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Life and Environmental Sciences

Junior units
of study
2017



THE UNIVERSITY OF
SYDNEY

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Discover

School's welcome

Welcome to the School of Life and Environmental Sciences and congratulations on your entry into the University of Sydney community. We all hope that your time with us will be enjoyable and rewarding.

We offer a range of introductory junior units of study to choose from in your first year of university. These will provide you with a good grounding in biology and prepare you for second- and third-year units. If you haven't done biology before, our units will introduce you gradually to biology and help you to appreciate and understand the inner workings of life.

If you are feeling particularly out of your depth, we offer a biology bridging course, before semester one starts, to give you a kick-start into university-level biology. If you have done biology previously, our advanced level units will give you a greater depth of knowledge that will extend your understanding and challenge your ideas about biology.

You'll be taken through this journey, in large and small classes, ranging from lectures and practical classes through to workshops, tutorials

and field-trips in later years. In our classes, you'll learn about the workings of biology and how real scientists investigate life. You'll also meet new friends and establish networks who will help you in your time at the University of Sydney.

In all this, you may feel a bit lost. Please feel free to ask for help if you need it – university is a big place so help us to help you by letting us know how. There is plenty of support for you as you move through your university career – staff are always willing to answer questions, your peers are a valuable resource, and there is a range of people and resources to provide learning support if you need it.

We want you all to do well and enjoy your time with us in the Life and Environmental Sciences. Once again, congratulations on achieving a place at the University of Sydney.



How to...

Understand this booklet

Junior year = First year;

Intermediate year = Second year;

Senior year = Third year.

Unit of study = stand-alone subject taken over one semester as part of a degree course.

Credit points = value of a unit of study. All junior biology units of study are 6 credit points. A science degree requires the completion of 144 credit points, i.e. 48 credit points per full-time academic year.

Biology major = a minimum of 24 credit points from senior BIOL units of study

Choose your biology subjects

Our flagship junior-year units, **Life and evolution** (evolution, genetics and biodiversity) and **From molecules to ecosystems** (biological molecules, cell biology, animals, plants and ecology), provide you with a broad overview of key biological concepts and systems.

For those who are focused on the medical sciences, Life and evolution and From molecules to ecosystems will provide you with a firm grasp of the biology that is necessary for understanding the inner workings of cells, tissues and organisms. However you may prefer to take **Human biology**, which focuses more on human anatomy and physiology.

In **first-year**, you can take up to three units of study in junior biology: Life and evolution (BIOL1**6), From molecules to ecosystems (BIOL1**7) and Human biology (BIOL1**3).

To enter intermediate (**second-year**) units in biology (BIOL2***) you will need a pass grade in two of these junior-year BIOL units. To enter Genetics and genomics (MBLG2072), the intermediate unit in molecular biology, you will need a pass grades in one junior level BIOL unit and one junior level CHEM unit.

More information about majors in biology with more advice on unit of study selections can be found at

- sydney.edu.au/science/life-environment/study/undergraduate-courses



Catch up if you didn't study biology at high school

If you haven't completed HSC Biology (or equivalent) at school, or if you need a refresher in biology, then consider enrolling in the **Biology bridging course** that is run a few weeks before semester 1 begins.

This course is a great introduction for the university-level Life and evolution (BIOL1006) and Human biology (BIOL1003) units of study that run in first semester. The bridging course will cover the basics of cell biology, genetics, evolution, and core laboratory skills to give you a firm foundation for further study in BIOL1006 or BIOL1003.

Dates: 20 - 24 February 2017

Cost: \$360

Contact: Associate Professor Charlotte Taylor (charlotte.taylor@sydney.edu.au).

– sydney.edu.au/science/fstudent/undergrad/entry/bridging

Jump ahead if you are a high-achiever

Are you a bright high-achiever looking for an accelerated start in biological research? If you're part of the **talented student program**, you will be offered special project work that introduces you to

research activities supervised by academic staff. This will broaden your knowledge of biology, giving you insight into how biologists think and how real research projects are tackled.

Entry to the talented student program is by invitation from the Dean. To be eligible for this program you must have an ATAR score (or equivalent) of at least 99, or 90+ in at least one HSC science subject (or equivalent) and/or a mark of 95+ in HSC Mathematics extension 2. The Dean may consider minor variations to these requirements where students have demonstrated exceptional performance in scientific study (e.g. participation in an International olympiad).

Projects undertaken in the talented student program appear separately on university academic transcripts so that potential employers are aware students have undertaken the additional challenges of this program.

Please contact the talented student program coordinators, Dr Hannah Nicholas (hannah.nicholas@sydney.edu.au), Associate Professor Dieter Hochuli (dieter.hochuli@sydney.edu.au) or Professor Balwant Singh (balwant.singh@sydney.edu.au) to register your interest.

– sydney.edu.au/science/tsp

Units of study

Life and evolution

BIOL1006

Course description

Biology is an immensely diverse science. Biologists study life at all levels, from the fundamental building blocks (genes, proteins) to whole ecosystems in which myriads of species interact. Evolution is the unifying concept that runs through the life sciences, from the origin and diversification of life to understanding behaviour, to dealing with disease.

Evolution through natural selection is the framework in biology in which specific details make sense. Science builds and organises knowledge of life and evolution in the form of testable hypotheses.

This unit will explore how new species, diseases and parasites continue to arise while others go extinct and discuss the role of mutations as the raw material on which selection acts. It will also explain how information is transferred between generations through DNA, RNA and proteins, transformations which affect all aspects of biological form and function.

You will participate in inquiry-led practical classes integrating Life and evolution concepts. By doing this unit of study, you will develop the

ability to examine novel biological systems and understand the complex processes that have shaped those systems and organisms into what they are today.

Course details

Credit points: 6

Unit Coordinator: Associate Professor Charlotte Taylor (charlotte.taylor@sydney.edu.au)

Session: Semester 1

Classes: two 1-hour lectures per week, online material and twelve 3-hour practicals

Prohibitions: BIOL1001, BIOL1911, BIOL1991, BIOL1906, BIOL1996

Assumed knowledge: HSC Biology (or equivalent). Students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology bridging course in February, (see page 5)

Assessment: Practical ePortfolio (10%), during semester exams (20%), communication (30%), summative final exam (40%)

Textbook

- See unit outline on learning management system

BIOL1906

Course description

Life and evolution (Advanced) has the same overall structure as BIOL1006 but material is discussed in greater detail and at a more advanced level.

Students enrolled in BIOL1906 participate in alternative components. The content and nature of these components may vary from year to year.

Course details

Credit points: 6

Unit Coordinator: Associate Professor Charlotte Taylor (charlotte.taylor@sydney.edu.au)

Session: Semester 1

Classes: two 1-hour lectures per week, online material and twelve 3-hour practicals

Assumed knowledge: 85+ in HSC Biology (or equivalent)

Prohibitions: BIOL1001, BIOL1911, BIOL1991, BIOL1006, BIOL1996

Assessment: Practical ePortfolio (10%), during semester exams (20%), communication (30%), summative final exam (40%)

Textbook

- See unit outline on learning management system



BIOL1996

Course description

Entry to the Special studies program in Life and evolution is restricted to students who have done exceptionally well in their HSC and/or have shown extraordinary aptitude in biology.

The practical work syllabus for BIOL1996 is different to BIOL1906 (Advanced) and consists of a special project-based laboratory.

Textbooks

- See unit outline on learning management system

Course details

Credit points: 6

Unit Coordinator: Associate Professor Nathan Lo
(nathan.lo@sydney.edu.au)

Session: Semester 1

Classes: two 1-hour lectures per week, online material and 30-36 hours of practicals

Assumed knowledge: 90+ in HSC Biology (or equivalent)

Prohibitions: BIOL1001, BIOL1911, BIOL1991, BIOL1006, BIOL1906

Assessment: practical (60%) (comprised of two practical reports, laboratory note book and seminar presentation); final summative exam (40%) as per BIOL1906



Human biology

BIOL1003

Course description

This unit of study provides an introduction to human anatomy and physiology. It includes an overview of cell and tissue structures, the skeletal system, nutrition, digestion and excretion.

Human biology looks at how our bodies respond to environmental stimuli with respect to the endocrine, nervous and immune systems. After discussion of reproduction and development, it concludes with an overview of modern studies in human genetics.

This unit has four main components: lectures, practicals, workshops and online activities.

Textbook

- Van Putte C, Regan J and Russo AF (2015). Seeley's Essentials of Anatomy & Physiology, 9th edition. McGraw Hill.
The edition comes with a custom publication of Mader SS and Windelspecht M (2015). Human Biology, 14th edition.

Course details

Credit points: 6

Unit Coordinator: Dr Osu Lilje (osu.lilje@sydney.edu.au)

Session: Semester 1

Classes: two to three 1-hour lectures per week, one 3-hour practical per fortnight, 6-9 hours of online activities per fortnight and one 2 hour workshop per fortnight

Assumed knowledge: HSC Biology (or equivalent). Students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology bridging course (in February, see page 5)

Prohibitions: BIOL1903, BIOL1993

Assessment: one 2-hour exam, assignment, group project presentation and quizzes (100%)

BIOL1903

Course description

This unit of study has the same overall structure as BIOL1003 but material is discussed in greater detail and at a more advanced level. Students enrolled in BIOL1903 participate in alternative components, e.g. guest lecture series and practical classes. The content and nature of these components may vary from year to year.

Course details

Credit points: 6

Unit Coordinator: Dr Osu Lilje (osu.lilje@sydney.edu.au)

Session: Semester 1

Classes: two to three 1-hour lectures per week, one 3-hour practical per fortnight, 6-9 hours of online activities per fortnight and one 2 hour workshop per fortnight

Assumed knowledge: 85+ in HSC Biology (or equivalent)

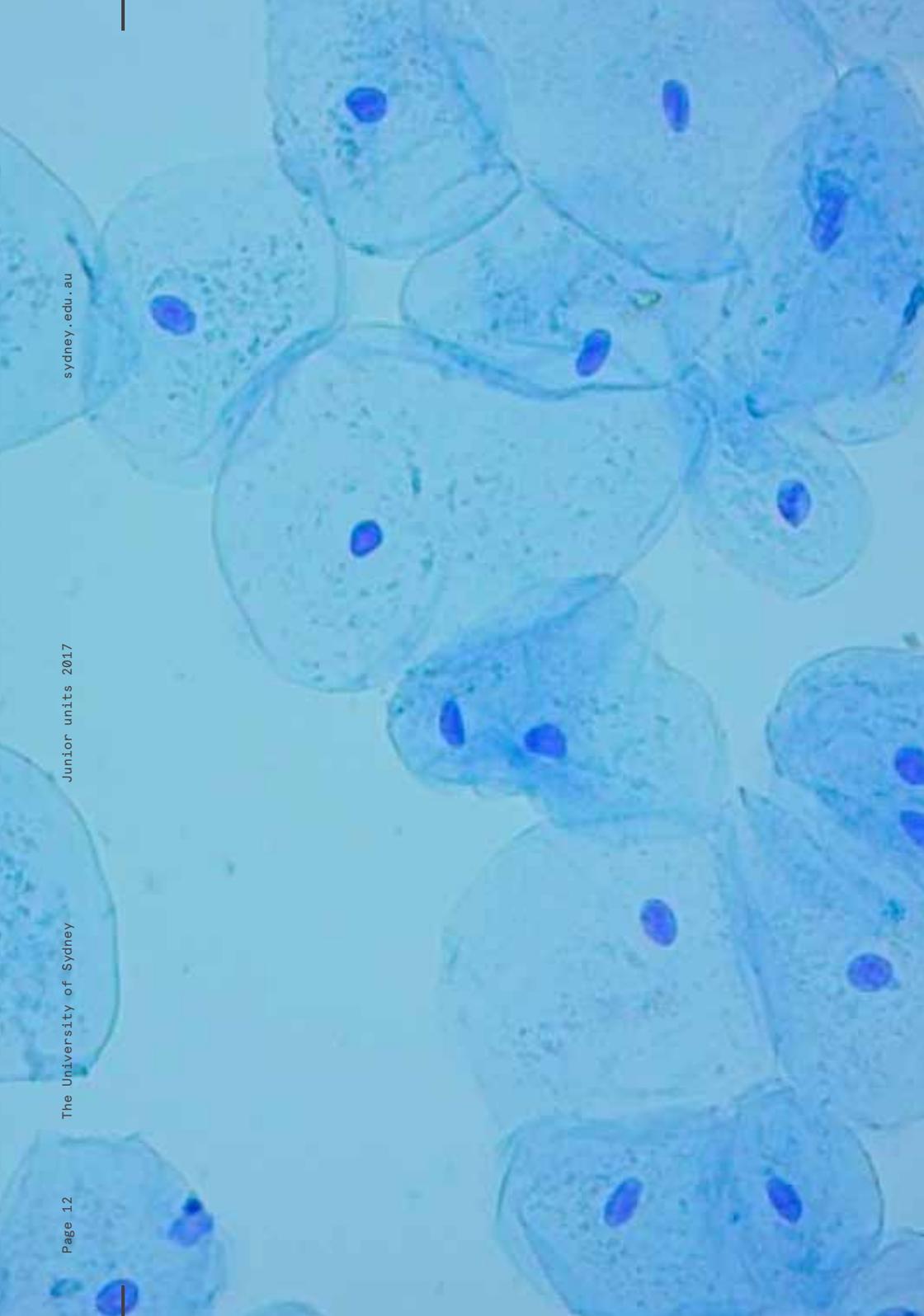
Prohibitions: BIOL1003, BIOL1993

Assessment: One 2-hour exam, assignment, group project presentation, quizzes and independent project (oral and written) (100%)

Textbook

As for BIOL1003





BIOL1993

Course description

Entry to Special studies program in Human biology is restricted to students who have done exceptionally well in their HSC and/or have shown extraordinary aptitude in biology.

The practical work for BIOL1993 is very different from that of BIOL1903 (Advanced) and consists of special project-based laboratory exercises.

Course details

Credit points: 6

Unit Coordinator: Professor Simon Ho (simon.ho@sydney.edu.au)

Session: Semester 1

Classes: lectures as for BIOL1903.

One 3-hour practical per week

Assumed knowledge: 90+ in HSC Biology (or equivalent) or 85 or above in any junior biology unit.

Prohibitions: BIOL1003, BIOL1903, BIOL1991

Assessment: one 2-hour exam (50%), practical reports (25%), seminar presentation (15%), laboratory note book (5%), and pre-laboratory quizzes (5%)

Textbooks

- Van Putte C, Regan J and Russo AF (2015). Seeley's Essentials of Anatomy & Physiology, 9th edition. McGraw Hill.
The edition comes with a custom publication of Mader SS and Windelspecht M (2015). Human Biology, 14th edition.
- Sanders MF and Bowman JL (2012). Genetic Analysis: An Integrated Approach. Benjamin Cummings, Boston
- Bromham L (2008). Reading the story in DNA: a beginner's guide to molecular evolution. Oxford University Press, US.

From molecules to ecosystems

BIOL1007

Course description

Paradigm shifts in biology have changed the emphasis from single biomolecule studies to complex systems of biomolecules, cells and their interrelationships in ecosystems of life. Such an integrated understanding of cells, biomolecules and ecosystems is key to innovations in biology.

Life relies on organisation, communication, responsiveness and regulation at every level.

Understanding biological mechanisms, improving human health and addressing the impact of human activity are the great challenges of the 21st century.

This unit will investigate life at levels ranging from cells, and biomolecule ecosystems, through to complex natural and human ecosystems.

You will explore the importance of homeostasis in health and the triggers that lead to disease and death.

You will learn the methods of cellular, biomolecular, microbial and ecological investigation that allow us to understand life and discover how expanding tools have improved our capacity to manage and intervene in ecosystems for our own health and

organisms in the environment that surround and support us.

You will participate in inquiry-led practicals that reinforce the concepts in the unit. By doing this unit you will develop knowledge and skills that will enable you to play a role in finding global solutions that will impact our lives.

Course details

Credit points: 6

Unit Coordinator: Professor Pauline Ross (pauline.ross@sydney.edu.au)

Session: Semester 2

Classes: two 1-hour lectures per week, online material and twelve 3-hour practicals

Assumed knowledge: HSC Biology (or equivalent). Students who have not completed HSC Biology (or equivalent) are strongly advised to take the Biology bridging course (in February, see page 5)

Prohibitions: BIOL1907, BIOL1997

Assessment: practical (50%), summative final exam (50%)

Textbook

- See unit outline on learning management system

BIOL1907

Course description

From molecules to ecosystems (Advanced) has the same overall structure as BIOL1007 but material is discussed in greater detail and at a more advanced level. The content and nature of these components may vary from year to year.

Textbook

- See unit outline on learning management system

Course details

Credit points: 6

Unit Coordinator: Professor Pauline Ross (pauline.ross@sydney.edu.au)

Session: Semester 2

Classes: two 1-hour lectures per week, online material and twelve 3-hour practicals

Assumed knowledge: 85+ in HSC Biology (or equivalent)

Prohibitions: BIOL1007, BIOL1997

Assessment: summative exam (50%), practical component which may include independent or group project (50%)



BIOL1997

Course description

The same theory will be covered as in the advanced stream (BIOL1907) but in this Special Studies unit of study, the practical component is a research project.

The research will be either a synthetic biology project investigating genetically engineered organisms or organismal/ecosystems biology.

Students will have the opportunity to develop higher level generic skills in computing, communication, critical analysis, problem solving, data analysis and experimental design.

Textbook

- See unit outline on learning management system

Course details

Credit points: 6

Unit Coordinator: Professor Pauline Ross (pauline.ross@sydney.edu.au)

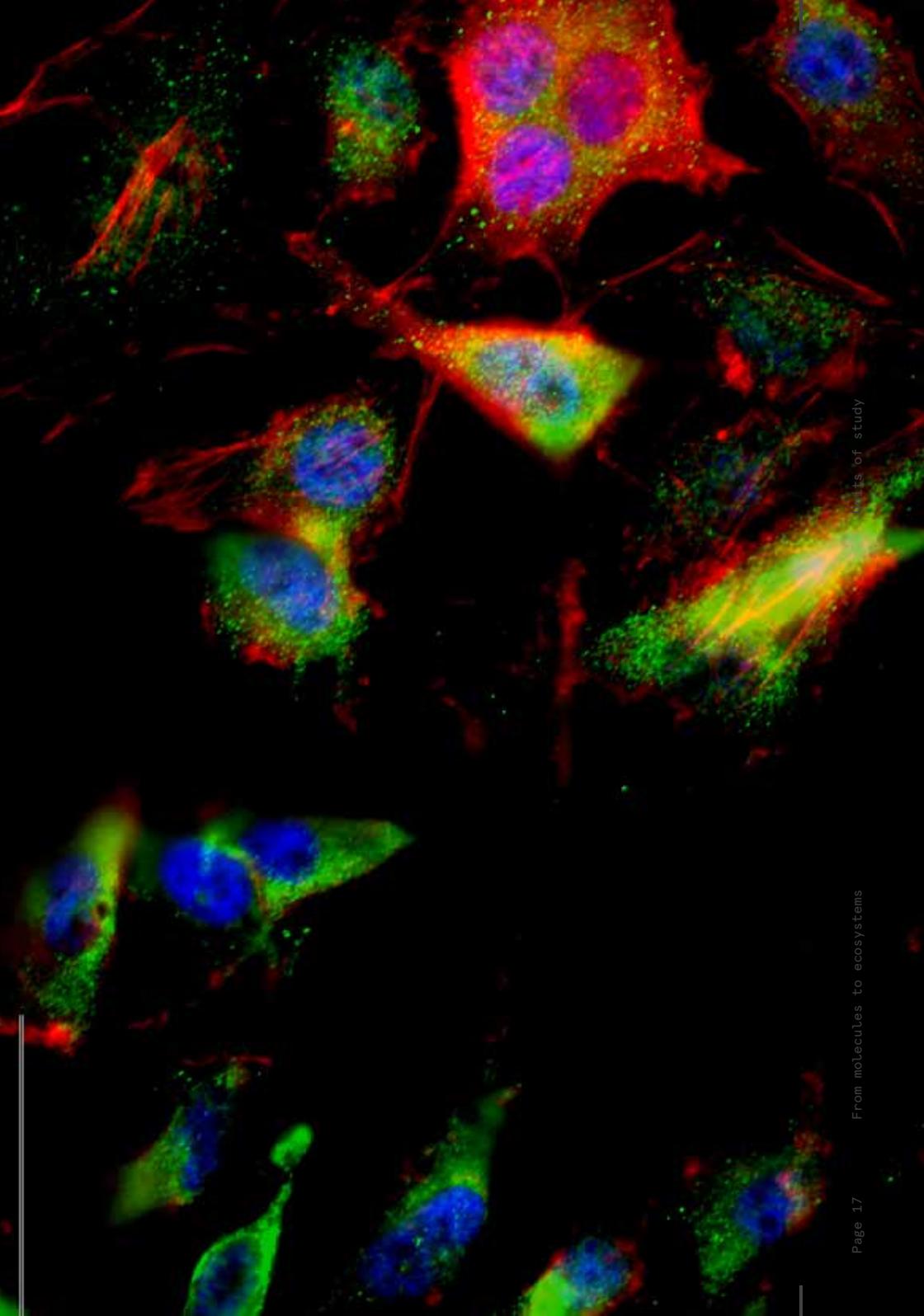
Session: Semester 2

Classes: two lectures per week, online material and practical work as advised and required by the project, approximately 30-36 hours of research project in the laboratory or field

Assumed knowledge: 90+ in HSC biology (or equivalent).

Prohibitions: BIOL1007, BIOL1907

Assessment: one 2-hour exam (50%); project report (50%) which includes written report and presentation



Additional information

Getting started

Here we have summarised the most important things you need to know coming into your first-year units with us. More in-depth information can be found on our website and from the university's eLearning system, once you are enrolled.

- sydney.edu.au/science/life-environment/study

eLearning at Sydney University

Before the first week of semester, you will be provided access to the University's learning management system (called Blackboard). This is where most of the resources for your units will be placed, including lecture notes and recordings, practical information, course and assessment resources, and advice on what to do if you are ill and cannot attend a class. Be sure to check this site daily!

- elearning.sydney.edu.au

Your university email is another avenue of official communication. All email information that comes from unit co-ordinators goes to this address. Make sure you check this daily as well.

Your classes are timetabled into your personalised timetable. You need to attend all the classes that are timetabled for you. Updates or last-minute changes to classes

will be posted on Blackboard. The University has attendance requirements that need to be met, but more fundamentally, you won't learn if you're not in class! Please attend your timetabled sessions – we have carefully placed you into your timeslots.

Textbooks and course notes/lab manuals

are available from the Co-op Bookshop, located close to the Sports and Aquatic Centre, or online from PublishPartner. More details will be provided before the start of semester.

- coop-bookshop.com.au
- publishpartner.com.au/students/

Lectures are in large venues where you will learn from leaders in the field of biology. Make sure you attend all your timetabled lectures and do any necessary preparation beforehand. Lectures are often fast-paced (but all are recorded) so be ready for some rapid thinking.

Practical classes are an integral part of our courses – you *learn* science primarily by doing science. Practical classes are small and you get to know a lot of people through them. Make sure you attend all of your timetabled practical classes and do any necessary preparation beforehand. Venues are typically

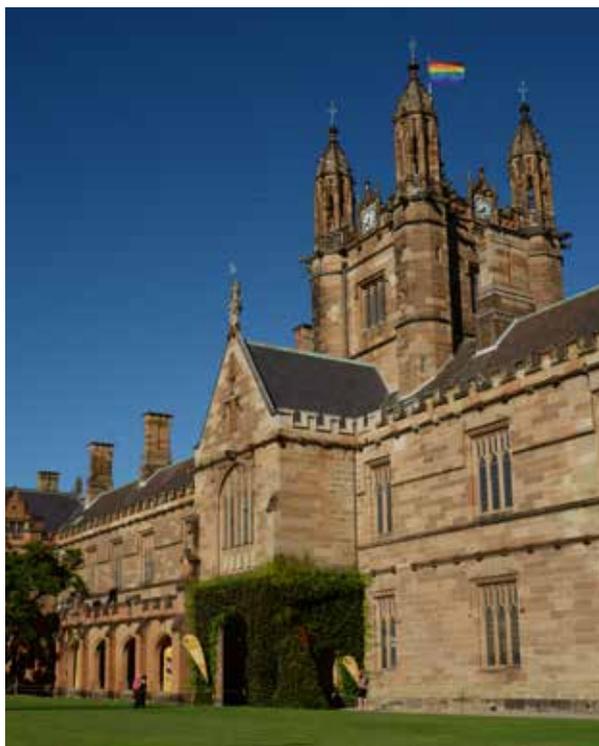
listed on your timetable, but last-minute changes or other updates will be posted on Blackboard. You need to **wear a lab coat** (you can purchase one from the campus store in the Holme building) and **closed-in shoes** (that fully enclose your feet and cover the tops of your feet). You will be advised of any other requirements in the first week's lab class.

Stressed and need a place to relax?

Need to work with friends on a project, or access computers and microscopes outside of class?

We provide a student lounge, in room 507 on level 5 of the Carslaw

building, for you to use for study and to relax with friends. There are internet-enabled computers and microscopes in this room, and you can borrow textbooks and other materials from the nearby Life and Environmental Sciences enquiries office for use in the *Lizard lounge*. The lounge is open from 9am – 4.30pm Mondays to Thursdays, and 9am – 12noon on Friday.



Student experience

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/SOLESVolunteers](https://www.facebook.com/SOLESVolunteers)

Join a student society

BioSoc is a student society dedicated to fostering biological activities and interests for biology students and the wider community.

The society organises social events throughout the year including lunchtime BBQs, cocktail parties, bush walks and trips to the school's field station on the Central Coast.

Come along, bring a friend, and get involved! Keep an eye out for announcements for upcoming BioSoc events and meetings.

- [facebook.com/groups/usydbiosoc](https://www.facebook.com/groups/usydbiosoc)

Summer scholarships

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

Research projects are available for a duration of 4-6 weeks over the summer holiday period (eg. November 2017-February 2018). Projects will be listed in July 2017 and applications will close at the end of August 2017 (please check the website for dates and to apply). Scholarships will be awarded primarily on academic performance.

- sydney.edu.au/science/life-environment/study/scholarships



“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 alumni)

Why study life and environmental sciences?

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

**[sydney.edu.au/science/
life-environment/study](http://sydney.edu.au/science/life-environment/study)**

School of Life and Environmental Sciences

sydney.edu.au/science/life-environment

+61 2 93515819

soles.teaching@sydney.edu.au