What class will you take in Biological Sciences?
### Discover

- Head of School’s welcome
- How to major in Biology

### Units of Study

#### Semester One
- Animal Behaviour
- Animal Ecological Physiology
- Evolution and Biodiversity
- Gene Technology and Genomics

#### Semester Two
- Developmental Genetics
- Ecology
- Marine Biology
- Plant Sciences

#### Pre-Semester Intensive
- Coral Reef Biology
- Terrestrial Field Ecology

### Additional information

- Honours
Discover
Head of School’s welcome

Biology is the science of the future. It will be central to solving problems of climate change, sustainable energy and food production, loss of biodiversity, appropriate use of genetic engineering in agriculture and medicine and the mystery of consciousness. I hope you consider making your future in Biology.

I am delighted to present you with our suite of senior units of study in the Biological Sciences. They delve into some of the most exciting areas in modern biology – from unravelling of mechanisms that control development or behaviour to the latest questions in ecology and evolution.

These units are presented by academics actively researching in that area of biology, so they will take you to the cutting edge of discovery. You will be engaged in independent or group research work, allowing you to sharpen your skills in experimental design and critical analysis. You can also gain experience as a field biologist. In 2016, two field trip units of study will take place in July (pages 22-25).

You will learn skills that will equip you to take on your next challenge whether in the workforce or in further study. Most students use their BIOL units of study to fulfil the requirements of a Biology Major, but they may also contribute to other Life Science Majors (see page 4).

I strongly encourage you to consider adding a fourth year to your degree to even further equip you for your next step (page 26). An Honours year allows you to focus on one large research project supervised by a member of academic staff. You will hone your skills in problem solving, critical analysis, presentation and writing – substantially increasing your competitiveness in the job market.

Sincerely,

Associate Professor Clare McArthur
Head of School
I’ve had tons of fun studying biology at Sydney Uni. Especially doing my own research projects, with the Australian Museum in my second year, and collecting frogs and snakes in the field in my third year.”

Kevin Hendrawan
Bachelor of Science (Advanced)
Units of Study
Animal Behaviour

BIOL3046

Course Description
The unit will provide a broad overview of the scientific study of animal behaviour. It will consider mechanistic and functional explanations of animal behaviour across contexts including kin selection and altruism, sociality, foraging, aggression and competition, sexual selection and mate choice, the behaviour of predators and prey, and communication and signalling. The information presented and discussed in this unit will reflect the most up-to-date research in each aspect of the field of animal behaviour. Practical sessions are closely aligned with the lecture material and will foster the development of key skills by providing hands-on experience of experimental design, data collection and analysis.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Ashley Ward (ashley.ward@sydney.edu.au)
Session: Semester 1
Classes: two lectures and one 3-hour practical per week
Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3946
Assessment: Practical reports, one 2-hour exam (100%)

Textbook

BIOL3946

Course Description
The content of Animal Behaviour (Advanced) (BIOL3946) will be based on Animal Behaviour (BIOL3046), however students enrolled in Animal Behaviour (Advanced) will have the opportunity to conduct a research project under the direction of a member of academic staff.

We have found the advanced projects are a great way to introduce students to research and we see that the more students put into their projects, the more they get out of the program. Participation in Animal Behaviour (Advanced) is excellent preparation for further study and research in science.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Ashley Ward (ashley.ward@sydney.edu.au)
Session: Semester 1
Classes: two lectures and one 3-hour practical per week
Pre-requisites: Distinction average across either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3046
Assessment: Practical reports, one 2-hour exam (100%)

Textbook
As for BIOL3046
Animal Ecological Physiology

BIOL3045

Course Details
Credit points: 6
Unit coordinator: Professor Frank Seebacher (frank.seebacher@sydney.edu.au)
Session: Semester 1
Classes: two lectures and one 3-hour practical per week
Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3945, BIOL3011, BIOL3911, BIOL3012, BIOL3912
Assessment: Practical reports (60%), one 1.5-hour exam (40%)

Textbook
None.

BIOL3945

Course Description
The content will be based on the standard unit BIOL3045 but qualified students will participate in alternative components at a more advanced level.

This may include a semester-long individual project under the supervision of an academic or post-doctoral researcher. The Advanced project would comprise writing a brief research proposal, conducting the project and then writing up the results in the form of a short scientific paper.

Course Details
Credit points: 6
Unit coordinator: Professor Frank Seebacher (frank.seebacher@sydney.edu.au)
Session: Semester 1
Classes: two lectures and one 3-hour practical per week
Pre-requisites: Distinction average across either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3045, BIOL3011, BIOL3911, BIOL3012, BIOL3912
Assessment: Practical reports (60%), one 1.5-hour exam (40%)

Textbook
None.
Evolution and Biodiversity

BIOL3044

Course Details
Credit points: 6
Unit coordinator: Associate Professor Murray Henwood (murray.henwood@sydney.edu.au)

Session: Semester 1
Classes: two lectures and three practicals per week
Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3944, BIOL3025, BIOL3925, PLNT3003, PLNT3903
Assessment: Practical reports and/or presentations (50%), one 1.5-hour exam (50%)

Textbook

This unit is valuable for students who intend to seek employment in areas such as biodiversity research, bioinformatics, ecology, taxonomy, biological conservation and teaching.

BIOL3944

Course Description
The content will be based on the standard unit BIOL3044 but qualified students will participate in alternative components at a more advanced level.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Murray Henwood (murray.henwood@sydney.edu.au)

Session: Semester 1
Classes: two lectures and three practicals per week
Pre-requisites: Distinction average across either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3044, BIOL3025, BIOL3925, PLNT3003, PLNT3903
Assessment: Practical reports and/or presentations (50%), one 1.5-hour exam (50%)

Textbook
As for BIOL3044
Gene Technology and Genomics

BIOL3018

Course Description
A unit of study with lectures and practicals on the application of recombinant DNA technology and the genetic manipulation of prokaryotic and eukaryotic organisms. Lectures cover the applications of molecular genetics in biotechnology and consider the regulation, impact and implications of genetic engineering and genomics.

Topics include biological sequence data and databases, comparative genomics, the cloning and expression of foreign genes in bacteria, yeast, animal and plant cells, novel human and animal therapeutics and vaccines, new diagnostic techniques for human and veterinary disease and the genetic engineering of animals and plants.

Practical work may include nucleic acid isolation and manipulation, gene cloning and PCR amplification, DNA sequencing and bioinformatics, immunological detection of proteins, and the genetic transformation and assay of plants.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Mary Byrne (mary.byrne@sydney.edu.au)
Session: Semester 1
Classes: two 1-hour lectures and one 3-hour practical per week
Pre-requisites: (MBLG2072 or MBLG2972) and 6 credit points from either (MBLG2071 or MBLG2971) or Intermediate BIOL
Prohibitions: BIOL3918
Assessment: One 2-hour exam (60%), assignments (40%)

Textbook
None.

BIOL3918

Course Description
Qualified students will participate in alternative components of BIOL3018 Gene Technology and Genomics. The content and nature of these components may vary from year to year but may include alternative practical work or review of recent research articles.

Session: Semester 1
Classes: two 1-hour lectures and one 3-hour practical per week
Pre-requisites: Distinction average across (MBLG2072 or MBLG2972) and 6 credit points from either (MBLG2071 or MBLG2971) or Intermediate BIOL
Prohibitions: BIOL3018
Assessment: One 2-hour exam (60%), assignments (40%)

Textbook
None.
Developmental Genetics

BIOL3026

Course Description
Developmental genetics discusses major concepts and our current understanding of developmental biology with an emphasis on molecular genetics. The developmental genetics of animal and plant systems will be investigated, along with approaches used to determine gene function in relation to development of complex multicellular organisms.

Topics include the features and resources for model organisms; the generation of mutants for forward and reverse genetics; the application of mutants to the study gene function and gene networks; spatial and temporal gene expression in pattern formation; quantitative trait loci analysis; utility of genome wide association studies; epigenetics in relation to inheritance; genome information in the study of human genetics.

Reference will be made to the use of modern techniques in developmental biology such as transgenics, recombinant DNA technology, tissue-specific expression analysis. Various methods of genetic mapping will be covered. Practical work complements the theoretical aspects of the course and develops important skills in genetics.

Course Details
Credit points: 6 Unit coordinator: To be confirmed Session: Semester 2 Classes: twenty-four 1-hour lectures/tutorials per semester and up to 3-hours laboratory per week Pre-requisites: (MBLG2072 or MBLG2972) and 6 credit points from either (MBLG2071 or MBLG2971) or Intermediate BIOL. For BMedSc students: 12 credit points from MBLG2071/2971, MBLG2072/2972 and Intermediate BIOL units or 12 credit points of Intermediate BMED units including BMED2802. Prohibitions: BIOL3926 Assessment: One 2-hour exam (60%), assignments (40%)

Textbook
None.

BIOL3926

Course Description
Qualified students will participate in alternative components to BIOL3026. The content and nature of these components may vary from year to year but may include alternative practical work or review of recent research articles.

Course Details
Credit points: 6 Unit coordinator: To be confirmed Session: Semester 2 Classes: twenty-four 1-hour lectures/tutorials per semester and up to 3-hours laboratory per week Pre-requisites: Distinction average across (MBLG2072 or MBLG2972) and 6 credit points from either (MBLG2071 or MBLG2971) or Intermediate BIOL. For BMedSc students: either (a) Distinction average in 12 credit points from MBLG2071/2971, MBLG2072/2972 and Intermediate BIOL units OR (b) Distinction average in 12 credit points of Intermediate BMED units, including BMED2802. Prohibitions: BIOL3026 Assessment: One 2-hour exam (60%), assignments (40%)

Textbook
None.
Ecology

BIOL3007

Course Description
This unit explores the dynamics of ecological systems, and considers the interactions between individual organisms and populations, organisms and the environment, and ecological processes. Lectures are grouped around four dominant themes: Interactions, Evolutionary Ecology, The Nature of Communities, and Conservation and Management. Emphasis is placed throughout on the importance of quantitative methods in ecology, including sound planning and experimental design, and on the role of ecological science in the conservation, management, exploitation and control of populations.

Relevant case studies and examples of ecological processes are drawn from marine, freshwater and terrestrial systems, with plants, animals, fungi and other life forms considered as required. Students will have some opportunity to undertake short term ecological projects, and to take part in discussions of important and emerging ideas in the ecological literature.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Peter Banks (peter.banks@sydney.edu.au)
Session: Semester 2
Classes: two 1-hour lectures and one 3-hour practical per week
Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3907
Assessment: One 2-hour exam, group presentations, one essay, one project report (100%)

Textbook

BIOL3907

Course Description
This unit has the same objectives as BIOL3007 Ecology, and is suitable for students who wish to pursue certain aspects in greater depth. Entry is restricted, and selection is made from the applicants on the basis of their previous performance.

Students taking this unit of study participate in discussions about key concepts and skills needed by ecologists in research, management and policy, and will be encouraged to pursue the objectives by more independent means in a series of research tutorials. Specific details of this unit of study and assessment will be announced in meetings with students in week 1 of semester 2. This unit of study may be taken as part of the BSc (Advanced) program.

Course Details
Credit points: 6
Unit coordinator: Associate Professor Peter Banks (peter.banks@sydney.edu.au)
Session: Semester 2
Classes: two 1-hour lectures and one 3-hour practical per week
Pre-requisites: Distinction average in either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3007
Assessment: One 2-hour exam, presentations, one essay, one project report (100%)

Textbook
As for BIOL3007
Marine Biology

**BIOL3013**

**Course Description**
We will examine in detail processes that are important for the establishment and maintenance of marine communities.

Lectures will expose students to the key ideas, researchers and methodologies within selected fields of marine biology. Laboratory sessions and field excursions will complement the lectures by providing students with hands-on experience with the organisms and the processes that affect them.

Students will develop critical analysis and scientific writing skills while examining the current literature.

**Course Details**
- **Credit points:** 6
- **Unit coordinator:** Dr Will Figueira (will.figueira@sydney.edu.au)
- **Session:** Semester 2
- **Classes:** two 1-hour lectures and one 4-hour practical per week
- **Pre-requisites:** Distinction average in either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972); or 6 credit points of Intermediate BIOL and (GEOS2115 or GEOS2915)
- **Prohibitions:** BIOL3013

**Assessment:** Practical reports, data exercises and exams (100%)

**Textbook**
None.

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**BIOL3913**

**Course Description**
Qualified students will participate in an alternative component of the BIOL3013 Marine Biology unit. The content and nature of this component may vary from year to year to suit student interests and will involve an independent project working individually or in small groups with one of the academic members of staff.

**Course Details**
- **Credit points:** 6
- **Unit coordinator:** Dr Will Figueira (will.figueira@sydney.edu.au)
- **Session:** Semester 2
- **Classes:** two 1-hour lectures and one 4-hour practical per week
- **Pre-requisites:** Distinction average in either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972); or 6 credit points of Intermediate BIOL and (GEOS2115 or GEOS2915)
- **Prohibitions:** BIOL3013

**Assessment:** Practical reports, data exercises and exams (100%)

**Textbook**
None.
Plant Sciences

**BIOL3043**

**Course Description**
This unit explores major concepts, discoveries and controversies in the plant sciences. Lectures will examine the mechanisms plants employ to adapt and acclimate to the environment.

Major topics include growth and development, acquisition of resources such as light and nutrients, perception and response to signals, and interactions of plants with other organisms. Emphasis will be placed on integration of plant responses from molecular through to whole plant scales. There is a focus on recent research that has been critical in enhancing our current understanding of plant biology. Lectures are augmented by experimental work.

This unit of study complements other Senior units of study in the Plant Science Major and is essential for those seeking a career in plant biology.

**Course Details**
- Credit points: 6
- Unit coordinator: Associate Professor Charles Warren (charles.warren@sydney.edu.au)
- **Session**: Semester 2
- **Classes**: two lectures and one 4-hour practical per week
- **Pre-requisites**: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
- **Prohibitions**: BIOL3943, PLNT3001, PLNT3002, PLNT3901, PLNT3902
- **Assessment**: Practical report and lab notebook (40%), group presentation (10%), one 2-hour exam (50%)

**Textbook**
None.

**BIOL3943**

**Course Description**
The content of Plant Sciences (Advanced) (BIOL3943) will be based on Plant Sciences (BIOL3043) but students enrolled in Advanced Plant Sciences are afforded the opportunity to undertake a research project under the direction of a member of academic staff.

For these candidates, 30% of the final mark will be based on a manuscript of their project and a presentation. We have found the advanced projects are a great way to introduce students to research and we see that the more students put into their projects, the more they get out of the program. Participation in Plant Sciences (Advanced) is excellent preparation for further study and research in the plant sciences.

**Course Details**
- Credit points: 6
- Unit coordinator: Associate Professor Charles Warren (charles.warren@sydney.edu.au)
- **Session**: Semester 2
- **Classes**: two lectures and one 4-hour practical per week
- **Pre-requisites**: Distinction average across either 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
- **Prohibitions**: BIOL3043, PLNT3001, PLNT3002, PLNT3901, PLNT3902
- **Assessment**: Advanced project report and lab notebook (40%), group presentation (10%), one 2-hour exam (50%)

**Textbook**
None.
Coral Reef Biology

BIOL3016

Course Description
Available in even years (2016, 2018)
Coral Reef Biology is an intensive unit held at a research station on the Great Barrier Reef.

The unit focuses on the dominant taxa in coral reef environments and the linkages between them. Emphasis is placed on the biological adaptations for life in tropical waters and the ecological, oceanographic and physiological processes involved. Aspects covered include: processes influencing the distribution of coral reefs, symbiosis, reef connectivity, lagoon systems, nutrient cycling and the impacts of climate change and other anthropogenic pressures on the world’s corals reefs.

Location
Great Barrier Reef, QLD.

Textbook
None.

Course Details
Credit points: 6
Unit Coordinator: Professor Maria Byrne (mbyrne@anatomy.usyd.edu.au)
Session: Int
July
Classes: Lectures on campus 27-29 June; Fieldwork Field intensive 80 hours block mode (12-18 July)
Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)
Prohibitions: BIOL3916, BIOL2920, NTMP3001
Assessment: Participation in field work, essay, project report and an exam (100%)

Note: This unit cannot be combined with more than one other BIOL field unit during the degree. Departmental permission is required for entry into this unit of study. Entry into the unit is based on placement availability and selection is competitive based on academic performance in the pre-requisite units of study. Academic performance in any Senior BIOL units of study may also be considered. This unit is only available in EVEN numbered years (e.g. 2016, 2018...), but students are offered alternative Intermediate field units in ODD numbered years.

BIOL3916

Course Description
Available in even years (2016, 2018)
This unit has the same objectives as BIOL3016, Coral Reef Biology, and is suitable for students who wish to pursue certain aspects of tropical marine biology in greater depth, with a focus on the Great Barrier Reef.

Entry is restricted, and selection is made from the applicants on the basis of their previous performance. Students taking this unit of study will pursue individual projects in consultation with, and under the guidance of, the course coordinator.

The aim is to design a project relating to the particular interests of the student. The nature of these projects will vary from year to year. This unit of study may be taken as part of the BSc (Advanced) program.

Location
As for BIOL3016

Textbook
None.
Terrestrial Field Ecology

**BIOL3009**

**Course Description**

Available in even years (2016, 2018)

This field course provides practical experience in terrestrial ecology suited to a broad range of careers in ecology, environmental consulting and wildlife management. Students learn a broad range of ecological sampling techniques and develop a detailed understanding of the logical requirements necessary for manipulative ecological field experiments.

The field work incorporates survey techniques for plants, small mammals and invertebrates and thus provides a good background for ecological consulting work. Students attend a week-long field course and participate in a large-scale research project as well as conducting their own research project. Invited experts contribute to the lectures and discussions on issues relating to the ecology, conservation and management of Australia’s terrestrial flora and fauna.

**Location**

Chichester State Forest and Wangat Lodge near Dungog, NSW

**Textbook**

None.

**Course Details**

Credit points: 6

Unit Coordinator: Professor Glenda Wardle

Session: Int July

Classes: One 6-day field trip held in the pre-semester break (July 17-July 22 inclusive) and four 4-hour practical classes during weeks 1-4 of semester two.

Pre-requisites: 12 credit points of Intermediate BIOL; or 6 credit points of Intermediate BIOL and (MBLG2072 or MBLG2972)

Prohibitions: BIOL3909, BIOL2009

**Assessment**

BIOL2909 Assessment: Discussions and quiz (10%), research project proposal and brief presentation (10%), sampling project report (20%), specimen collection (10%), research project report (50%)

Note: This unit cannot be combined with more than one other BIOL field unit during the degree. Departmental permission is required for entry into this unit of study. Entry into the unit is based on placement availability and selection is competitive based on academic performance in the pre-requisite units of study. Academic performance in any Senior BIOL units of study may also be considered. The unit is only available in EVEN years (2016, 2018), but students may apply for entry into an alternative intermediate field unit in ODD years.

**BIOL3909**

**Course Description**

Available in even years (2016, 2018)

This unit has the same objectives as BIOL3009 Terrestrial Field Ecology, and is suitable for students who wish to pursue certain aspects in greater depth. Entry is restricted, and selection is made from applicants on the basis of previous performance.

Students taking this unit of study will complete an individual research project on a topic negotiated with a member of staff. It is expected that much of the data collection will be completed during the field trip but some extra time may be needed during semester two. Specific details of this unit of study and assessment will be announced in meetings with students at the beginning of the unit. This unit of study may be taken as part of the BSc (Advanced) program.

**Location**

Chichester State Forest and Wangat Lodge near Dungog, NSW

**Textbook**

None.
### Units of Study

#### Junior

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<td>BIOL1001/1911/1991</td>
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<td>Human Biology</td>
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<td>Living Systems</td>
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#### Intermediate

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<td>Cell Biology</td>
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<td>Zoology</td>
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<td>Biology Experimental Design and Analysis</td>
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<td>Ecology and Conservation</td>
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<td>Genetics and Genomics</td>
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<td>Introduction to Tropical Wildlife Biology</td>
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<td>Introduction to Coral Reef Biology</td>
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#### Senior

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<td>Animal Behaviour</td>
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<td>Evolution and Biodiversity</td>
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#### Honours (optional)

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<tr>
<td>Biology Honours</td>
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Honours in Biology

“It’s been great learning about (and getting experience in) how research is conducted in biology. It’s rewarding to work on your own project focusing on a particular research topic for an extended period of time. Also you meet a lot of people who really love biology!”

Danya Luo
Honours student 2015

As a biology student, you are strongly encouraged to specialise by continuing into the honours (fourth) year. An honours year gives you the chance to refine your biological knowledge and research skills by working in the research community. You complete advanced course material and an independent research project that culminates in a thesis.

Entry into honours is competitive and depends on your performance in second and third year units of study. You will need a minimum WAM (weighted average mark) of 65 for all Intermediate and Senior units of study and a major in one of the Life Sciences (see page 4).

-sydney.edu.au/science/biology/studying_biology/future_honours/

Honours gave me experience in problem solving, project management and analytics. Plus it improved my communication skills and I had a blast!”

Jessica Higgs (Honours graduate)
Why study biology?

As a graduate of the University of Sydney you can expect to contribute to your community in many different ways. Opportunities exist in business, government, media, education, and research. Apart from applying your biological expertise, you will be able to use other skills you developed during the course of your studies, in particular those associated with effective communication, knowledge acquisition and analysis, and team building.

Your understanding of biology will contribute to decision-making in ways that you can’t predict. We make a considerable effort to assist you to develop a broad base of skills, within a biological framework.

sydney.edu.au/science/biology/studying_biology