – Semester 1 and Semester 2	***Statistics– Semester 1***	***Statistics– Semester 1***	***Full Year – Semester 1 and Semester 2***
MA180 **Mathematics [15]**	ST1111 **Probability Models [5]**	ST311 **Applied Statistics [5]**	MM4000 **Final Year Project [10]**
CS102 **Computer Science [15]**	***Statistics– Semester 2***	ST2003 **Random Variables [5]**	***Statistics– Semester 1***
	ST1112 **Statistical Methods [5]**	***Statistics– Semester 2***	ST413 **Statistical Modelling [5]**
	Computing - Semester 1	ST312 **Applied Statistics 2 [5]**	ST417 **Bayesian Modelling [5]**
	CS2101 **Programming for Science and Finance [5]**	ST2004 **Statistical Inference [5]**	***Statistics– Semester 2***
	CT2101 **Object Oriented Programming 1 [5]**	***Computing - Semester 1***	ST4120 **Causal Inference [5]***
	Computing– Semester 2	CT511 **Databases [5]**	ST4140 **Modern Statistical Methods [5]**
	CT2102 **Object Oriented Programming 2 [5]**	CS3304 **Logic [5] ***	***Computing - Semester 1***
	Mathematics - Semester 1	CT3535 **Object Oriented Programming [5]***	CT4101 **Machine Learning [5]**
	MA284 **Discrete Mathematics [5]**	CT331 **Programming Paradigms [5] ***	MA4102 **Algebraic Foundations of Quantum Computing [5]***
	MA2286 **Differential Forms [5]**	***Computing– Semester 2***	CT421 **Artificial Intelligence [5] ***
	Mathematics– Semester 2	CS319 **Scientific Computing [5]**	CS4102 **Geometric Foundations of Analysis I [5]***
	MA283 **Linear Algebra [5]**	CT411 **Multimedia Development [5]***	CT336 **Graphics and Image Processing [5]***
		CT2108 **Networks and Data Communications [5]***	CT318 **Human Computer Interaction [5]***
		CS211 **Programming and Operating Systems [5]***	CT4100 **Information Retrieval [5]***
		Mathematics - Semester 1	
		MA215 **Mathematical Molecular Biology [5]***	
		MP305 **Modelling I [5]***	
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Data Science Pathway – *Continued*

		Mathematics– Semester 2	***Computing– Semester 2***
		MA2287 **Complex Variables [5] ***	CS402 **Cryptography [5]**
		MA216 **Mathematical Molecular Biology II [5] ***	CS4423 **Networks [5]**
		MP307 **Modelling II [5] ***	CT414 **Distributive and Cooperative Systems [5] ***
			CS4103 **Geometric Foundations of Analysis II [5]***
			MA461 **Probabilistic Models for Molecular Biology [5] ***
		*Select remaining modules to the value of 30 credits.	* Select remaining modules to a value of 10 credits. ^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

EARTH AND OCEAN SCIENCES PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 10 credits; Options: min 30 Credits]**	**[Core: 40 credits; Options: 20 credits]**
Full Year – Semester 1 and Semester 2	*Semester 1*	*Semester 1*	*Full Year – Semester 1 and Semester 2*
BO101 **Biology [15]**	EOS213 **Introduction to Ocean Science [10]**	EOS305 **Introduction to Applied Field Hydrology [5]***	EOS405 **Fieldskills in Oceanography [5]***
CH101 **Chemistry [15]**	*Semester 2*	EOS3106 **Minerals and Rocks under the Microscope [5]***	*Semester 1*
PH101 **Physics [15]**	EOS2102 **The Earth: From Core to Crust [10]**	EOS3103 **Palaeontology and Evolution [5]***	EOS418 **Applied Field Hydrogeology [5]**
		EOS323 **Sediments and the Sedimentary Record [5]***	EOS402 **Global Change [5]**
		EOS3105 **The Crystalline Crust [5]***	EOS4102 **EOS Minor Final Year Project [10]***
		Semester 2	EOS403 **Final Year Project [20]***
		EOS3104 **Fieldskills Training [5]**	BPS402 **Current Topics in Algal Research [5]***
		EOS3101 **Geological Structures and Maps [5]**	BPS4107 **Plant Cell Biology and Biochemistry [5]***
		EOS304 **Aquatic Geochemistry [5]***	PAB4103 **Climate Change, Plants & Agriculture [5]***
		EOS3102 **Environmental and Marine Geophysical Remote Sensing [5]***	ZO415 **Biometry [5]***
		EOS303 **Ocean Dynamics [5]***	ZO418 **Phylogenetics & Conservation [5]***
			Semester 2
			EOS4103 **Advanced Fieldskills [5]**
			EOS409 **Biophysical Interactions in the Ocean [5]**
			EOS4101 **Earth Observation and Remote Sensing [5]**
			EOS407 **History of Life [5]**
			EOS422 **Sedimentary Basins [5]**

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Earth and Ocean Sciences Pathway – *Continued*

			BPS3107 **Plants, Atmosphere and Environment throughout Earth History [5]***
			BPS4104 **Primary Productivity and Global Change [5]***
			EOS4105 **Economic Geology: principles, practice and sustainability [5]***
			* Assigned one project module: EOS403 [20] or EOS4102 [10] If allocated EOS4102, select elective modules to a value of 10 credits.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MATHEMATICS PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 30 Credits; Options 10 Credits]	[Core: 30 credits; Options: 30 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 MA180 **Mathematics [15]**	*Semester 1* MA284 **Discrete Mathematics [5]** MA2286 **Differential Forms [5]** *Semester 2* MA283 **Linear Algebra [5]** MA2287 **Complex Analysis [5]**	*Semester 1* MA3101 **Euclidean and Non-Euclidean Geometry [5]** MA3343 **Groups [5]** MA341 **Metric Spaces [5]** One of: ST2001 **Statistics in Data Science I [5]*** ST2003 **Random Variables [5]*** ST311 **Applied Statistics I [5]*** *Semester 2* MA3491 **Fields and Applications [5]** MA378 **Numerical Analysis II [5]** MA342 **Topology [5]** One of: ST2002 **Statistics in Data Science II [5]*** ST2004 **Statisitical Inference [5]*** ST312 **Applied Statistics II [5]***	*Full Year – Semester 1 and Semester 2* MM4000 **Final Year Project [10]** MA4101 **Teaching and Learning in Mathematics [5]*** *Semester 1* MA490 **Measure Theory [5]** MA416 **Rings [5]** MA4102 **Algebraic Foundations of Quantum Computing [5]*** ST313 **Applied Regression Models [5]*** ST311 **Applied Statistics [5]*** MP403 **Cosmology and General Relativity [5]*** CS4102 **Geometric Foundations in Data Analysis I [5]*** ST417 **Introduction to Bayesian Modelling [5]*** MA437 **Introduction to Mathematical Research Topics I [5]*** CS3304 **Logic [5]*** MP345 **Mathematical Methods I [5]*** MP305 **Modelling I [5]*** MP410 **Non Linear Elasticity [5]^** MA385 **Numerical Analysis I [5]*** ST413 **Statistical Modelling [5]***

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Mathematics Pathway – *Continued*

			Semester 2
			MA482 **Functional Analysis [5]**
			MA4344 **Advanced Group Theory [5]**
			MA495 **Actuarial Mathematics: Life Contingencies II [5]***
			ST312 **Applied Statistics II [5]***
			CS402 **Cryptography [5]***
			MA418 **Differential Equations with Financial Derivatives [5]***
			CS4103 **Geometric Foundations in Data Analysis II [5]***
			MA438 **Introduction to Mathematical Research Topics II [5]***
			MP346 **Mathematical Methods II [5]***
			MP307 **Modelling II [5]***
			ST4140 **Modern Statistical Methods [5]***
			CS4423 **Networks [5]***
			MP491 **Nonlinear Systems [5]***
			MA416 **Probabilistic Models for Molecular Biology [5]***
			CS319 **Scientific Computer [5]***
			ST4120 **Causal Inference [5]***
			* Select optional modules to a value of 30 credits.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MATHEMATICS AND APPLIED MATHEMATICS PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[40 credits]	[Core: 50 credits; Options: 10 credits]	[60 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 MP180 **Applied Mathematics [15]** MA180 **Mathematics (Honours) [15]**	*Mathematics – Semester 1* MA2286 **Differential Forms I [5]** MA284 **Discrete Mathematics [5]** *Mathematics – Semester 2* MA283 **Linear Algebra [5]** MA2287 **Complex Analysis [5]** *Applied Mathematics – Semester 1* MP231 **Mathematical Methods I [5]** MP236 **Mechanics I [5]** *Applied Mathematics – Semester 2* MP237 **Mechanics II [5]** MP232 **Mathematical Methods II [5]**	*Semester 1* MA3101 **Euclidean and Non-Euclidean Geometry [5]** MA3343 **Groups [5]** MP345 **Mathematical Methods I [5]** MP410 **Non Linear Elasticity [5]^** MP356 **Quantum Mechanics I [5]^** One of: ST2001 **Statistics in Data Science I [5]*** ST2003 **Random Variables [5]*** ST311 **Applied Statistics I [5]*** *Semester 2* MA3491 **Fields and Applications [5]** MP346 **Mathematical Methods II [5]** MP491 **Non Linear Systems [5]** MP357 **Quantum Mechanics II [5]^** MA342 **Topology [5]** One of: ST2002 **Statistics in Data Science II [5]*** ST2004 **Statisitical Inference [5]*** ST312 **Applied Statistics II [5]***	*Full Year – Semester 1 and Semester 2* MM4000 **Final Year Project [10]** *Semester 1* MP356 **Quantum Mechanics I [5]^** MA490 **Measure Theory [5]** MP305 **Modelling I [5]** MP410 **Non Linear Elasticity [5]^** MA416 **Ring Theory [5]** *Semester 2* MA4344 **Advanced Group Theory [5]** MA482 **Functional Analysis [5]** MP307 **Modelling II [5]** MA378 **Numerical Analysis II [5]** MP357 **Quantum Mechanics II [5]^**
		* Select modules to a value of 10 credits. ^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.	^ These modules are only available every 2nd Year. Alternative modules are offered next academic year.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MATHEMATICS AND COMPUTING PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 40 credits]	[Core: 40 credits; Options: 20 credits]	[Core 55 credits; Options: 5 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 MA180 **Mathematics [15]** CS102 **Computer Science [15]**	*Mathematics – Semester 1* MA2286 **Differential Forms [5]** MA284 **Discrete Mathematics [5]** *Mathematics – Semester 2* MA283 **Linear Algebra [5]** MA2287 **Complex Analysis [5]** *Computing – Semester 1* CT2101 **Object Oriented Programming 1 [5]** CS2101 **Programming for Science and Finance [5]** *Computing – Semester 2* CT2102 **Object Oriented Programming 2 [5]** CS211 **Programming and Operating Systems [5]**	*Semester 1* MA3101 **Euclidean and Non-Euclidean Geometry [5]** MA3343 **Groups [5]** CS3304 **Logic [5]** CT3535 **Object Oriented Programming [5]** MA2111 **Anailís [5]*** CT511 **Databases [5]*** CT331 **Programming Paradigms [5]*** One of: ST2001 **Statistics in Data Science I [5]*** ST2003 **Random Variables [5]*** ST311 **Applied Statistics I [5]*** *Semester 2* MA3491 **Fields and Applications [5]** CT2108 **Networks and Data Communications I [5]** CS319 **Scientific Computing [5]** MA342 **Topology [5]** CT411 **Multimedia Development [5]*** One of: ST2002 **Statistics in Data Science II [5]*** ST2004 **Statistical Inference [5]*** ST312 **Applied Statistics II [5]***	*Full Year – Semester 1 and Semester 2* MM4000 **Final Year Project [10]** *Semester 1* CS4102 **Geometric Foundations in Data Analysis I [5]** CT4101 **Machine Learning [5]** MA490 **Measure Theory [5]** MA416 **Rings [5]** MA4102 **Algebraic Foundations of Quantum Computing [5]*** CT421 **Artificial Intelligence [5]*** CT318 **Human Computer Interaction [5]*** MA437 **Introduction to Mathematical Research [5]*** CT4100 **Information Retrieval [5]*** MA385 **Numerical Analysis I [5]*** CT331 **Programming Paradigms [5]*** *Semester 2* MA4344 **Advanced Group Theory [5]** CS402 **Cryptography [5]** MA482 **Functional Analysis [5]** CS4103 **Geometric Foundations in Data Analysis II [5]** MA378 **Numerical Analysis II [5]**

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Mathematics and Computing Pathway – *Continued*

			CT414 **Distributed Systems and Cooperative Computing [5]***
			CS4423 **Networks [5]***
			CT548 **Object Oriented Software Design and Development [5]***
			MA461 **Probabilistic Methods in Bioinformatics [5]***
		* Select modules to the value of 20 credits	* Select remaining modules to a value of 5 credits.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MATHEMATICAL STUDIES AND COMPUTING PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 40 credits]	[Core: 50 credits; Options: 10 credits]	[Core: 50 credits; Options: 10 credits]
Optional Modules to be chosen in consultation with the School of Mathematics			
Full Year – Semester 1 and Semester 2 CS102 **Computer Science [15]** MA161 **Mathematical Studies [15]** or MA180 **Mathematics [15]**	*Mathematical Studies – Semester 1* MA211 **Calculus I [5]** MA284 **Discrete Mathematics [5]** *Mathematical Studies – Semester 2* MA203 **Linear Algebra [5]** MA212 **Calculus II [5]** *Computing – Semester 1* CT2101 **Object Oriented Programming 1 [5]** CS2101 **Programming for Science and Finance [5]** *Computing – Semester 2* CT2102: **Object Oriented Programming 2 [5]** CS211 **Programming and Operating Systems [5]**	*Semester 1* MA335 **Algebraic Structures [5]** MA302 **Complex Variable [5]** MA313 **Linear Algebra I [5]** CS3304 **Logic [5]** CT3535 **Object Oriented Programming [5]** ST2001 **Statistics in Data Science I [5]** CT511 **Databases [5]*** CT331 **Programming Paradigms [5]*** *Semester 2* CT2108 **Networks and Data Communications I [5]** CS319 **Scientific Computing [5]** CS3101 **Software for Mathematical Scientists and Educators [5]** ST2002 **Statistics in Data Science II [5]** CT411 **Multimedia Development [5]***	*Full Year – Semester 1 and Semester 2* MM4000 **Final Year Project [10]** *Semester 1* MA3101 **Euclidean and Non-Euclidean Geometry [5]** CS4102 **Geometric Foundations in Data Analysis I [5]** MA3343 **Groups [5]** CT4101 **Machine Learning [5]** ST311 **Applied Statistics I [5]*** CT421 **Artificial Intelligence [5]*** CT318 **Human Computer Interaction [5]*** CT4100 **Information Retrieval [5]*** MA341 **Metric Spaces [5]*** MA385 **Numerical Analysis I [5]*** CT331 **Programming Paradigms [5]*** *Semester 2* MA4344 **Advanced Group Theory [5]** CS402 **Cryptography [5]** CS4103 **Geometric Foundations in Data Analysis II [5]** MA342 **Topology [5]**

Continued…

Mathematical Studies and Computing Pathway – *Continued*

			ST312 **Applied Statistics II [5]***
			CT414 **Distributed Systems and Cooperative Computing [5]***
			CS4423 **Networks [5]***
			MA378 **Numerical Analysis II [5]***
			CT548 **Object Oriented Software Design and Development [5]***
		* Select modules to a value of 10 credits	* Select remaining modules to a value of 10 credits.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MEDICINAL CHEMISTRY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 35 credits]**	**[Core: 60 credits]**	**[Core: 50 Credits; Options: 10 Credits**
Full Year – Semester 1 and Semester 2 BO101 **Biology [15]** CH101 **Chemistry [15]** PH101 **Physics [15]**	*Full Year – Semester 1 and Semester 2* CH2101 **Medicinal Chemistry [5]** *Semester 1* BO201 **Molecular and Cellular Biology (MCB) [5]** CH204 **Inorganic Chemistry [5]** CH203 **Physical Chemistry [5]** PM209 **Applied Concepts in Pharmacology [5]** PM208 **Fundamental Concepts in Pharmacology [5]** *Semester 2* CH202 **CH202 Organic Chemistry [5]**	*Semester 1* CH326 **Analytical Chemistry & Molecular Structure [5]** CH333 **Experimental Chemistry I [5]** CH311 **Organic Chemistry [5]** CH332 **Drug Design & Drug Discovery [10]** PM311 **Introduction to Toxicology [5]** *Semester 2* CH3101 **Computers and Chemical Research [10]** CH334 **Experimental Chemistry II [5]** CH307 **Inorganic Chemistry [5]** CH313 **Physical Chemistry [5]** CH3103 **Validation in the Pharmaceutical and Medical Device Industry [5]**	*Full Year – Semester 1 and Semester 2* CH4114 **Current Topics in Medicinal Chemistry [10]** CH4104 **Organic and Bioorganic Chemistry [10]** CH4101 **Research - Independent Investigation [20]** CH4102 **Synthesis, Organometallic & Analytical Chemistry [10]** CH4105 **Inorganic and Bioinorganic Chemistry [10]*** *Semester 1* CH445 **Advanced Inorganic Chemsitry [5]*** *Semester 2* CH432 **Physical Chemistry II [5]***
			* Select options to a value of 10 credits

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

MICROBIOLOGY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 30 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2 BO101 **Biology [15]** CH101 **Chemistry [15]**	*Semester 1* MI202 **Laboratory Skills in Microbiology I [5]** BO201 **Molecular and Cellular Biology (MCB) [5]** *Semester 2* MI203 **Laboratory Skills in Microbiology II [5]** MI204 **Microbes and the Environment [5]**	*Semester 1* MI323 **Food and Industrial Microbiology [5]** MI3101 **Microbial Genomics [5]** MI326 **Microbial Metabolic and Molecular Systems [5]** *Semester 2* MI322 **Environmental Microbiology [5]** MI324 **Immunology and Recombinant Techniques [5]** MI325 **Microbial Infectious Diseases [5]**	*Semester 1* MI405 **Project [20]** MI4104 **Scientific Communication [5]** *Semester 2* MI4103 **Environmental Biotechnology [5]** MI437 **Bacterial Pathogenesis [5]** MI442 **Bioprocessors and Recombinant Protein Production [5]** MI413 **Problem Solving Papers I & II [5]** MI4102 **Microbial Ecosystems & Systems Biology [5]** MI439 **The Meaning of Life: Bioinformatics [5]** MI4101 **Host Microbe Interactions [5]**

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

PHARMACOLOGY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 20 credits]**	**[Core: 30 credits]**	**[Core: 60 credits]**
Full Year – Semester 1 and Semester 2 BO101 **Biology [15]** CH101 **Chemistry [15]** PH101 **Physics [15]**	*Semester 1* PM209 **Applied Concepts in Pharmacology [5]** PM208 **Fundamental Concepts in Pharmacology [5]** *Semester 2* PM210 **Molecular Pharmacology and Signalling [10]**	*Semester 1* PM309 **Drugs and Disease I [10]** PM311 **Introduction to Toxicology [5]** *Semester 2* PM3103 **Advanced Pharmacology [5]** PM3102 **Neuropharmacology [5]** PM3101 **Pharmacology in Practice [5]**	*Semester 1* PM431 **Research Project [20]** PM432 **Experimental Pharmacology [10]** *Semester 2* PM435 **Advanced Technologies for Therapeutics [5]** PM436 **Advanced Toxicology [5]** PM433 **Drug Development and Emerging Therapies [10]** PM434 **Molecular Pharmacology and Therapeutics [10]**

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

PHYSICS AND APPLIED PHYSICS PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 40 credits]	[Core: 55 credits; Options: 5 credits]
Full Year – Semester 1 and Semester 2 PH101 **Physics** [15]	*Semester 1* PH2105 **Mechanics and Thermodynamics** [5] PH2102 **Physics Laboratory and Problem Solving I** [5] *Semester 2* PH2106 **Atomic Physics and Electromagnetism** [5] PH2104 **Physics Laboratory and Problem Solving II** [5]	*Full Year – Semester 1 and Semester 2* PH3101 **Experimental and Computational Physics** [15] *Semester 1* PH338 **Properties of Materials** [5] PH333 **Quantum Physics** [5] PH331 **Wave Optics** [5] *Semester 2* PH335 **Nuclear and Particle Physics** [5] PH337 **Thermal Physics** [5]	*Full Year – Semester 1 and Semester 2* PH4102 **Final Year Project** [20] PH4101 **Physics Problem Solving** *Semester 1* PH424 **Electromagnetism and Special Relativity** [5] PH421 **Quantum Mechanics** [5] PH422 **Solid State Physics** [5] PH428 **Atmospheric Physics & Climate Change** [5]* PH430 **Biophotonics** [5]* *Semester 2* PH423 **Applied Optics & Imaging** [5] PH425 **Lasers & Spectroscopy** [5] PH429 **Nanotechnology** [5] PH466 **Astrophysics** [5]*
			* Select one 5-credit module

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

PHYSICS AND CLIMATE PHYSICS PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	**[Core: 40 credits; Options: 20 credits]**	**[Core: 60 credits]**	**[Core: 55 credits; Options: 5 Credits] (intake: 2023)**
Full Year – Semester 1 and Semester 2 CH101 **Chemistry [15]** PH101 **Physics [15]**	*Semester 1* PH2105 **Mechanics and Thermodynamics [5]** PH2102 **Physics Laboratory and Problem Solving I [5]** MP231 **Mathematical Methods I [5]** MG3113 **Megatrends [5]** *Semester 2* PH2106 **Atomic Physics and Electromagnetism [5]** BSS2104 **Introduction to Sustainability I [5]** PH2104 **Physics Laboratory and Problem Solving II [5]** MP232 **Mathematical Methods II [5]** **Chemistry*** *Semester 1* CH204 **Inorganic Chemistry [5]** CH203 **Physical Chemistry [5]** *Semester 2* CH202 **Organic Chemistry [5]** CH205 **Analytical and Environmental Chemistry [5]**	*Full Year – Semester 1 and Semester 2* PH3101 **Experimental and Computational Physics [15]** *Semester 1* MP345 **Mathematical Methods I [5]** PH328 **Physics of the Environment I [5]** PH338 **Properties of Materials [5]** PH333 **Quantum Physics [5]** PH331 **Wave Optics [5]** *Semester 2* MP346 **Mathematical Methods II [5]** PH329 **Physics of the Environment II [5]** PH335 **Nuclear and Particle Physics [5]** PH337 **Thermal Physics [5]**	*Full Year – Semester 1 and Semester 2* PH4102 **Final Year Project [20]** PH4101 **Physics Problem Solving [5]** *Semester 1* PH4103 **Atmospheric Composition & Climate Change [5]** PH424 **Electromagnetism and Special Relativity [5]** PH421 **Quantum Mechanics [5]** PH422 **Solid State Physics [5]** *Semester 2* PH4104 **Aerosol Physics and Climate Change [5]** PH425 **Lasers & Spectroscopy [5]** EOS4101 **Remote Sensing [5]*** PH4105 **Ocean Climate Physics [5]***

Continued…

Physics and Climate Physics Pathway – *Continued*

	Earth and Ocean Sciences* ***Semester 1*** EOS213 **Introduction to Ocean Science [10]** ---------- ***Semester 2*** EOS2102 **The Earth: From Core to Crust [10]**		
	*Students can pursue this pathway in year 2 by choosing the above modules in either Chemistry, or in Earth and Ocean Sciences		*Select one 5-credit module

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

PHYSIOLOGY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 30 credits]	[Core: 60 credits]
Full Year – Semester 1 and Semester 2 BO101 **Biology** [15] CH101 **Chemistry** [15] PH101 **Physics** [15]	*Semester 1* SI206 **Introduction to Physiology and Gastrointestinal** [5] SI207 **Nerve and Muscle** [5] *Semester 2* SI208 **Cardiovascular Physiology** [5] SI212 **Respiratory Physiology** [5]	*Full Year – Semester 1 and Semester 2* SI329 **Laboratory Methods in Physiology** [5] *Semester 1* SI326 **Advanced Cardiovascular Physiology** [5] SI312 **Endocrinology** [5] SI311 **Neurophysiology** [5] *Semester 2* SI328 **Exercise Physiology** [5] SI331 **Renal Physiology** [5]	*Semester 1* SI438 **Advanced GIT** [5] SI422 **Advanced Neurophysiology** [5] SI408 **Immunology** [5] SI437 **Reproduction and Aging** [5] SI4102 **Science Communication Skills** [5] SI436 **Therapeutics** [5] *Semester 2* SI4101 **Case Based Physiology** [5] SI432 **Pathophysiology** [5] SI435 **Project** [20]

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

PLANT AND AGRIBIOSCIENCES PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 20 credits]	[Core: 20 Credits; Options: 40 Credits*]
Full Year – Semester 1 and Semester 2 BO101 **Biology [15]**	*Semester 1* BO202 **Evolution and the Tree of Life [5]** BO201 **Molecular and Cellular Biology (MCB) [5]** *Semester 2* PAB2101 **AgriBiosciences [5]** MI204 **Microbes and the Environment [5]**	*Semester 1* PAB3102 **AgriBiosciences for Sustainable Global Development [5]** PAB3101 **Soil Sciences [5]** *Semester 2* PAB3103 **Plant and Agricultural Genetics [5]** PAB3104 **Systems Biology of Plant-Environment Interactions [5]**	*Full Year – Semester 1 and Semester 2* PAB4106 **Current Topics in Plant and AgriBiosciences [5]** PAB4105 **AgriBiosciences Internship Project [20]**** PAB4101 **PAB Research Project [20]**** *Semester 1* PAB4103 **Climate Change, Plants & Agriculture [5]** PAB4102 **Plant Genetics and Systems Biology [5]** *Semester 2* PAB4104 **Plant and Agri-Biotechnologies [5]**
			**Assigned one project module: PAB4101 [20] or PAB4105 [20] *Select remaining modules to a value of 20 Credits – list provided by PAB.

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

ZOOLOGY PATHWAY

Year 1	Year 2	Year 3	Year 4
[60 credits]	[Core: 20 credits]	[Core: 15 credits; Options: 15 credits]	[Core: 55 credits; Options: 5 credits]
Full Year – Semester 1 and Semester 2 BO101 **Biology [15]**	*Semester 1* BO202 **Evolution and the Tree of Life [5]** BO201 **Molecular and Cellular Biology (MCB) [5]** *Semester 2* ZO208 **Invertebrate Biology [5]** ZO209 **Vertebrate Zoology [5]**	*Semester 1* ZO317 **Evolutionary Biology [5]** BO3101 **Developmental Biology [5]*** EOS3103 **Palaeontology and Evolution [5]*** ZO3101 **Marine Habitat [5]*** *Semester 2* ZO315 **Applied Ecology [5]** ZO320 **Concepts in Population and Community Ecology [5]** ZO3102 **Behaviour in Social Insects [5]*** AN223 **Embryology & Development [5]*** ZO318 **Geographic Information Systems and Biostatistics [5]***	*Full Year – Semester 1 and Semester 2* ZO414 **Advanced Zoology Topics [5]** ZO418 **Phylogenetics & Conservation [5]** *Semester 1* ZO415 **Biometry [5]** ZO417 **Marine & Coastal Ecology [5]** ZO4101 **Research Project in Zoology [20]** BI445 **Biomolecules [5]*** BPS402 **Current Topics in Algal Research [5]*** EOS402 **Global Change [5]*** BI448 **Modern Biotechnologies [5]*** BPS4107 **Plant Cell Biology and Biochemistry [5]*** *Semester 2* ZO416 **Integrative Zoology [5]** ZO425 **Literature Review and Presentation [10]** MI4103 **Environmental Biotechnology [5]*** MI437 **Bacterial Pathogenesis [5]*** MI442 **Bioprocessors and Recombinant Protein Production [5]*** BPS405 **Ecology and Conservation Issues [5]*** EOS407 **History of Life [5]*** MI4102 **Microbial Ecosystems & Systems Biology [5]***

Continued…

Zoology Pathway – ***Continued***

			BI449 **Molecular and Cellular Biology [5]***
			ZO419 **Practical Skills in Zoology [5]***
			BPS4104 **Primary Productivity and Global Change [5]***
		* Select three 5-credit modules	*Select remaining modules to a value of 5 credits

Module Descriptors for Years 1 to 4 are available at: http://www.nuigalway.ie/science-engineering/undergraduateprogrammes/science-undenominated.html#course_outline

ELECTIVES

Year 1	Year 2	Year 3	Year 4
	Full Year – Semester 1 and Semester 2 FR252 **French [10]** GR224 **Beginner's German for Science [10]** GR252 **German [10]** GR353 **German [10]** --- *Semester 1* BO201 **Molecular and Cellular Biology (MCB) [5]** BO202 **Evolution and the Tree of Life [5]** BO2101 **Scientific Writing Skills [5]** BPS202 **Fundamentals in Aquatic Plant Science [5]** BSS1100 **Digital Citizenship [5]** BSS2103 **Introduction to Sustainability I [5]** ED2103 **Design Your Life [5]** EOS213 **Introduction to Ocean Science [10]** LN2210 **Scileanna Gaeilge don Eolaíochta 1 [5]** MA284 **Discrete Mathematics [5]** MA211 **Calculus I [5]** MG3113 **Megatrends [5]** MA215 **Mathematical Molecular Biology I [5]** MA2111 **Anailís [5]** MP231 **Mathematical Methods I [5]** MP236 **Mechanics I [5]** PH2107 **Scalable Technology-based Innovation [5]** *Continued…*	*Full Year – Semester 1 and Semester 2* BPS3101 **Techniques in Field Ecology and Conservation [5]** FR365 **Advanced French for Science [10]** GR224 **Beginner's German for Science [10]** GR252 **German [10]** GR353 **German [10]** --- *Semester 1* BO3101 **Developmental Biology [5]** BPS3102 **Plant Resources and Ecosystems [5]** BPS3103 **Plant Function [5]** BSS1100 **Digital Citizenship [5]** BSS2103 **Introduction to Sustainability I [5]** ED2103 **Design Your Life [5]** CH311 **Organic Chemistry [5]** CH326 **Analytical Chemistry & Molecular Structure [5]** CH332 **Drug Design & Drug Discovery [10]** EOS3105 **The Crystalline Crust [5]** EOS3106 **Minerals and Rocks under the Microscope [5]** EOS305 **Introduction to Applied Field Hydrology [5]** EOS323 **Sediments and the Sedimentary Record [5]** EOS3103 **Palaeontology and Evolution [5]** LN2210 **Scileanna Gaeilge don Eolaíochta 1 [5]** *Continued…*	

Electives – *Continued*

PM208 **Fundamental Concepts in Pharmacology [5]**

PM209 **Applied Concepts in Pharmacology [5]**

PS3108 **Design Thinking [5]**

ST1111 **Probability Models [5]**

ST2001 **Statistics in Data Science I [5]**

ZO2101 **Entomology [5]**

Semester 2

AJ2114 **Communicating Through Storytelling [5]**

BPS203 **Plant Diversity, Physiology & Adaptation [5]**

BSS2104 **Introduction to Sustainability 2 [5]**

BSS3105 **Global Engagement [5]**

ED2104 **Design Your Life [5]**

EOS2102 **The Earth: From Core to Crust [10]**

LN2211 **Scileanna Gaeilge don Eolaíochta 2 [5]**

MA203 **Linear Algebra [5]**

MA212 **Calculus II [5]**

MA216 **Mathematical Molecular Biology II [5]**

MA2993 **Mathematics of Finance [5]**

MG3115 **Megatrends [5]**

MP232 **Mathematical Methods II [5]**

MP237 **Mechanics II [5]**

PAB2101 **AgriBiosciences [5]**

ST1112 **Statistical Methods [5]**

ST2002 **Statistics in Data Science II [5]**

MA215 **Mathematical Molecular Biology I [5]**

MA2111 **Anailís [5]**

MA302 **Complex Variable [5]**

MA313 **Linear Algebra I [5]**

MA335 **Algebraic Structures [5]**

MA3992 **Actuarial Mathematics: Life contingencies 1, pricing and reserving [5]**

MG3113 **Megatrends [5]**

MP231 **Mathematical Methods I [5]**

MP305 **Modelling I [5]**

MP345 **Mathematical Methods I [5]**

PAB3101 **Soil Sciences [5]**

PAB3102 **AgriBiosciences for Sustainable Global Development [5]**

PH222 **Astrophysical Concepts [5]**

PH2107 **Scalable Technology-based Innovation [5]**

PH328 **Physics of the Environment I [5]**

PH341 **Measurement of Health Hazards at Work [5]**

PM208 **Fundamental Concepts in Pharmacology [5]**

PM209 **Applied Concepts in Pharmacology [5]**

PM311 **Introduction to Toxicology [5]**

PS3108 **Design Thinking [5]**

SI311 **Neurophysiology [5]**

SI312 **Endocrinology [5]**

SI317 **Human Body Function [10]**

Continued…

Electives – ***Continued***

		ST2001 **Statistics in Data Science I [5]** ST2003 **Random Variables [5]** ST311 **Applied Statistics I [5]** --- ***Semester 2*** AJ2114 **Communicating Through Storytelling [5]** BPS3104 **Plant Interactions [5]** BPS3107 **Plants, Atmosphere and Environment throughout Earth History [5]** BSS2104 **Introduction to Sustainability 2 [5]** BSS3105 **Global Engagement [5]** ED2104 **Design Your Life [5]** CH307 **Inorganic Chemistry [5]** CH3103 **Validation in the Pharmaceutical and Medical Device Industry [5]** CH313 **Physical Chemistry [5]** CS3101 **Software for Mathematical Scientists and Educators [5]** EOS303 **Ocean Dynamics [5]** EOS304 **Aquatic Geochemistry [5]** EOS3102 **Environmental and Marine Geophysical Remote Sensing [5]** LN2211 **Scileanna Gaeilge don Eolaíochta 2 [5]** MA216 **Mathematical Molecular Biology II [5]** MA334 **Geometry [5]** MA461 **Probabilistic Models for Molecular Biology [5]** MG3115 **Megatrends [5]** MP232 **Mathematical Methods II [5]** *Continued…*	

Electives – ***Continued***

		MP307 **Modelling II [5]** MP346 **Mathematical Methods II [5]** MP491 **Non Linear Systems [5]** PAB3103 **Plant and Agricultural Genetics [5]** PAB3104 **Systems Biology of Plant-Environment Interactions [5]** PH329 **Physics of the Environment II [5]** PH362 **Stellar Astrophysics [5]** SI328 **Exercise Physiology [5]** ST2002 **Statistics in Data Science II [5]** ST2004 **Statistical Inference [5]** ST312 **Applied Statistics II [5]**	