



## Bachelor of Advanced Science (Honours) (Domestic students)

Program code	Entry requirements	Prerequisites
1330	80.00	NIL
<b>Available at</b> Gold Coast Campus, Nathan Campus	ATAR/RANK 2024 ( <a href="#">more</a> )	<b>Assumed knowledge</b> Any General or Applied English subject (Units 3&4, C)
<b>Duration</b> 4 years full-time 8 years part-time	<b>Commencing in</b> Trimester 1, Trimester 2 and Trimester 3	General Mathematics or Mathematical Methods (Units 3&4, C)
<b>Credit points</b> 320		
<b>Indicative fee</b> \$8,500.00* per year ( <a href="#">more</a> ) * 2024 indicative annual CSP fee		

### Degree requirements: Students who started Trimester 2 - 2024

For Domestic and those International students not required to complete the English Language Enhancement course

For the award of *Bachelor of Advanced Science (Honours) [BAdvancedSc (Hons)]*, you must successfully complete 320 credit points, made up of the core courses AND

- 60 credit points for a major and 70 credit points of free-choice electives; **or**
- 60 credit points for a major and 60 credit points for a second major and 10 credit points of free-choice electives;**or**
- 70 credit points for the Physics major and 60 credit points of free-choice electives; **or**
- 70 credit points for the Physics major and 60 credit points for the Applied Mathematics major;  
AND
- 80 credit points for the final year (Honours level) courses in a maximum of two trimesters of full-time study or one full-time and two part-time trimesters of study.

You must maintain a GPA of at least 5.0 at the end of the first and second years of the program or you will be required to transfer into program [Bachelor of Science \(1634\)](#).

You must have a GPA of at least 5.0 upon completion of Year 3 to progress to Honours in Year 4. If you do not meet this requirement (or choose not to progress to Honours in Year 4) you will exit with a Bachelor of Science Advanced.

### Other program requirements

You must successfully complete:

- no more than 100 credit points of Level 1 courses (the first digit of a course code denotes the level);
- at least 60 credit points of Level 3 courses or higher.

### Exit point

To be eligible for the award of *Bachelor of Advanced Science (BAdvancedSc)*, you must successfully complete 240 credit points as prescribed below:

- gain 70 credit points for the prescribed first year level courses
- 60 credit points for a major and 70 credit points of free-choice electives; **or**
- 70 credit points for the Physics major and 60 credit points of free-choice electives; **or**
- 70 credit points for the Physics major and 60 credit points for the Applied Mathematics major;
- gain 40 credit points for specific Advanced Studies courses:
  - [2601SCG Advanced Studies Task 1](#)
  - [2602SCG Advanced Studies Task 2](#)
  - [3094SCG\\_P1 Advanced Studies Project](#) and [3094SCG\\_P2 Advanced Studies Project](#)
- gain 60 credit points for electives or a second Bachelor of Science major
- complete no more than 100 credit points for first year level courses

- complete at least 60 credit points for third year level courses.

To exit at the end of third year, you should apply for a program transfer.

## Honours

### Classification of Honours

This degree with Honours may be awarded in the following classes:

- Class I Honours
- Class IIA Honours
- Class IIB Honours
- Class III Honours

The class of Honours to be awarded to each student in this degree will be determined on the basis of the GPA achieved for the 80 credit points of nominated courses and a minimum percentage for the Dissertation as outlined in the **Dissertation Management Procedure**.

The 80 credit points of nominated courses are as follows:

- **Applied Mathematics:**
  - 6205NSC Topics in Applied Mathematics 1 (10CP)
  - 6206NSC Topics in Applied Mathematics 2 (10CP)
  - 6207NSC Topics in Applied Mathematics 3 (10CP)
  - 6208NSC Topics in Applied Mathematics 4 (10CP)
  - 6002ESC\_P1 Honours Dissertation (20CP)
  - 6002ESC\_P2 Honours Dissertation (20CP)
- **Biosciences:**
  - 6000ESC Research Proposal and Planning (10CP)
  - Listed elective (10CP)
  - 6001ESC\_P1 Honours Dissertation (20CP)
  - 6001ESC\_P2 Honours Dissertation (20CP)
  - 6001ESC\_P3 Honours Dissertation (20CP)
- **Chemistry:**
  - 6000ESC Research Proposal and Planning (10CP)
  - Listed elective (10CP)
  - 6001ESC\_P1 Honours Dissertation (20CP)
  - 6001ESC\_P2 Honours Dissertation (20CP)
  - 6001ESC\_P3 Honours Dissertation (20CP)
- **Geography/Marine Science/Wildlife Biology/Archaeological Science:**
  - 6000ESC Research Proposal and Planning (10CP)
  - Listed elective (10CP)
  - 6001ESC\_P1 Honours Dissertation (20CP)
  - 6001ESC\_P2 Honours Dissertation (20CP)
  - 6001ESC\_P3 Honours Dissertation (20CP)
- **Physics (Nathan):**
  - 6005ESC Tensors, Groups and General Relativity (10CP)
  - 6006ESC Honours Classical and Quantum Mechanics (10CP)
  - 6304NSC Honours Statistical and Condensed Matter Physics (10CP)
  - 6007ESC Classical and Quantum Electrodynamics (10CP)
  - 6002ESC\_P1 Honours Dissertation (20CP)
  - 6002ESC\_P2 Honours Dissertation (20CP)

If you do not achieve the standard necessary to be awarded Class III Honours, you will exit with the Bachelor of Advanced Science.

### Australian Qualifications Framework (AQF) Level and Type

The **Australian Qualifications Framework (AQF)** is the national policy for regulated qualifications in Australian education and training. This qualification is accredited as an AQF Level 8 - Bachelor Honours Degree.

### English Language Enhancement

Domestic students enrolled in this program whose first language is not English may complete the following **English Language Enhancement Course** as an elective.

- 5903LHS Language and Communication for Sciences

**Students whose first language is English are not permitted to undertake this course.**

## Program learning outcomes

### Program learning outcomes

**Program Learning Outcomes** communicate to the community the value of the Griffith educational experience as benchmarked against national qualification standards.

**Program Learning Outcomes for this award** describe the knowledge, skills and the application of knowledge and skills you will acquire through studying the Griffith program of your choice.

### Course list: Students starting Trimester 2 - 2024

**Course offering information in program structures is a guide only. Please check the actual offering information in the Course Catalogue.**

**Note: Students must check the prerequisite and incompatible requirements before selecting any course within this program.**

### English Language Enhancement course

Students required to undertake the English Language Enhancement course must complete the following course in their first trimester of study in place of a Level 1 Science course:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2 or 3	5903LHS	English Enhancement	Language and Communication for Sciences	10
			<b>OR</b>	
Tri 1,2 or 3		Listed Elective	Level 1 Science course (from list below)	10

### Year 1

You must select **70 credit points** from the following Level 1 courses (or 60 credit points for those students completing the English Language Enhancement course):

Trimester	Course code	Requirement	Course title	CP
Tri 1	1001NSC	Listed Elective	Human Biology: from Cells to Systems (Clinical Sciences major)	10
Tri 1	1007ENV	Listed Elective	Introduction to Marine Science (Marine Biology major) (Gold Coast)	10
Tri 1,3	1041SCG	Listed Elective	Biological Systems (Biochemistry and Molecular Biology major / Clinical Sciences major / Geography major / Marine Biology major / Microbiology major / Wildlife Biology major)	10
Tri 1,3	1021SCG	Listed Elective	Chemistry 1A NATHAN (Biochemistry and Molecular Biology major / Chemistry major / Clinical Sciences major / Geography major / Microbiology major / Wildlife Biology major)	10
			<b>OR</b>	
Tri 1,3	1023SCG	Listed Elective	Chemistry I GOLD COAST (Biochemistry and Molecular Biology major / Chemistry major / Geography major / Marine Biology major / Wildlife Biology major)	10
Tri 1,3	1201SCG	Listed Elective	Linear Algebra (Applied Mathematics major/ Chemistry major / Physics major)	10
Tri 2	1042SCG	Listed Elective	Genetics and Evolutionary Biology (Biochemistry and Molecular Biology major / Clinical Sciences major / Marine Biology major / Microbiology major / Wildlife Biology major)	10
Tri 1,3	1015SCG	Listed Elective	Quantitative Reasoning (Biochemistry and Molecular Biology major / Clinical Sciences major / Data science major / Geography major / Marine Biology major / Microbiology major / Wildlife Biology major)	10
Tri 1,2	1031SCG	Listed Elective	Physics 1A (Physics major)	10

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1043SCG	Listed Elective	Introduction to Environmental Sustainability (Geography major / Marine Biology major / Wildlife Biology major)	10
Tri 2	1044SCG	Listed Elective	Earth Systems (Geography major / Marine Biology major / Wildlife Biology major)	10
Tri 2	1014NSC	Listed Elective	Fundamentals of Biochemistry (Biochemistry and Molecular Biology major / Clinical Sciences major / Microbiology major)	10
Tri 2	1022SCG	Listed Elective	Chemistry 1B NATHAN (Biochemistry and Molecular Biology major / Chemistry major / Clinical Sciences major / Microbiology major)	10
			<b>OR</b>	
Tri 2	1024SCG	Listed Elective	Chemistry II GOLD COAST (Biochemistry and Molecular Biology major / Chemistry major)	10
Tri 2	1032SCG	Listed Elective	Physics 1B (Physics major) (see Note 1)	10
Tri 2,3	1014SCG	Listed Elective	Statistics (Biochemistry and Molecular Biology major / Chemistry major / Data science major / Geography major / Marine Biology major / Microbiology major / Wildlife Biology major)	10
Tri 2,3	1202SCG	Listed Elective	Calculus I (Applied Mathematics major / Chemistry major / Physics major)	10
Tri 1,2	1811ICT	Listed Elective	Programming Principles (Data Science major)	10
Tri 2	1024ENG	Listed Elective	Intro to Digital and Spatial Analysis	10
Tri 1,2 or 3	1017SCG	Listed Elective	Foundation Mathematics (see Note 2)	10
Tri 1	1088LHS	Listed Elective	First Peoples	10

Note 1: Students undertaking 1032SCG must complete 1202SCG Mathematics 1B.

Note 2: Students entering the program WITHOUT the assumed knowledge of Senior Secondary Syllabus of Mathematical Methods (or equivalent) are recommended to complete 1017SCG Foundation Mathematics in their first trimester of study. This will be considered a first year elective course. 1201SCG Liner Algebra can be completed in Year 2 in place of an elective or free-choice elective.

#### Years 2, 3 and 4

You must complete one of the following options:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2			Major	60
			<b>AND</b>	
Tri 1,2			Free-choice electives	70
			<b>OR</b>	
Tri 1,2			Major	60
			<b>AND</b>	
Tri 1,2			Second major	60
			<b>AND</b>	
Tri 1,2			Free-choice elective	10
			<b>OR</b>	
Tri 1,2			Physics major	70
			<b>AND</b>	
Tri 1,2			Free-choice electives	60
			<b>OR</b>	
Tri 1,2			Physics major	70
			<b>AND</b>	
Tri 1,2			Second major	60
Tri 1,2,3	2601SCG	Core to Program	Advanced Studies Task 1	10
Tri 2,3	2602SCG	Core to Program	Advanced Studies Task 2	10
Tri 1,2	3094SCG_P1	Core to Program	Advanced Studies Project	10
Tri 2	3094SCG_P2	Core to Program	Advanced Studies Project	10

You may choose from the following **Honours specialisations** in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2			Applied Mathematics	80
			<b>OR</b>	
Tri 1,2			Biosciences	80
			<b>OR</b>	
Tri 1,2			Chemistry	80
			<b>OR</b>	
Tri 1,2			Geography	80
			<b>OR</b>	
Tri 1,2			Marine Science (Gold Coast only)	80
			<b>OR</b>	
Tri 1,2			Physics	80
			<b>OR</b>	
Tri 1,2			Wildlife Biology	80
			<b>OR</b>	
Tri 1,2			Archaeological Science	80

### Majors (11 available)

#### Applied Mathematics Major

#### Applied Mathematics

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	1811ICT	Recommended Prereq	Programming Principles	10
Tri 1,3	1201SCG	Recommended Prereq	Linear Algebra (see Note 1)	10
Tri 2,3	1202SCG	Recommended Prereq	Calculus I	10

Note 1: Students who successfully completed Senior Secondary Syllabus of Mathematical Methods (or equivalent) should complete **1201SCG Linear Algebra**. Students who successfully completed Senior Secondary Syllabus of General Mathematics only (or equivalent) will complete **1017SCG Foundation Mathematics** in their first trimester of study and complete **1201SCG Linear Algebra** in their second trimester of study. If you complete **1017SCG Foundation Mathematics**, this will then be considered a first year elective course.

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 2	2201NSC	Core to Major	Linear Algebra and Applications	10
Tri 1	2205NSC	Core to Major	Calculus II	10
Tri 1	2202NSC	Core to Major	Numerical Methods	10
Tri 2	2204NSC	Core to Major	Introduction to Mathematical Modelling	10
Tri 1	3201NSC	Core to Major	Advanced Differential Equations and Modelling	10
Tri 1	3203NSC	Core to Major	Complex Analysis and Applications	10

## Science Majors

### Archaeology (Nathan)

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1	1088LHS	Recommended Prereq	First Peoples	10
Tri 2	1044SCG	Recommended Prereq	Earth Systems	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2303ENV	Core to Major	Zoology	10
Tri 1	2416ENV	Core to Major	Environmental Anthropology	10
Tri 1	2006ESC	Core to Major	Archaeology: Discovering the Human Past	10
Tri 2	2061ESC	Core to Major	Artefacts in Archaeology	10
Tri 1	3067ESC	Core to Major	Great Debates in Archaeology	10
Tri 2	3065ESC	Core to Major	Topics in Archaeology	10

### Biochemistry and Molecular Biology

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast)	10
			<b>OR</b>	
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
Tri 2	1014NSC	Recommended Prereq	Fundamentals of Biochemistry (Nathan) (see Note 1)	10
			<b>OR</b>	
Tri 2			Listed first year course (Gold Coast)	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 2	1024SCG	Recommended Prereq	Chemistry II (Gold Coast)	10
			<b>OR</b>	
Tri 2	1022SCG	Recommended Prereq	Chemistry 1B (Nathan)	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10

Note 1: 1014NSC Fundamentals of Biochemistry is a prerequisite for 2005NSC Protein Science and 2013NSC\_Y1&Y2 Biotechniques Laboratory. Nathan based students will need to take this course before moving to second year major courses.

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2005NSC	Core to Major	Protein Science (Nathan)	10
			<b>OR</b>	
Tri 1	2008MSC	Core to Major	Structural Biochemistry (Gold Coast)	10
Tri 2	2013NSC	Core to Major	Biotechniques Laboratory (Nathan)	10
			<b>OR</b>	
Tri 2	2018NSC	Core to Major	Biosciences Laboratory Skills (Gold Coast)	10
Tri 1	2003NSC	Core to Major	Metabolism (Nathan)	10
			<b>OR</b>	
Tri 2	2011MSC	Core to Major	Metabolism (Gold Coast)	10
Tri 2	2012NSC	Core to Major	Molecular Biology	10
Tri 1,2	3001NSC	Core to Major	Molecular Cell Biology (Nathan)	10
			<b>OR</b>	
Tri 1	3016MSC	Core to Major	Macromolecular and Cellular Biochemistry (Gold Coast)	10

You must complete 10 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	3009NSC	Elective to Major	Biomedical Sciences Laboratory (offered at Nathan)	10
Tri 2	3012MSC	Elective to Major	Clinical Biochemistry (offered at Gold Coast)	10
Tri 2	3012NSC	Elective to Major	Infectious Disease (offered at Nathan)	10
			<b>OR</b>	
Tri 2	3013MSC	Elective to Major	Infectious Disease (offered at Gold Coast)	10
Tri 2	3022MSC	Elective to Major	Molecular Medicine (offered at Gold Coast)	10
Tri 1	3030NSC	Elective to Major	Applied Bioinformatics (offered at Nathan)	10

## Chemistry

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast)	10
			<b>OR</b>	
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
Tri 1,3	1201SCG	Recommended Prereq	Linear Algebra (Nathan) (see Note 1)	10
			<b>OR</b>	
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning (Gold Coast)	10
Tri 2	1024SCG	Recommended Prereq	Chemistry II (Gold Coast)	10
			<b>OR</b>	
Tri 2	1022SCG	Recommended Prereq	Chemistry 1B (Nathan)	10
Tri 2,3	1202SCG	Recommended Prereq	Calculus I	10
			<b>OR</b>	
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10

Note 1: Students who successfully completed Senior Secondary Syllabus of Mathematical Methods (or equivalent) should complete **1201SCG Linear Algebra**. Students who successfully completed Senior Secondary Syllabus of General Mathematics only (or equivalent) will complete **1017SCG Foundation Mathematics** in their first trimester of study and complete **1201SCG Linear Algebra** in their second trimester of study. If you complete **1017SCG Foundation Mathematics**, this will then be considered a first year elective course.

You must complete 40 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2103NSC	Elective to Major	Organic Chemistry (Nathan)	10
			<b>OR</b>	
Tri 1	2014MSC	Elective to Major	Organic Chemistry (Gold Coast)	10
Tri 2	2209ENV	Elective to Major	Environmental Chemistry (Nathan)	10
			<b>OR</b>	
Tri 1	2203ENV	Elective to Major	Environmental Chemistry and Monitoring (Gold Coast)	10
Tri 1	2101NSC	Elective to Major	Inorganic Chemistry (Nathan)	10
			<b>OR</b>	
Tri 2	2208ENV	Elective to Major	Inorganic Chemistry (Gold Coast)	10
Tri 2	2102NSC	Elective to Major	Spectroscopic and Molecular Analysis	10
Tri 2	2106NSC	Elective to Major	Physical and Analytical Chemistry (Nathan)	10
			<b>OR</b>	
Tri 2	2202ENV	Elective to Major	Physical and Analytical Chemistry (Gold Coast)	10

You must complete 20 credit points from the following courses:



Trimester	Course code	Requirement	Course title	CP
Tri 1	3431ENV	Elective to Major	Water Pollution Chemistry (Nathan)	10
			<b>OR</b>	
Tri 1	3201ENV	Elective to Major	Aquatic Chemistry and Pollution (Gold Coast)	10
Tri 1	3105NSC	Elective to Major	Advanced Organic Chemistry	10
Tri 1	3103NSC	Elective to Major	NMR and Structural Chemistry (not offered from 2021)	10
			<b>OR</b>	
Tri 1	3225ENV	Elective to Major	NMR in Biological Systems	10
Tri 2	3102NSC	Elective to Major	Advanced Analytical Chemistry (Nathan)	10
			<b>OR</b>	
Tri 2	3202ENV	Elective to Major	Advanced Analytical Chemistry (Gold Coast)	10

## Clinical Sciences

**This major is offered on the Nathan campus only**

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
			<b>OR</b>	
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast)	10
Tri 1	1001NSC	Recommended Prereq	Human Biology: from Cells to Systems (Nathan only)	10
Tri 2	1014NSC	Recommended Prereq	Fundamentals of Biochemistry (Nathan only)	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 2	1022SCG	Recommended Prereq	Chemistry 1B (Nathan)	10
			<b>OR</b>	
Tri 2	1024SCG	Recommended Prereq	Chemistry II (Gold Coast)	10

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 2	2013NSC	Core to Major	Biotechniques Laboratory (Nathan)	10
			<b>OR</b>	
Tri 2	2018NSC	Core to Major	Biosciences Laboratory Skills (Gold Coast)	10
Tri 1	2005NSC	Core to Major	Protein Science (Nathan)	10
			<b>OR</b>	
Tri 1	2008MSC	Core to Major	Structural Biochemistry (Gold Coast)	10
Tri 1	2007NSC	Core to Major	Human Anatomy and Physiology 1	10
Tri 2	2002NSC	Core to Major	Human Anatomy and Physiology 2 (Nathan)	10
Tri 1	3009NSC	Core to Major	Biomedical Sciences Laboratory (Nathan)	10
Tri 2	3014NSC	Core to Major	Advanced Physiology (Nathan)	10

## Data Science

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,2	1811ICT	Recommended Prereq	Programming Principles	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10

You must complete 30 credit points from the following second year courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2291ENV	Elective to Major	Applied Data Science	10
Tri 1,2,3	2814ICT	Elective to Major	Data Management	10
Tri 1,3	2107ENV	Elective to Major	Introduction to Geographic Information Systems	10
Tri 1	2031ICT	Elective to Major	Data Analytics Methods	10
Tri 2	2030ICT	Elective to Major	Introduction to Big Data Analytics	10

You must complete 30 credit points from the following third year courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	3030ICT	Elective to Major	Data Analytics	10
Tri 1	4030ICT	Elective to Major	Big Data Analytics and Social Media (not offered from 2023)	10
			<b>OR</b>	
Tri 1,2,3	3032ICT	Elective to Major	Big Data Analytics and Social Media	10
Tri 2	3033ESC	Elective to Major	Environmental Data Analytics	10
Tri 2	3031ICT	Elective to Major	Applied Data Mining	10

## Geography

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
			<b>OR</b>	
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast)	10
Tri 1,3	1043SCG	Recommended Prereq	Introduction to Environmental Sustainability	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10
Tri 2	1044SCG	Recommended Prereq	Earth Systems	10

You must complete 40 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	2107ENV	Elective to Major	Introduction to Geographic Information Systems	10
Tri 1	2071ENV	Elective to Major	Soils and Geomorphology (offered at Nathan only)	10
Tri 1	2416ENV	Elective to Major	Environmental Anthropology	10
Tri 2	2209ENV	Elective to Major	Environmental Chemistry (Nathan)	10
			<b>OR</b>	
Tri 1	2203ENV	Elective to Major	Environmental Chemistry and Monitoring (Gold Coast)	10
Tri 2	2313AFE	Elective to Major	Environmental and Energy Economics	10
			<b>OR</b>	
Tri 1,3	2004GIR	Elective to Major	The Government Business Nexus: Intervening, Lobbying and Responding	10
Tri 2	2281ENV	Elective to Major	Economics and the Environment	10
Tri 2	2304ENV	Elective to Major	Rivers and Catchments (offered at Nathan only)	10
Tri 2,3	2212ENV	Elective to Major	Ecotox and Impact Assessment (offered online)	10

You must complete 20 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	3431ENV	Elective to Major	Water Pollution Chemistry (Nathan)	10
			<b>OR</b>	
Tri 1	3201ENV	Elective to Major	Aquatic Chemistry and Pollution (Gold Coast)	10
Tri 1	3307ENV	Elective to Major	Environmental and Social Futures (not offered in 2021)	10
			<b>OR</b>	
Tri 1,3	4118ENV	Elective to Major	Policymaking and Planning for Climate Change	10
Tri 2	3441ENV	Elective to Major	Land Degradation and Catchment Management (offered at Nathan only)	10
Tri 2	3306ENV	Elective to Major	Environmental Management	10
Tri 2	3119MED	Elective to Major	Environmental Toxicology and Risk Assessment (offered at Gold Coast only)	10
Tri 2	3418ENV	Elective to Major	Spatial Modelling (not offered from 2021)	10
			<b>OR</b>	
Tri 2	3033ESC	Elective to Major	Environmental Data Analytics	10

## Marine Biology

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I	10
			<b>OR</b>	
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A	10
Tri 1,3	1043SCG	Recommended Prereq	Introduction to Environmental Sustainability	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 1	1007ENV	Recommended Prereq	Introduction to Marine Science (Gold Coast)	10

You must complete 40 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2291ENV	Elective to Major	Applied Data Science	10
Tri 1	2804ENV	Elective to Major	Coastal Environments	10
Tri 2	2305ENV	Elective to Major	Marine Megafauna and Planetary Health	10
Tri 2	2603ENV	Elective to Major	Ecology (Gold Coast) (not offered from 2023)	10
			<b>OR</b>	
Tri 2	2051ENV	Elective to Major	Ecology (NA and GC from 2023)	10
Tri 2,3	2212ENV	Elective to Major	Ecotox and Impact Assessment (offered online)	10

You must complete 20 credit points from the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	3801ENV	Elective to Major	Estuarine Ecology	10
Tri 2	3332ENV	Elective to Major	Marine Conservation and Resource Management	10
Tri 1	3805ESC	Elective to Major	Coral Reefs	10

## Microbiology

This major is available on the Nathan campus only.

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
			<b>OR</b>	
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast) (from 2021)	10
Tri 2	1014NSC	Recommended Prereq	Fundamentals of Biochemistry (Nathan)	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10
Tri 2	1022SCG	Recommended Prereq	Chemistry 1B (Nathan)	10
			<b>OR</b>	
Tri 2	1024SCG	Recommended Prereq	Chemistry II (Gold Coast) (from 2021)	10

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 2	2013NSC	Core to Major	Biotechniques Laboratory (Nathan)	10
			<b>OR</b>	
Tri 2	2018NSC	Core to Major	Biosciences Laboratory Skills (Gold Coast) (from 2021)	10
Tri 1	2005NSC	Core to Major	Protein Science (Nathan)	10
			<b>OR</b>	
Tri 1	2008MSC	Core to Major	Structural Biochemistry (Gold Coast) (from 2021)	10
Tri 1	2008NSC	Core to Major	General Microbiology (Nathan)	10
Tri 2	2010NSC	Core to Major	Applied Microbiology (Nathan)	10
Tri 2	3018NSC	Core to Major	Microbiology Laboratory (Nathan)	10
Tri 2	3020NSC	Core to Major	Techniques in Molecular Microbiology (Nathan)	10

## Wildlife Biology

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1015SCG	Recommended Prereq	Quantitative Reasoning	10
Tri 1,3	1041SCG	Recommended Prereq	Biological Systems	10
Tri 1,3	1023SCG	Recommended Prereq	Chemistry I (Gold Coast)	10
			<b>OR</b>	
Tri 1,3	1021SCG	Recommended Prereq	Chemistry 1A (Nathan)	10
Tri 1,3	1043SCG	Recommended Prereq	Introduction to Environmental Sustainability	10
Tri 2	1042SCG	Recommended Prereq	Genetics and Evolutionary Biology	10
Tri 2,3	1014SCG	Recommended Prereq	Statistics	10
Tri 2	1044SCG	Recommended Prereq	Earth Systems	10

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2291ENV	Core to Major	Applied Data Science	10
Tri 2	2251ENV	Core to Major	Animal Diversity (Nathan) (not offered from 2021)	10
			<b>OR</b>	
Tri 1	2303ENV	Core to Major	Zoology	10
Tri 2	2051ENV	Core to Major	Ecology (NA and GC from 2023)	10
			<b>OR</b>	
Tri 2	2603ENV	Core to Major	Ecology (Gold Coast) (not offered from 2023)	10
Tri 1	2261ENV	Core to Major	Plant Diversity (Nathan) (not offered from 2021)	10
			<b>OR</b>	
Tri 2	2702ENV	Core to Major	Botany	10
Tri 1	3241ENV	Core to Major	Quantitative Ecology (Nathan) (not offered from 2021)	10
			<b>OR</b>	
Tri 1	3606ENV	Core to Major	Conservation Biology	10
Tri 2	3308ENV	Core to Major	Emerging Topics in Conservation	10

## Physics Major

### Physics

You must complete the following foundation courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1,3	1201SCG	Recommended Prereq	Linear Algebra (see Note 1)	10
Tri 1,2	1031SCG	Recommended Prereq	Physics 1A	10
Tri 2,3	1202SCG	Recommended Prereq	Calculus I	10
Tri 2	1032SCG	Recommended Prereq	Physics 1B	10

Note 1: Students who successfully completed Senior Secondary Syllabus of Mathematical Methods (or equivalent) should complete **1201SCG Linear Algebra**. Students who successfully completed Senior Secondary Syllabus of General Mathematics only (or equivalent) will complete **1017SCG Foundation Mathematics** in their first trimester of study and complete 1201SCG in their second trimester of study. If you complete **1017SCG Foundation Mathematics**, this will then be considered a first year elective course.

You must complete the following courses:

Trimester	Course code	Requirement	Course title	CP
Tri 1	2304NSC	Core to Major	Statistical and Solid State II (not offered from 2021)	10
			<b>OR</b>	
Tri 2	2307ESC	Core to Major	Analytical and Statistical Mechanics	10
Tri 1	2302NSC	Core to Major	Modern Physics Laboratory	10
Tri 1	2305NSC	Core to Major	Quantum Mechanics, Relativity and Elementary Particles	10
Tri 2	2301NSC	Core to Major	Electromagnetism and Optics	10
Tri 1	3301NSC	Core to Major	Quantum Physics III	10
Tri 2	3304NSC	Core to Major	Physics Laboratory III	10
Tri 2	3309ESC	Core to Major	Condensed Matter Physics	10

## Specialisations (8 available)

### Applied Mathematics

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1	6205NSC	Hons Core to Major	Topics in Applied Mathematics 1	10
Tri 1	6206NSC	Hons Core to Major	Topics in Applied Mathematics 2	10
Tri 1,2	6002ESC_P1	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6002ESC_P2	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 2	6207NSC	Hons Core to Major	Topics in Applied Mathematics 3	10
Tri 2	6208NSC	Hons Core to Major	Topics in Applied Mathematics 4	10

## Archaeological Science

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

## Biosciences

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

Note 2: Students will undertake a research project in the specialisation defined by their undergraduate degree.

## Chemistry

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

Note 2: Students will undertake a research project in the specialisation defined by their undergraduate degree.

## Geography

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation (see Note 2)	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

Note 2: Students will undertake a research project in the specialisation defined by their undergraduate degree.

## Marine Science

**This specialisation is offered at the Gold Coast campus only.**

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

## Physics

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6002ESC_P1	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6002ESC_P2	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1	6005ESC	Hons Core to Major	Tensors, Groups and General Relativity	10
Tri 1	6006ESC	Hons Core to Major	Honours Classical and Quantum Mechanics	10
Tri 2	6007ESC	Hons Core to Major	Classical and Quantum Electrodynamics	10
Tri 2	6304NSC	Hons Core to Major	Honours Statistical and Condensed Matter Physics	10

## Wildlife Biology

You must complete the following Honours courses in Year 4:

Trimester	Course code	Requirement	Course title	CP
Tri 1,2	6000ESC	Hons Core to Major	Research Proposal and Planning (see Note 1)	10
Tri 1,2			Listed Honours Elective	10
Tri 1,2	6001ESC_P1	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P2	Hon Diss Core to Mjr	Honours Dissertation	20
Tri 1,2	6001ESC_P3	Hon Diss Core to Mjr	Honours Dissertation	20

Note 1: 6000ESC must be undertaken in your first Trimester of study.

## Electives (2 available) Listed Honours Electives



Trimester	Course code	Requirement	Course title	CP
Tri 1,2	8000ESC	Hons Listed Elect 2	Strategies for Effective Science Communication (all specialisations)	10
Tri 1,2	6103NSC	Hons Listed Elect 2	Advanced Synthetic Chemistry (Bioscience, Chemistry specialisations)	10
Tri 1,2	6003ESC	Hons Listed Elect 2	Scientific Data Analysis (Bioscience, Marine Science or Wildlife Biology specialisations)	10
Tri 1,2	6195NSC	Hons Listed Elect 2	Topics in Drug Discovery (Chemistry, Bioscience specialisations)	10

### Free-choice electives (Science)

You may select free-choice electives from the list below or any **Undergraduate free-choice elective/s** offered across the University provided prerequisites are met. If you require guidance, please liaise with your Program Director.

Trimester	Course code	Requirement	Course title	CP
Tri 1	2006ESC	Free-choice Elective	Archaeology: Discovering the Human Past	10
Tri 2	2002NSC	Free-choice Elective	Human Anatomy and Physiology 2	10
Tri 1	2000MSC	Free-choice Elective	Molecular Genetics	10
Tri 1	2003NSC	Free-choice Elective	Metabolism	10
Tri 2	2003MSC	Free-choice Elective	Fundamentals of Microbiology	10
Tri 1	2005NSC	Free-choice Elective	Protein Science	10
Tri 2	2007MSC	Free-choice Elective	Microbiology	10
Tri 1	2007NSC	Free-choice Elective	Human Anatomy and Physiology 1	10
Tri 1	2008MSC	Free-choice Elective	Structural Biochemistry	10
Tri 1	2008NSC	Free-choice Elective	General Microbiology	10
Tri 2	2010NSC	Free-choice Elective	Applied Microbiology	10
Tri 2	2012NSC	Free-choice Elective	Molecular Biology	10
Tri 2	2013NSC	Free-choice Elective	Biotechniques Laboratory (Nathan)	10
			<b>courseLineOperator</b>	
Tri 2	2018NSC	Free-choice Elective	Biosciences Laboratory Skills (Gold Coast)	10
Tri 1,2 or 3	2043IBA	Free-choice Elective	Innovation, Creativity and Entrepreneurship	10
Tri 2	2051ENV	Free-choice Elective	Ecology	10
Tri 2	2061ESC	Free-choice Elective	Artefacts in Archaeology	10
Tri 1	2071ENV	Free-choice Elective	Soils and Geomorphology	10
Tri 1	2101NSC	Free-choice Elective	Inorganic Chemistry (Nathan)	10

Trimester	Course code	Requirement	Course title	CP
			<b>courseLineOperator</b>	
Tri 1	2208ENV	Free-choice Elective	Inorganic Chemistry (Gold Coast)	10
Tri 2	2102NSC	Free-choice Elective	Spectroscopic and Molecular Analysis	10
Tri 1	2103NSC	Free-choice Elective	Organic Chemistry (Nathan)	10
			<b>courseLineOperator</b>	
Tri 1	2014MSC	Free-choice Elective	Organic Chemistry (Gold Coast)	10
Tri 2	2106NSC	Free-choice Elective	Physical and Analytical Chemistry	10
Tri 1,3	2107ENV	Free-choice Elective	Introduction to Geographic Information Systems	10
Tri 2	2201NSC	Free-choice Elective	Linear Algebra and Applications	10
Tri 2	2202ENV	Free-choice Elective	Physical and Analytical Chemistry	10
Tri 1	2202NSC	Free-choice Elective	Numerical Methods	10
Tri 1	2203ENV	Free-choice Elective	Environmental Chemistry and Monitoring (Gold Coast)	10
			<b>courseLineOperator</b>	
Tri 2	2209ENV	Free-choice Elective	Environmental Chemistry (Nathan)	10
Tri 2	2204NSC	Free-choice Elective	Introduction to Mathematical Modelling	10
Tri 1	2205NSC	Free-choice Elective	Calculus II	10
Tri 1,3	2004GIR	Free-choice Elective	The Government Business Nexus: Intervening, Lobbying and Responding	10
Tri 2	2251ENV	Free-choice Elective	Animal Diversity (Nathan) (not offered from 2021)	10
			<b>courseLineOperator</b>	
Tri 1	2303ENV	Free-choice Elective	Zoology	10
Tri 2	2702ENV	Free-choice Elective	Botany	10
Tri 2	2281ENV	Free-choice Elective	Economics and the Environment	10
Tri 1	2291ENV	Free-choice Elective	Applied Data Science	10
Tri 2	2301NSC	Free-choice Elective	Electromagnetism and Optics	10
Tri 1,2	2302NSC	Free-choice Elective	Modern Physics Laboratory	10
Tri 2	2304ENV	Free-choice Elective	Rivers and Catchments	10
Tri 1,2	2304NSC	Free-choice Elective	Statistical and Solid State II (not offered from 2021)	10
Tri 2	2307ESC	Free-choice Elective	Analytical and Statistical Mechanics	10

Trimester	Course code	Requirement	Course title	CP
Tri 2,3	2305ENV	Free-choice Elective	Marine Megafauna and Planetary Health	10
Tri 1	2305NSC	Free-choice Elective	Quantum Mechanics, Relativity and Elementary Particles	10
Tri 1	2416ENV	Free-choice Elective	Environmental Anthropology	10
Tri 1	2804ENV	Free-choice Elective	Coastal Environments	10
Tri 2	2803ENV	Free-choice Elective	Marine Biodiscovery	10
Tri 2,3	2212ENV	Free-choice Elective	Ecotox and Impact Assessment (offered online)	10
Tri 2	2810ICT	Free-choice Elective	Software Technologies	10
Tri 2	2703ICT	Free-choice Elective	Web Application Development (not offered from 2026)	10
Tri 1,2	3001NSC	Free-choice Elective	Molecular Cell Biology (Nathan)	10
			<b>courseLineOperator</b>	
Tri 1	3016MSC	Free-choice Elective	Macromolecular and Cellular Biochemistry (Gold Coast)	10
Tri 3	3002ESC	Free-choice Elective	Biomolecular Sciences Laboratory	20
Tri 1	3004MSC	Free-choice Elective	Immunology (Gold Coast)	10
Tri 1	3007NSC	Free-choice Elective	Immunology (Nathan)	10
Tri 1	3006MSC	Free-choice Elective	Clinical Microbiology	10
Tri 1	3009NSC	Free-choice Elective	Biomedical Sciences Laboratory	10
Tri 2	3012MSC	Free-choice Elective	Clinical Biochemistry	10
Tri 2	3012NSC	Free-choice Elective	Infectious Disease (offered at Nathan campus)	10
			<b>courseLineOperator</b>	
Tri 2	3013MSC	Free-choice Elective	Infectious Disease (offered at Gold Coast)	10
Tri 2	3014NSC	Free-choice Elective	Advanced Physiology	10
Tri 2	3018NSC	Free-choice Elective	Microbiology Laboratory	10
Tri 2	3020NSC	Free-choice Elective	Techniques in Molecular Microbiology	10
Tri 2	3022MSC	Free-choice Elective	Molecular Medicine	10
Tri 2,3	2034IBA	Free-choice Elective	Griffith Innovation Challenge	10
Tri 2	3102NSC	Free-choice Elective	Advanced Analytical Chemistry (Nathan)	10
			<b>courseLineOperator</b>	

Trimester	Course code	Requirement	Course title	CP
Tri 2	3202ENV	Free-choice Elective	Advanced Analytical Chemistry (Gold Coast)	10
Tri 1	3103NSC	Free-choice Elective	NMR and Structural Chemistry (Nathan) (not offered from 2021)	10
Tri 1	3225ENV	Free-choice Elective	NMR in Biological Systems	10
Tri 1	3105NSC	Free-choice Elective	Advanced Organic Chemistry	10
Tri 2	3119MED	Free-choice Elective	Environmental Toxicology and Risk Assessment	10
Tri 1	3201ENV	Free-choice Elective	Aquatic Chemistry and Pollution (Gold Coast)	10
			<b>courseLineOperator</b>	
Tri 1	3431ENV	Free-choice Elective	Water Pollution Chemistry (Nathan)	10
Tri 1	3201NSC	Free-choice Elective	Advanced Differential Equations and Modelling	10
Tri 1	3203NSC	Free-choice Elective	Complex Analysis and Applications	10
Tri 2	3204NSC	Free-choice Elective	Advanced Numerical Methods	10
Tri 1	3241ENV	Free-choice Elective	Quantitative Ecology (not offered from 2021)	10
Tri 1	3301NSC	Free-choice Elective	Quantum Physics III	10
Tri 2	3309ESC	Free-choice Elective	Condensed Matter Physics	10
Tri 2	3304NSC	Free-choice Elective	Physics Laboratory III	10
Tri 2	3306ENV	Free-choice Elective	Environmental Management	10
Tri 1	3307ENV	Free-choice Elective	Environmental and Social Futures	10
Tri 2	3308ENV	Free-choice Elective	Emerging Topics in Conservation	10
Tri 2	3332ENV	Free-choice Elective	Marine Conservation and Resource Management	10
Tri 2	3441ENV	Free-choice Elective	Land Degradation and Catchment Management	10
Tri 1	3606ENV	Free-choice Elective	Conservation Biology (not offered from 2021)	10
Tri 1	3801ENV	Free-choice Elective	Estuarine Ecology	10
Tri 2	3030NSC	Free-choice Elective	Applied Bioinformatics (offered from 2021)	10
Tri 1	3804ENV	Free-choice Elective	Marine Ecosystem Modelling	10
Tri 1,2 or 3	3911ESC	Free-choice Elective	Work Integrated Learning Special Topic	10
Tri 1,2 or 3	3922ESC	Free-choice Elective	Research Special Topic	10
Tri 1	3003NSC	Free-choice Elective	Neuroscience	10