Intermediate Units 2016

What class will you take in Biological Sciences?
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Discover
Head of School’s welcome

The big problems facing the world – climate change, providing sustainable food and energy, loss of habitat and biodiversity – have solutions in biology.

In the next decades, new technologies will no doubt bring us closer to an understanding of the fundamental riddles of life – evolution, control of development, aging, and consciousness.

I encourage you to keep a broad approach to your study of biology – increasingly biologists need a solid understanding across a range of areas. For example, ecologists and conservation biologists need population genetics and an understanding of both plants and animals; taxonomists need phylogenetics and bioinformatics; physiologists and cell biologists use molecular biology techniques; and molecular biologists need to understand the physiological state, cell biology and development of their organisms of study. All biologists need skills in designing good experiments, to excel in their own research or for judging the research of others. We have designed our undergraduate program with this need for integrated biology in mind.

I look forward to welcoming you as an intermediate student in Biological Sciences next year.

Associate Professor Clare McArthur
Head of School
How to...

Apply for intensive units

If you are interested in enrolling in the intensive field units of study you should submit a special permission form directly to the Biological Sciences office (Carslaw, Level 5) during the pre-enrolment period.

Acceptance will be based on availability of places and academic merit. Students will be notified of their acceptance and subsequent enrolment in the unit after the release of semester two results.

Gain experience through volunteering

Volunteering gives you the opportunity to participate in real research. You can start out simply helping an academic, a junior researcher or a PhD student setting up experiments or analysing data; then end up running your own research project.

Go to our Volunteers facebook page to see what is available:
- facebook.com/SOBS-Volunteers-397820207076634/

Major in Biology

- To major in Biology you need at least 24 credit points (that is 4 units of study) of senior BIOL units. If you are planning to major in biology, we recommend that you take all in-semester intermediate units listed in this booklet to give you a solid understanding of the major fields of biology. If you do not have the pre-requisites listed for MBLG2072 please contact the unit coordinator as it may be possible to give you special permission to enrol in this unit.

- Biology units may also count towards other majors: Bioinformatics, Environmental Studies, Marine Science, Molecular Biology and Genetics and Plant Science. You could consider completing a double major, in Biology and one of these areas or other areas of Science. Each senior unit of study may be counted towards only one major. Of course it is also possible to include Biology units of study in your degree even if you do not plan to major in Biology.

- The detailed timetable for the Biology Intermediate units of study for 2016 will be developed to minimise clashes for most students and will be released by the timetabling unit before semester 1.

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
Botany

BIOL2023

Course Description
This unit of study focuses on the remarkable world of plants and recent advances in botanical research. A phylogenetic approach provides the systematic foundation to this unit and is fundamental to biology. Students are introduced to large-scale patterns in plant morphology and distribution (biogeography). At a different scale, this unit of study investigates the structure of cells, tissues and organs of flowering plants and addresses how plants are constructed and how they respond to environmental signals (incl. stress responses).

There is a focus on recent advances in botanical research. Students will develop skills in phylogenetic inference, plant identification and plant anatomy. The content is well-suited to students with specific interests in botany, broad interests in biology (ecology, bioinformatics, environmental science, molecular and cell biology, genetics and biotechnology) and broader disciplines (e.g. education, arts, and environmental law). This unit of study provides a suitable foundation for senior biology units of study.

Course Details
Credit points: 6
Unit Coordinator: Dr Rosanne Quinnell
Session: Semester 1
Classes: Two lectures and one 2- to 3-hour practical per week.
Prerequisites: 6cp Junior BIOL and 6cp Junior Sciences
Assumed knowledge: BIOL1001 OR BIOL1002
Assessment: 1x 2-hr exam (40%), anatomy project (20%), quizzes (10%), one 2-hour practical exam (30%)

Textbook

Note: A Study Guide for the unit will be available for download from the LMS.

BIOL2923

Course Description
The content of Advanced Botany will be based on Botany (BIOL2023) but students enrolled in Advanced Botany are afforded the opportunity to undertake 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 Advanced Botany is excellent preparation for further study and research in science.

Course Details
Credit points: 6
Unit Coordinator: Dr Rosanne Quinnell
Session: Semester 1
Classes: Two lectures and one 2- to 3-hour practical per week.
Prerequisites: Distinction average in at least 6 credit points of Junior Biology units of study and 6 credit points Junior Sciences
Assumed knowledge: BIOL1001 OR BIOL1002
Assessment: One 2-hour exam (40%), one 2-hour practical exam (30%), research project (30%)

Textbook
As for BIOL2023
Cell Biology

BIOL2016

Course Description
This unit of study focuses on contemporary principles in cell biology and development in plants and animals, with emphasis on cellular functions and a focus on the molecular perspective, fundamental to understanding biological organisms. Topics include cancer and control of cell division and migration, pre-programmed cell death, molecular signalling and transport systems, cellular endocrinology and embryonic development. The practical component provides students with hands-on training in key research techniques using modern equipment. This unit of study provides a suitable foundation for senior biology units of study.

Course Details
Credit points: 6
Unit Coordinator: Dr Murray Thomson
Session: Semester
Classes: Two 1-hour lectures per week and one 4-hour practical per week.
Prerequisites: 12cp of Junior BIOL; or 6cp of Junior BIOL and (MBLG1001 or MBLG1901); or (6cp of Junior Biology and 6cp of Junior Chemistry)
Prohibitions: BIOL2916; all intermediate BMED units
Assumed knowledge: 12cp of Junior BIOL and 12cp of Junior CHEM
Assessment: One 3-hour theory exam, 1 project assignment, 1 practical report (100%)

Textbook

Note: This unit is not available to students in BMedSc.

BIOL2916

Course Description
In the advanced stream of Cell Biology you will become involved with a project under the supervision of an academic staff member or members. This will give you the opportunity to work in the lab and or field and gain important insight and training into cell biology research techniques and current areas of study.

If you want to give your CV a boost with valuable experience in the exciting and challenging area of cutting edge cell biology research, the advanced stream is the choice for you.

Note: This unit is not available to students in BMedSc.

Course Details
Credit points: 6
Unit Coordinator: Dr Murray Thomson
Session: Semester
Classes: Two 1-hour lectures per week, one 4-hour practical per week.
Prerequisites: Distinction average across either 12cp of Junior Biology, or 6cp of Junior Biology and (MBLG1001 or MBLG901), or 6cp of Junior Biology and 6cp of Junior Chemistry.
Prohibitions: BIOL2016, all intermediate BMED units
Assumed knowledge: 12cp of Junior BIOL and 12cp of Junior CHEM
Assessment: One 3-hour exam, 1 practical report, 1 project assignment (100%)

Textbook
As for BIOL2016
Zoology

BIOL2021

Course Description
This unit of study provides an overview of the functional and phylogenetic diversity of invertebrate and vertebrate animals. The material is presented within the conceptual framework of evolution, the foundation of biology.

Lectures explore the diversity of major functional systems and behaviour in the context of environmental challenges and the ecological roles of different animal groups. Laboratory classes include dissections and demonstrations of the functional anatomy of invertebrates and vertebrates, as well as experiments. This unit of study provides a suitable foundation for senior biology units of study.

Course Details
Credit points: 6
Unit Coordinator: Associate Professor Dieter Hochuli
Session: Semester 1
Classes: One 2-hour lecture and one 3-hour practical per week
Prerequisites: 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901). These requirements may be varied and students with lower averages should consult the Unit Coordinator.
Prohibitions: BIOL2011, BIOL2911, BIOL2012, BIOL2912, BIOL2021
Assumed knowledge: BIOL1002 or BIOL1902
Assessment: One 2-hour theory exam (50%), Lab book (15%), Invertebrate Collection (20%), Oral presentation (15%)

Recommended reading

BIOL2921

Course Description
The content will be based on the standard unit BIOL2021 but qualified students will participate in alternative components at a more advanced level.

Students will participate in an independent research project with a member of academic staff in the School or researchers at the Australian Museum.

Course Details
Credit points: 6
Unit Coordinator: Associate Professor Dieter Hochuli
Session: Semester 1
Classes: One 2-hour lecture and one 3-hour practical per week; one 1-hr tutorial in alternating weeks
Prerequisites: Distinction average in either 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901). These requirements may be varied and students with lower averages should consult the Unit Coordinator.
Prohibitions: BIOL2011, BIOL2911, BIOL2012, BIOL2912, BIOL2021
Assumed knowledge: BIOL1002 or BIOL1902
Assessment: One 2-hour theory exam (50%), Lab book (15%), Invertebrate Collection (20%), Oral presentation (15%)

Recommended reading
As for BIOL2021
Biology Experimental Design and Analysis

BIOL2022

Course Description
This unit provides foundational skills essential for doing research in biology and for critically judging the research of others. You will consider how biology is practiced as a quantitative, experimental and theoretical science.

It focuses on the underlying principles and practical skills required to explore questions and test hypotheses, particularly in a messy world where background variation (error) is inherently high. In so doing, it provides an understanding of how biological research is designed, analysed and interpreted using statistics.

Lectures focus on sound experimental and statistical principles, using biological examples to demonstrate concepts. In the practical sessions, students design and perform, analyse (using appropriate statistical tools) and interpret their own experiments to answer research questions in topics relevant to each student’s particular interest. This unit of study is highly recommended as a foundation for senior biology units of study.

Course Details
Credit points: 6
Unit Coordinator: Associate Professor Clare McArthur
Session: Semester 2
Classes: Two lectures per week and one 3-hour practical per week.
Prerequisites: 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901).
Prohibitions: BIOL2922, BIOL3006, BIOL3906
Assessment: Practical reports/presentations (60%), one 2-hour exam (40%)

Textbook

Recommended reading

BIOL2922

Course Description
The content will be based on the standard unit BIOL2022 but qualified students will participate in alternative components at a more advanced level.

Students will develop a greater depth of understanding of fundamental principles through a more challenging individual project, and will be expected to take a greater lead role in running research projects in the practical sessions.

Course Details
Credit points: 6
Unit Coordinator: Associate Professor Clare McArthur
Session: Semester 2
Classes: Two lectures per week and one 3-hour practical per week.
Prerequisites: Distinction average in either 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901).
These requirements may be varied and students with lower averages should consult the Unit Coordinator.
Prohibitions: BIOL2022, BIOL3006, BIOL3906
Assessment: Practical reports/presentations (60%), one 2-hour exam (40%)

Recommended reading
As for BIOL2022
Ecology and Conservation

BIOL2024

Course Description
This unit of study examines the ecological principles driving the major ecosystems of the world and ecological processes behind the world’s major conservation issues. It aims to develop in students the core foundations for an understanding of Ecology and its application in conservation.

Lectures will focus on the ecology of the major terrestrial and marine biomes of the world. Application of ecological theory and methods to practical conservation problems will be integrated throughout the unit of study. Practical sessions will provide hands-on experience in ecological sampling and data handling to understand the ecology of marine and terrestrial environments, as well as ecological simulations to understand processes. This unit of study provides a suitable foundation for senior biology units of study.

Course Details
Credit points: 6
Unit Coordinator: Professor Glenda Wardle
Session: Semester 2
Classes: Two lectures and one 3-hour practical per week.
Prerequisites: 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901).
Prohibitions: BIOL2924
Assumed knowledge: BIOL1002 or BIOL1902
Assessment: Practical reports/presentations (50%), one 2-hour exam (50%)

Recommended reading

BIOL2924

Course Description
The content will be based on the standard unit BIOL2024 but qualified students will participate in alternative components at a more advanced level.

Course Details
Credit points: 6
Unit Coordinator: Professor Glenda Wardle
Session: Semester 2
Classes: Two lectures and one 3-hour practical per week.
Prerequisites: Distinction average in either 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901). These requirements may be varied and students with lower averages should consult the Unit Coordinator.
Prohibitions: BIOL2024
Assumed knowledge: BIOL1002 or BIOL1902
Assessment: Practical reports/presentations (50%), one 2-hour exam (50%)

Recommended reading
As for BIOL2024
This unit of study brings together traditional genetic analysis and modern molecular biology to study genetics of all life forms from humans and other complex multicellular organisms through to single celled organisms such as bacteria.

Students will be introduced to complex modes of Mendelian inheritance, including those involved in human diseases. The molecular basis for different patterns of inheritance will be discussed. The interaction of genes and gene products will be illustrated by the examination of the molecular genetics of development. The application of genomics to the study of genetic variation, molecular evolution and gene function in humans and model organisms will also be described.

In the practical sessions students will investigate the genetics of a variety of prokaryotic and eukaryotic organisms in order to illustrate concepts covered in the lecture material. Students will develop familiarity and competence with equipment used in molecular genetic analysis, bioinformatics, microscopy and statistical tests.

This unit of study provides a suitable foundation for senior biology units of study, which can lead to a major in Biology, and successful completion of this unit of study is required in order to progress in the Molecular Biology and Genetics major.

Note: For students planning a Molecular Biology and Genetics major, 12cp of Junior Chemistry is required.

**Course Details**
- **Credit points:** 6
- **Unit Coordinator:** TBC
- **Session:** Semester 2
- **Classes:** Two 1-hour lectures per week, one 2-3 hour practical per week, one tutorial every second week
- **Prerequisites:** 6cp of Junior Biology and (one of MBLG1001 and MBLG1901) and 6cp of Junior Chemistry
- **Prohibitions:** MBLG2972
- **Assumed knowledge:** 12cp of Junior Chemistry

**Assessment:**
One 2-hour exam (50%), laboratory reports and quizzes (50%)

**Textbook**
Introduction to Coral Reef Biology

BIOL2020

Course Description
Available in even years (2016, 2018)
This unit covers the key biological organisms and processes in coral reef environments and linkages between them. Emphasis is given to corals, other reef associated invertebrates (e.g. echinoderms), plankton and fishes. Ecological and physiological aspects of key organisms are explored. Aspects covered include oceanography, biogeography, distribution of corals, coral bleaching and health, symbioses, the input of plankton to reefs, the role of fishes and invertebrate bio-eroders in reef environments, and impacts of environmental change on coral reef health.

The unit is well suited to students with interests in marine science and ecology, environmental sciences and broader disciplines (e.g. education, arts, and environmental law).

Contact the Biological Sciences Office for the Special Permission form to request enrolment.

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 Intermediate BIOL units of study may also be considered. This unit is only available in EVEN numbered years (e.g. 2016, 2018...).

Course Details
Credit points: 6
Unit Coordinator: Professor Maria Byrne
Session: Int
July
Classes: Lectures on campus 27-29 June; field intensive 80 hours block mode (18-23 July)

Prerequisites: 12 credit points of Junior BIOL; or 6 credit points of Junior BIOL and (MBLG1001 or MBLG1901).
Prohibitions: BIOL2920, BIOL3016, BIOL3916
Assumed knowledge: BIOL1002 or BIOL1902 and 12 credit points of Intermediate Biology
Assessment: One 1500-word essay (15%), two species portfolios (5% each) and presentation (5%), two practical reports (15% each), one 2-hour exam (40%)

Location
Great Barrier Reef, QLD.

Textbooks

BIOL2920

Course Description
Available in even years (2016, 2018)
The content will be based on the standard unit BIOL2020 but qualified students will participate in alternative components at a more advanced level.

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 Intermediate 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.

Location
As for BIOL2020

Textbooks
As for BIOL2020
Introduction to Terrestrial Field Ecology

**BIOL2009**

**Course Description**

Available in even years (2016, 2018)

This field course provides a practical introduction in the experimental analysis of terrestrial populations and assemblages. The experience is best suited to students who will continue into senior units of study in ecology. 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 other fauna 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 part of a large team, as well as conducting a research project that they design with a small group of students. Invited experts contribute to the lectures and discussions on issues relating to the ecology, conservation and management of Australia’s terrestrial flora and fauna. Contact the Biological Sciences Office for the Special Permission form to request enrolment.

**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 intermediate 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.

**Course Details**

**Credit points:** 6

**Unit Coordinator:** Professor Glenda Wardle

**Session:** Int

**July Classes:** Intensive, 6-day field course (July 17–July 22 inclusive); 4 practical classes held in weeks 1–4 of semester 2; introductory lecture in last week of semester 1.

**Prerequisites:** 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901)

**Prohibitions:** BIOL2909, BIOL3009, BIOL3909

**Assumed knowledge:** BIOL1002 or BIOL1902 and 12 credit points of Intermediate Biology Assessment:

- Two in-class quizzes (20%)
- Major research report (40%)
- Sampling project report (20%)
- Research proposal and presentation (10%)
- Data collection and analysis in teams (10%)

**Location**

Chichester State Forest and Wangat Lodge near Dungog, NSW

**Textbook**

None.

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**BIOL2909**

**Course Description**

Available in even years (2016, 2018)

This unit has the same objectives as BIOL2009 Introduction to Terrestrial Field Ecology, and is suitable for qualified students who wish to pursue certain aspects at a more advanced level.

Entry is restricted, and selection is made from the applicants on the basis of their previous performance. Students taking this unit of study will participate in alternatives to some elements of the standard course and will be required to pursue the objectives by more independent means. Specific details of this unit of study and assessment will be announced in meetings with students at the beginning of the unit.

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 intermediate 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.

**Course Details**

**Credit points:** 6

**Unit Coordinator:** Professor Glenda Wardle

**Session:** Int

**July Classes:** Intensive, 6-day field course (July 17–July 22 inclusive); 4 practical classes held in weeks 1–4 of semester 2; introductory lecture in last week of semester 1.

**Prerequisites:** Distinction average in either 12cp Junior BIOL; or 6cp Junior BIOL and (MBLG1001 or MBLG1901)

**Prohibitions:** BIOL2909, BIOL3009, BIOL3909

**Assumed knowledge:** BIOL1002 or BIOL1902 and 12 credit points of Intermediate Biology Assessment:

- Two in-class quizzes (20%)
- Major research report (40%)
- Sampling project report (20%)
- Research proposal and presentation (10%)
- Data collection and analysis in teams (10%)

**Location**

Chichester State Forest and Wangat Lodge near Dungog, NSW

**Textbook**

None.
# Additional Information

Pathways to studying biology

## Units of Study

### Junior

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<td>BIOL1001/1911/1991</td>
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<tr>
<td>Human Biology</td>
<td>BIOL1003/1903/1993</td>
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<tr>
<td>Living Systems</td>
<td>BIOL1002/1902/1992</td>
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<td>Molecular Biology and Genetics</td>
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### Intermediate

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<tr>
<td>Cell Biology</td>
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<td>BIOL2021/2921</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>Introduction to Tropical Wildlife Biology</td>
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<td>Introduction to Marine Field Ecology</td>
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### Senior

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<td>Evolution and Biodiversity</td>
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<td>Gene Technology and Genomics</td>
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<td>Developmental Genetics</td>
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<td>Ecology</td>
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<td>Marine Biology</td>
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<td>Plant Sciences</td>
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<td>Tropical Wildlife Biology</td>
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<td>Coral Reef Biology</td>
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<td>Marine Field Ecology</td>
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<td>Terrestrial Field Ecology</td>
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### Honours (optional)

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<th>Unit codes</th>
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<tr>
<td>Biology Honours</td>
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Summer Scholarships

“I had an absolute blast working in the Bee Lab! A lot of my time was spent dissecting ovaries out of bees to score their activation state and count the number of ovarioles. I’m hoping to return to this lab in the future, I enjoyed it so much!”

Melanie Vo Hoang
Summer Scholar 2013-14

The Biological Sciences Summer Research Scholarships are a great way to gain research experience and an insight into research process while working alongside leading scientific researchers from Biological Sciences.

Research projects are available for a duration of 4-6 weeks over the summer holiday period (November 2016-February 2017). Projects will be listed in July 2016 and applications will close at the end of August 2015 (please check the website for dates and to apply). Scholarships will be awarded primarily on academic performance.

Research projects are open to students who have completed Intermediate Biology (BIOL, MBLG) and who intend to undertake Senior Biology units. For the 2015-2016 summer break, each scholarship was worth $2928 (tax exempt).


“I improved my skills, my confidence and by the end of the program I felt less like a student and more like a team member”

Carolyn Samer (Summer Scholar 2014-15)
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