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School of Life and  
Environmental  
Sciences

# Honours 2020

## Which question will you tackle?

# Investigate life

## Which question will you tackle?



## Discover

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# Why do Honours?

If you are looking to improve your career prospects, open the door to further academic study, or simply indulge a passion, then honours is your next step.

For some students, an honours year is an introduction to further academic research with many using it as a pathway to undertake a PhD.

For others, it is a stepping stone to an interesting career in science and an opportunity to extend your knowledge on a topic of interest.

Today's job market for scientific positions is very competitive. In fact, many entry level positions now require an honours degree.

Our honours graduates find employment in a wide variety of fields - including federal and state government departments and agencies and non-government organisations within medical, environmental and conservation areas. They tell us that the skills they learned in verbal and written communication and critical analysis of issues along with their broader scientific knowledge have been crucial to them in their work.

Others enter environmental consultancy companies, pharmaceutical companies,

zoos, museums, hospitals or research institutions such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Honours is a challenging year, but students look back on it as a very rewarding period in their life.

## Course objectives

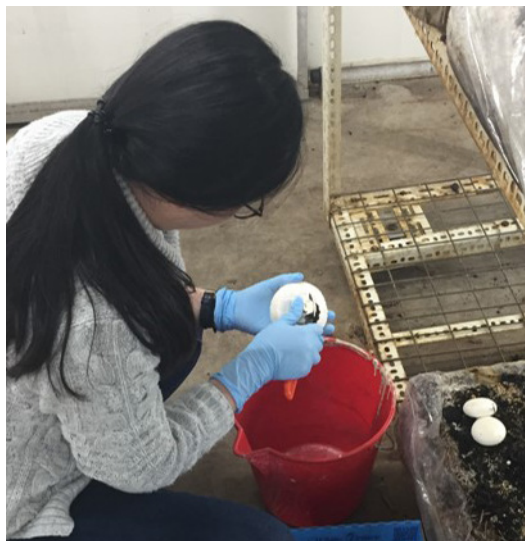
- train students to carry out independent research;
- enable students to develop a specialist understanding of one area of science;
- integrate specialist knowledge into a broad appreciation of life and environmental sciences;
- enable students to use skills in research methodology and philosophy; and
- continue to engender and encourage enthusiasm and curiosity in science.



"For my honours project I explored how the nitrifying bacteria in compost affect the growth of the common button mushroom *Agaricus bisporus*. It has been very interesting to observe how microorganisms behave in their natural environment as opposed to inside the laboratory."

**Shang-Yu Shueh**

Microbiology Honours student 2017





# How to Qualify for Honours

## Qualify for honours

The Faculty of Science requires that to enrol in an honours unit of study you must have satisfied all the requirements for a pass degree and be considered by the School and the Faculty to have the required knowledge and aptitude to undertake an honours course.

To qualify for honours you also must have provisional acceptance of project supervision by at least one academic in the School of Life and Environmental Sciences.

Specific additional academic requirements for biology honours are:

- a minimum of 24 credit points of senior units of study relating to the intended honours area in biology;
- a minimum SCIWAM (science weighted average mark) of 65 for all intermediate and senior units of study attempted

Specific additional academic requirements for biochemistry and microbiology honours are:

- a minimum of 24 completed credit points of senior units of study relating to the intended honours area in biochemistry or microbiology;

- either a credit average in 48 credit points of relevant intermediate and senior units of study or a SCIWAM of at least 65

Graduates from other Australian Universities: The minimum requirement for acceptance into the honours program is SCIWAM of 65. The Faculty of Science will calculate your SCIWAM after you have applied. Otherwise, the requirements for application are the same as for graduates from the University of Sydney.

International students: The International Office will assess your academic record and advise whether it is equivalent to a pass degree from the University of Sydney, at the level required for entry into Honours.

## Apply for honours

Step 1: Find a project and supervisor. Get confirmation from your potential supervisor(s) that they are willing to supervise you.

Step 2: Submit your supervisor details to SOLES.

- For internal students: visit [canvas.sydney.edu.au/courses/7931/pages/honours](https://canvas.sydney.edu.au/courses/7931/pages/honours)
- For external students: email [soles.education@sydney.edu.au](mailto:soles.education@sydney.edu.au)

Step 3: For domestic students submit the Faculty of Science Honours application;

- [sydney.edu.au/courses/courses/uc/bachelor-of-science-honours.html](https://sydney.edu.au/courses/courses/uc/bachelor-of-science-honours.html)

For internal (currently enrolled) international students, submit the Faculty of Science Honours application (above) and also submit an international undergraduate student application form to the International Office for visa processing. Part-time enrolment is not available for international students.

For external international students, contact the appropriate Honours Coordinator (details on page 9 and 11 of this guide) before applying through the International Office. You will need to provide evidence in your application form that you have secured an academic contact/supervisor. You must complete an international undergraduate student application form and lodge this from at the International Office. Part-time enrolment is not available for international students.

## Application deadlines

For semester 1, 2020 applications, the last day for lodging your Step 2 application with the School is



Image credit (above): Matthew Withers

**28 November 2019.** The last day for lodging your Step 3 application with the Faculty is **29 November 2019.** The Faculty will contact you in mid December 2019 to confirm your offer.

Deadlines for semester 2, 2020 applications are yet to be determined. Please check the website:

- [canvas.sydney.edu.au/courses/7931/pages/honours](https://canvas.sydney.edu.au/courses/7931/pages/honours)

The closing date for University of Sydney honours scholarships is January 2020 (exact date to be confirmed).

- [sydney.edu.au/scholarships/prospective/honours](https://sydney.edu.au/scholarships/prospective/honours)

## Contact

SOLES Education  
[soles.education@sydney.edu.au](mailto:soles.education@sydney.edu.au)

# How to Qualify for Honours

## Choose a supervisor

Talk to them!

- Firstly, read through the following pages to find supervisors whose research interests you. Check out the projects online too as there may be more detail or additional project options.
- Email or phone supervisors whose research interests you to set up a meeting.
- Next, come prepared with some questions about their research programs, and be prepared to answer questions about your interests and future plans.
- Finally, speak to more than one potential supervisor. A personality match between supervisor and student is almost as important as a matched interest in an area of science!

## Meet academics and current students

Join us at the 'Meet a supervisor' event on Tuesday 10 September 2019 from 4:30pm - 6pm at the LEES Building Foyer. Chat with academics and current students in this informal setting and enjoy some drinks and nibbles.







Image credit (above): Matthew Withers

Image credit (left): Aaron Greenville

"Honours was a fantastic year! For me, it was a great opportunity to work in a remote part of Australia on some really cool wildlife. It was also a very rewarding experience in which I learnt so much, not just about my specific topic area, but it also gave me greater insight into the research process and what it involves."

**Tamara Potter**

Biology Honours Student 2016/17



How to Qualify for Honours

Page 7

# Course details - biology

## Outline

Honours students in biology are required to:

- undertake a major research project under the supervision of an academic member of staff;
- write a thesis based on this research;
- present an introductory and final seminar describing their work;
- undertake research skills training, including how to design experiments and perform appropriate statistical analyses; and
- attend weekly school seminars

## Assessment

A majority of your final mark, 80%, comes from your thesis. Your thesis is comprised of original research which through the guidance of your supervisor you have developed, carried out, and written up. Your thesis will be assessed by three academics, usually within the life and environmental sciences.

The coursework component is the smallest component, comprising only 20% of the final mark. This includes your research and development proposal (7.5%), experimental design assessment (5%) and opinion article (7.5%).

## Calendar

You can begin honours in either semester, but be aware that honours starts before the regular semester. You should discuss which semester you should start honours with your supervisor, as many projects have field work that can only be done during certain times of the year.

Starting dates will be confirmed when you get your letter of offer.

- Early February (Semester 1 entry) or Late July (Semester 2 entry): Honours commences with an orientation day (mandatory). Please note: there are compulsory workshops on several days for the first six weeks.
- Early March (or late August): submission of written project proposal
- Late February (or mid-August): project proposal oral presentation
- Early April (or mid-September): submission of opinion article
- Mid-August (or mid-February): end of experimental work
- Mid-September (or mid-March): final seminar
- Mid-October (or mid-April): submission of thesis

## Course codes

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Biology honours:  
BIOL4012, BIOL4013, BIOL4014,  
BIOL4015 and BIOL4016

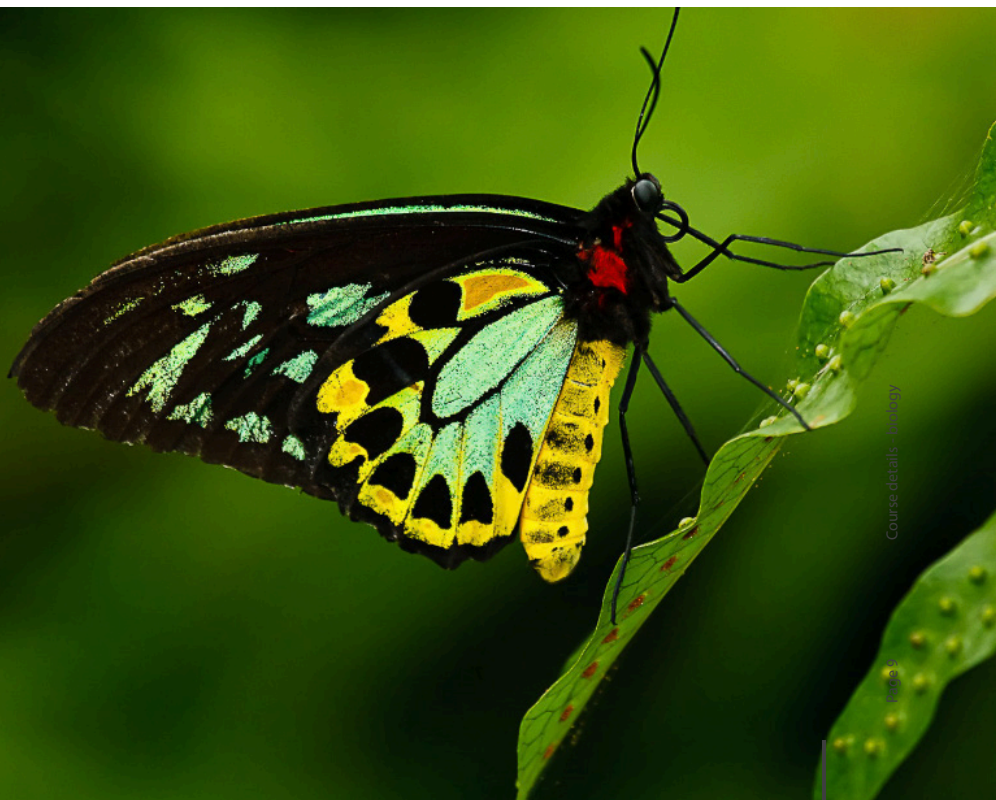
## Coordinator

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Professor Ashley Ward  
Room 324, Heydon-Laurence  
Building (A08)  
The University of Sydney  
E [ashley.ward@sydney.edu.au](mailto:ashley.ward@sydney.edu.au)  
T (02) 9351 4778



Image credit (below and above): Aaron Greenville





# Course details - biochemistry and microbiology

## Outline

Honours students in biochemistry and microbiology are inducted into a joint program.

Students are required to:

- undertake a major research project under the supervision of an academic member of staff;
- write a thesis based on this research;
- present an introductory and final seminar describing their work;
- undertake research skills training involving six tutorials and an examination; and
- attend the weekly school seminar

## Assessment

Your research thesis (65%) is expected to be approximately 50 pages in length (<12,000 words). You will also undertake a short (20-30 minute) oral examination to defend your research.

You will present a final seminar (10%) of approximately 20 minutes describing the aims of your project, the results you obtained, and the significance of the results in the context of the published literature.

The research skills training task (25%) consists of approximately six

2-hour tutorials run by the honours committee in small groups of six to ten students. In these tutorials, each student will be assigned a scientific paper and will run a discussion amongst the group on that manuscript. You will be assessed on your presentation as well as your participation in the group discussions. In the final examination, you receive a scientific paper and are required to write an appraisal of that paper, highlighting your opinions of the research described.

## Calendar

- Early February: honours commences and orientation day. Please note: orientation day is compulsory for all students. The day will include information on laboratory safety, computer usage and safety within the school.
- Mid-February: submission of written project proposal
- Late February: project proposal oral presentation
- Late April until early June: coursework tutorials and examination
- Late July: progress presentation
- Mid-October: submission of thesis
- Late October: final oral presentation and oral examination

## Course codes

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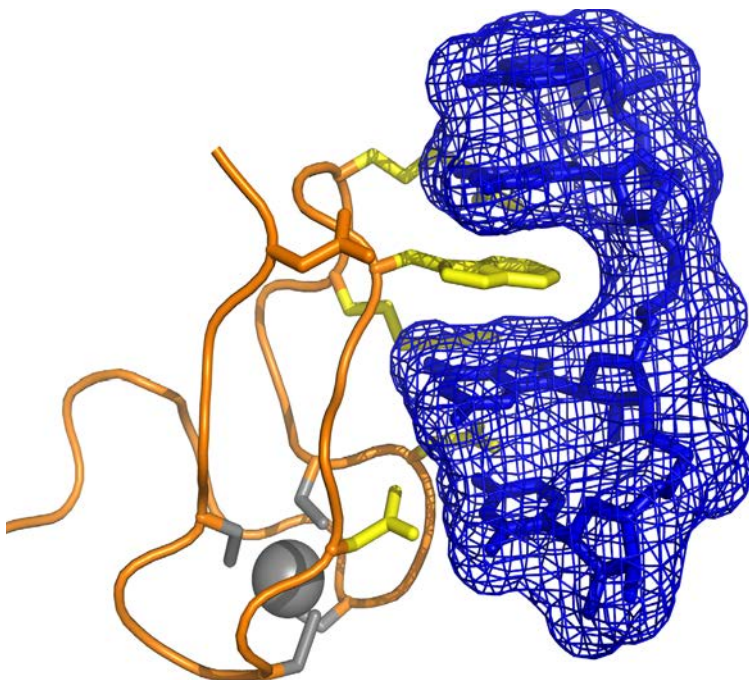
Biochemistry honours:  
BCHM4011, BCHM4012, BCHM4013  
and BCHM4014

Microbiology honours:  
MICR4011, MICR4012, MICR4013 and  
MICR4014

## Coordinator

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Associate Professor Andrew Holmes  
Level 4 East, Charles Perkins Centre  
Bldg D17  
The University of Sydney  
T +61 2 9351 2530  
E [andrew.holmes@sydney.edu.au](mailto:andrew.holmes@sydney.edu.au)





# Academic directory

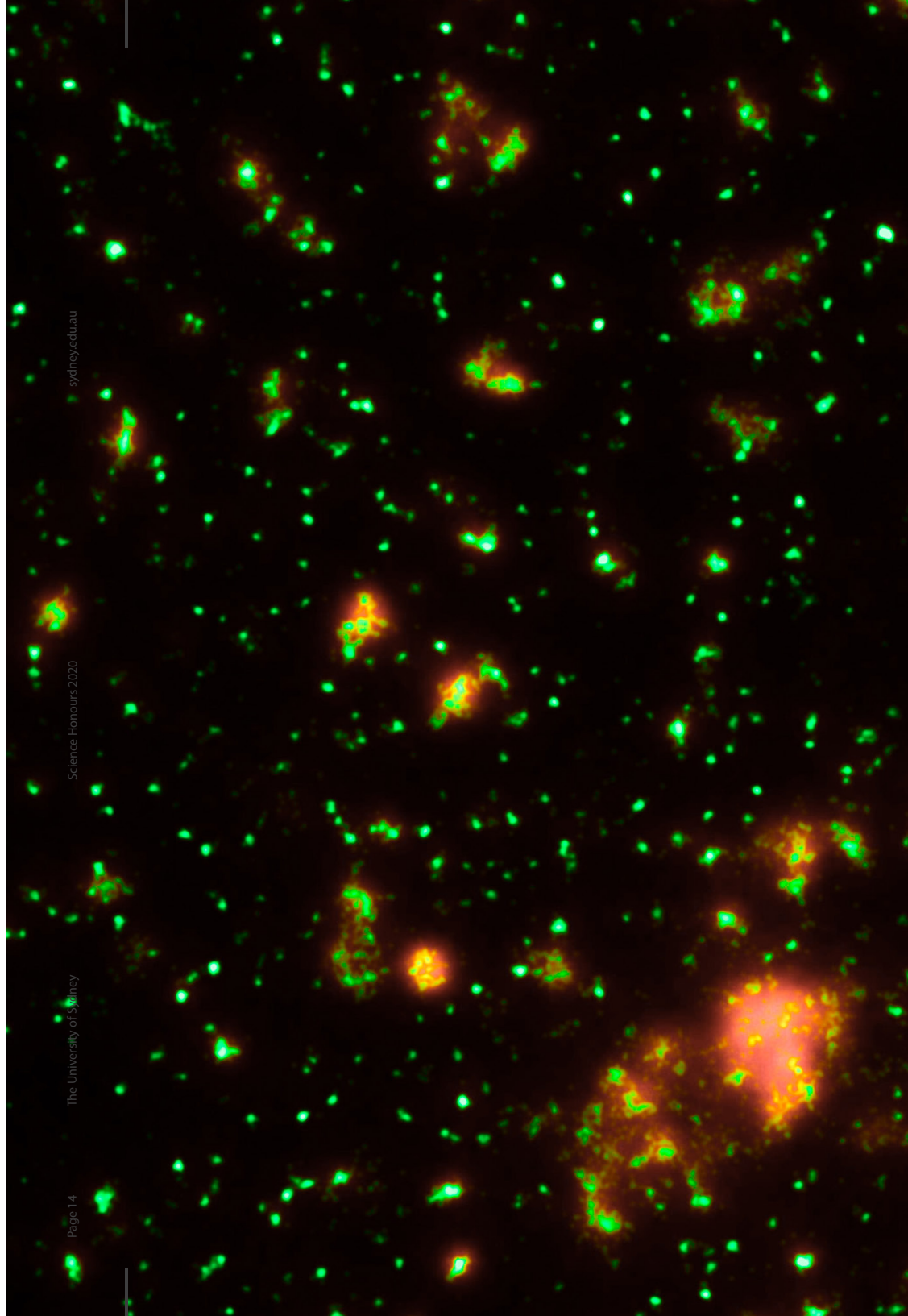
## Find your supervisor here

You will work with world-class scientists and scientific infrastructure. You will learn a multitude of new skills, and discover how excellent research is done.

### Biology

Page	Name	Research area
18	Peter Banks	conservation, ecology, animal behaviour
19	Joy Becker	biology
19	Kim Bell-Anderson	nutrition, metabolism
20	Kathy Belov	immunogenetics, conservation genetics
21	Ana Bugnot	marine ecology, restoration
21	Maria Byrne	developmental and marine biology
22	Mary Byrne	molecular biology, genetics
24	Nadine Chapman	biology
25	Min Chen	plant molecular biology
26	Ross Coleman	marine biology, ecology, animal behaviour
28	Angela Crean	biology
28	Mathew Crowther	ecology, conservation
29	Mark de Bruyn	ecology, evolutionary biology, conservation
30	Chris Dickman	ecology
31	Will Figueira	marine biology, conservation
32	Ros Gloag	evolution, genetics, animal behaviour
33	Aaron Greenville	biology
34	Catherine Grueber	population genetics, conservation

36	Murray Henwood	phylogenetics, systematics
36	Catherine Herbert	wildlife management
37	Simon Ho	phylogenetics, evolutionary genetics
37	Dieter Hochuli	ecology, conservation, animal behaviour
39	Lachlan Ingram	biology
40	Brian Jones	molecular genetics, reproductive development
43	Tanya Latty	animal behaviour, ecology
44	Osu Lilje	physiological ecology
44	Nathan Lo	phylogenetics, evolutionary genetics
47	Ziggy Marzinelli	marine ecology and restoration
48	Clare McArthur	behavioural ecology, conservation
49	Thomas Newsome	microbiology or biochemistry
51	Catherine Price	biology
51	Matthew Pye	botany, biology education research
52	Rosanne Quinnell	science education
52	David Raubenheimer	nutrition, ecology, conservation
54	Emily Remnant	genetics, evolution and viruses
55	Pauline Ross	molluscs, resilience
55	Guy Roth	biology
56	Frank Seebacher	physiological ecology, animal behaviour
57	Alistair Senior	biology, biochemistry and microbiology
59	Brigitte Sommer	biology
59	Murray Thomson	physiological ecology, marine biology
61	Ashley Ward	animal behaviour
62	Glenda Wardle	ecology, evolution
62	Charles Warren	plant function, ecology
63	Thomas White	animal behaviour, evolution
64	Camilla Whittington	evolutionary genetics, development



## Microbiology

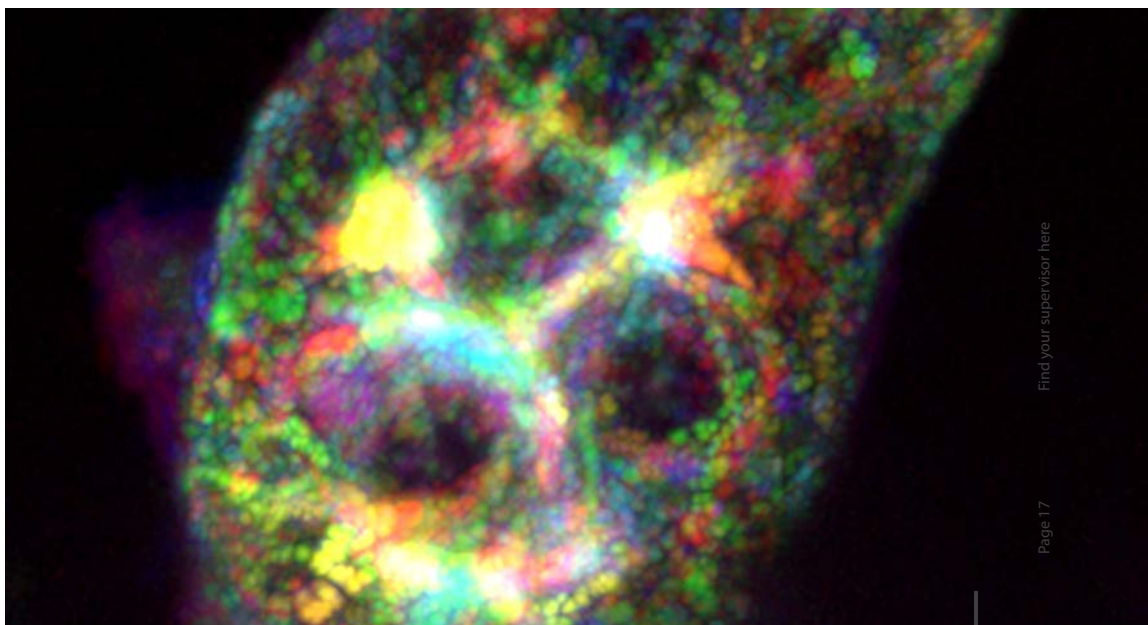
Page	Name	Research area
19	Joy Becker	microbiology
22	Mary Byrne	molecular biology, genetics
23	Dee Carter	fungi, evolution, genetics
24	Alex Chaves	microbiology
26	Nick Coleman	biotechnology, biodegradation
27	Stuart Cordwell	proteomics, human health
32	Neville Firth	molecular microbiology, antibiotic resistance
33	Merran Govendir	microbiology
34	David Guest	microbiology
35	Ruth Hall	antibiotic resistance, genetics
38	Andrew Holmes	nutrition, human health, gut microbes
41	Michael Kertesz	soil microbes, plant-microbe interactions
44	Osu Lilje	physiological ecology
47	Ziggy Marzinelli	marine microbiomes
50	Timothy Newsome	viral genetics
53	Mark Read	computational microbiology, immunology
54	Peter Reeves	genetics, biosynthesis
57	Alistair Senior	biology, biochemistry and microbiology
58	Erin Shanahan	microbiome, gut health and bowel cancer

## Biochemistry

Page	Name	Research area
18	Alyson Ashe	molecular biology, genetics
19	Kim Bell-Anderson	nutrition, metabolism
20	Jennie Brand-Miller	nutrition, metabolism
22	Mary Byrne	molecular biology, genetics
22	Iain Campbell	molecular biology, genetics
23	Leslie Caron	biochemistry
23	Dee Carter	fungi, evolution, genetics
25	Min Chen	plant molecular biology
25	Tara Christie	biochemistry
27	Arthur Conigrave	nutrition, metabolism
57	Stuart Cordwell	biochemistry, cell biology
29	Gareth Denyer	molecular biology, genetics
30	Sandro Fernandes Ataide	structural biology
32	Neville Firth	molecular microbiology, antibiotic resistance
34	David Guest	biochemistry
35	Marcus Heisler	plant development
38	Markus Hofer	molecular biology, genetics
38	Andrew Holmes	microbiology
39	David James	nutrition, metabolism
40	Melkam Kebede	nutrition, metabolism
41	Ali Khoddami	biochemistry
42	Sergey Kurdyukov	biochemistry and biology
42	Ann Kwan	structural biology
43	Mark Larance	nutrition, proteomics



45	Lipin Loo	biochemistry
45	Joel Mackay	structural biology
47	Jacqui Matthew	structural biology
48	Arjun Muralidaran	biochemistry
49	Greg Neely	behavioural genetics, sensory perception
50	Timothy Newsome	microbiology and biochemistry
50	Benjamin Parker	proteomics, biochemistry and metabolism
53	Mark Read	computational microbiology, immunology
56	Jenny Saleeba	genetics, molecular biology
57	Alistair Senior	biochemistry, biology and microbiology
58	Samantha Solon-Biet	nutrition, metabolism
59	Murray Thomson	physiological ecology, marine biology
61	Jibran Wali	nutrition, metabolism, diabetes/obesity
63	Anthony Weiss	proteomics, biotechnology
64	Giselle Yeo	biochemistry



# Supervisors and projects

## Which question will you tackle?

Dr Alyson Ashe

[alyson.ashe@sydney.edu.au](mailto:alyson.ashe@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

We study epigenetic regulation of gene expression – the interplay between the environment that an organism encounters during its lifetime, and the expression patterns of its genes. Importantly, these environmental signals can sometimes get passed between generations (Darwin was wrong!), and we are trying to understand how this occurs.

### Projects

- In vitro labelling of nascent RNA molecules
- A forward genetic screen for genes involved in male fertility and epigenetic inheritance
- Investigating the mechanism of transgenerational epigenetic inheritance. (with Prof Joel Mackay)



Professor Peter Banks

[peter.banks@sydney.edu.au](mailto:peter.banks@sydney.edu.au)

Honours stream: Biology

### Research interests

My research focuses on the behavioural ecology of Australian wildlife and aims to develop ecologically-based solutions to conservation problems. I am interested in invasive species, urban wildlife and the ecology of chemical communication. I work mainly with mammals, including bats, and most of our work is field based and involves manipulative experiments.

### Projects

- Reducing mice damage to wheat crops using chemical camouflage
- Training predators to recognise novel invasive prey and prevent invasions
- Habitat selection by introduced rats across the urban:bushland divide



## Associate Professor Joy Becker

[joy.becker@sydney.edu.au](mailto:joy.becker@sydney.edu.au)

Honours stream: Biology or Microbiology

### Research interests

Joy's research program is focused on understanding and controlling production-limiting diseases affecting global aquaculture. Her research program has a strong industry focus on "real world" problems faced by fish farmers.

<https://sydney.edu.au/science/people/joy.becker.php>



### Projects

- Depending on the interest area of the student, potential projects involve studying fish health and disease in aquaculture environments.

## Associate Professor Kim Bell-Anderson

[kim.bellanderson@sydney.edu.au](mailto:kim.bellanderson@sydney.edu.au)

Honours stream: Biology or Biochemistry

### Research interests

Kim's lab research interest is in processes of nutritional physiology and mechanisms of adaptation. The main goal being to gain insight into the mechanisms underpinning diet-mediated phenotype in order to better understand the developmental origins of obesity and related disorders. Established techniques in the lab include in vivo physiological measurements of energy balance and metabolism in mice, gene expression, and biochemical analysis of plasma and tissues from animal studies. Kim also collaborates with A/Prof Tina Hinton to investigate the role of flavonoids in type 2 diabetes.



### Projects

- Carbohydrate availability and developmental programming in mice
- Development of a Shiny App for analysis of Promethion metabolic data
- GABA, dietary flavonoids and diabetes (co-supervised with A/Prof Tina Hinton, School of Medical Sciences)

## Professor Kathy Belov

[kathy.belov@sydney.edu.au](mailto:kathy.belov@sydney.edu.au)

Honours stream: Biology

### Research interests

My research group focuses on the evolution of the adaptive immune system in marsupials and monotremes. Through our industry partnerships we undertake conservation genetics with some of Australia's most threatened species, such as the Tasmanian devils, koalas and bilbies, ensuring our research is applied in real-time to conservation problems.

### Projects

- Ferocious by nature: Tasmanian devil behavioural genetics



## Professor Jennie Brand-Miller

[jennie.brandmiller@sydney.edu.au](mailto:jennie.brandmiller@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Carbohydrates – friend or foe? Our group's research on food carbohydrates has provided evidence that foods with a high glycaemic index (GI) increase the risk of chronic diseases, thereby challenging conventional views on healthy diets. This has raised the current profile and reach of nutrition science, and its potential future impact.

### Projects

- Salivary amylase gene (AMY1) copy number and the amount of starch digested in a meal
- Salivary amylase gene (AMY1) copy number and satiety/appetite responses to foods (co-supervised with Dr Fiona Atkinson)



## Dr Ana Bugnot

[ana.bugnot@sydney.edu.au](mailto:ana.bugnot@sydney.edu.au)

Honours stream: Biology

### Research interests

I study the ecological impacts of humans in estuarine habitats (habitat degradation, pollution, coastal hardening, invasive species, among others) at a range of spatial and temporal scales. I also test ecological strategies to rehabilitate and restore biodiversity, functions and services in estuaries, such as contaminant processing by habitat forming organisms, sediment infauna and microbes.

### Projects

- Effects of oysters in estuarine water quality
- The role of oyster reefs in estuarine nutrient cycling
- Using burrowing animals for sediment rehabilitation in Sydney Harbour



Supervisors and projects

## Professor Maria Byrne

[maria.byrne@sydney.edu.au](mailto:maria.byrne@sydney.edu.au)

Honours stream: Biology

### Research interests

I have a wide interest in the biology of marine invertebrates. My research is focused in two interlinked areas, global change biology and marine invertebrate evolution to determine the response of marine biota to global change and to understand mechanisms underlying evolution in the sea.

### Projects

- Evolution and Development
- The Impact of Climate Change Stressors on Marine Invertebrates



Which question will you tackle?



## Associate Professor Mary Byrne

[mary.byrne@sydney.edu.au](mailto:mary.byrne@sydney.edu.au)

Honours stream: Biochemistry, Biology or Microbiology

### Research interests

We are interested in the genetic regulation of plant shoot development. Working with the model system *Arabidopsis*, we are able to use a broad range of genetic and molecular tools to investigate details of how homeodomain protein transcription factors control shoot meristem maintenance and leaf patterning.

### Projects

- Determining the role of BLH genes in leaf development
- Using gene editing to determine how SAW genes control the shape of leaves
- Developing tools for gene expression studies using CRISPR/Cas9



## Professor Emeritus Iain Campbell

[iain.campbell@sydney.edu.au](mailto:iain.campbell@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Cytokines are important host response molecules. Learning how cytokines function in the brain to cause inflammation and disease remains an important puzzle to solve and is a major goal of our research. We seek to understand the precise signal transduction mechanisms and gene regulatory programs altered by cytokines in the brain and how this impacts the central nervous system to cause neurological disease.

### Projects

- IL-6/gp130 cytokine signalling and actions in the brain
- Type I interferon signalling and actions in the brain (all projects in collaboration with and co-supervision of Dr Markus Hofer)



## Dr Leslie Caron

[eslie.caron@sydney.edu.au](mailto:eslie.caron@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Human pluripotent stem cells (hPSC) are potential models of human development and disease and an unlimited source for cell replacement therapies. Our research focuses on using hPSC systems to identify cellular and molecular mechanisms that regulate differentiation into specific cell types and test drugs that affect human development and diseases. I have a particular interest in stem cell therapy and modeling neuro-muscular degenerative disorders.



### Projects

- Developing a stem cell therapy for Neuropathic Pain.
- Using hPSC as a model for muscular Dystrophy and sarcopenia.

## Professor Dee Carter

[dee.carter@sydney.edu.au](mailto:dee.carter@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

Fungi have a huge impact on our health, food and environment. We are interested in how fungi are able to cause harm and resist treatment, and in new approaches to treat fungal diseases.



### Projects

- Antifungal resistance in *Cryptococcus*
- Micro-cell variants in *Cryptococcus* and their role in infection
- The use of antimicrobial honey and milk proteins to treat fungal infections

## Dr Nadine Chapman

[nadine.chapman@sydney.edu.au](mailto:nadine.chapman@sydney.edu.au)

Honours stream: Biology

### Research interests

The Bee Lab is interested in the behavioural ecology and genetics of insects, particularly bees. Bees have a critical ecosystem function because they pollinate many food crops and native plants, but they are also fascinating models for understanding key evolutionary and genetic processes. Our research aims to shed light on these processes while at the same time safeguarding Australian bee populations against pathogens, invasive species and other threats. Projects can be lab-based, field-based or both.

### Projects

- Breeding better bees for Australia
- Honey bee colony traits associated with almond pollination
- Genetics of Australian honey bee populations



## Professor Alex Chaves

[alex.chaves@sydney.edu.au](mailto:alex.chaves@sydney.edu.au)

Honours stream: Microbiology

### Research interests

My research focuses on animal nutrition, on rumen microbiology and genomics, sustainable ruminant production systems, mitigation of greenhouse gases, and management approaches to utilise the existing feed resources more efficiently. The importance of this research has led me to engage: interdisciplinary approaches; strong international collaboration with Canada, Germany and Brazil; and recently engagement with the industry.

### Projects

- Effects of unsaleable vegetables and probiotics on silage microbiome
- Assessment of BioWish MultiBio 3PS (direct-fed microbes) on ruminal in vitro incubations
- Evaluation of the effects of incubation run on microbes diversity



## Professor Min Chen

[min.chen@sydney.edu.au](mailto:min.chen@sydney.edu.au)

Honours stream: Biochemistry or Biology

### Research interests

Our research focus is on molecular mechanisms of photosynthesis, especially the functional characterisation of unique photopigments and pigment-binding protein complexes. We use state-of-the-art molecular and biochemical approaches to understand the photosynthetic apparatus and the energy transfer pathways, including genetic modification, transcriptional regulatory mechanisms and protein structural investigation in related to the efficiency of photosynthetic reactions.



### Projects

- Investigating a broad-spectrum light-capturing protein complexes (co-supervisor: Dr. Ann Kwan)
- The unseeing regulatory network in cyanobacteria (co-supervisor: Dr. Miguel Hernandez-Prieto)
- The effect of iron on the photosynthetic apparatus and chlorophyll biosynthetic pathway

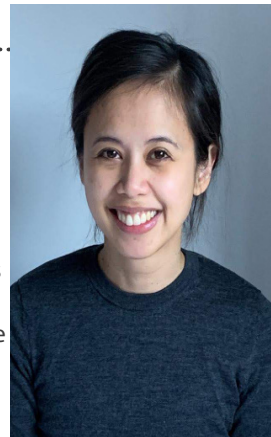
## Dr Tara Christie

[tara.christie@sydney.edu.au](mailto:tara.christie@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

We are interested in how cells regulate protein levels in response to external stimuli, and how dysregulation of these processes contributes to disease. We use a range of techniques (molecular biology, protein expression and purification, biophysical assays, x-ray crystallography) to study the structure and function of proteins that govern these pathways.



### Projects

- Post-transcriptional gene regulation in human diseases
- The role of gene expression regulation in plant immunity

## Dr Nick Coleman

[nicholas.coleman@sydney.edu.au](mailto:nicholas.coleman@sydney.edu.au)  
Honours stream: Microbiology

### Research interests

Environmental microbiology, biotechnology, synthetic biology, bacterial evolution. Our lab takes inspiration from the incredible power of microorganisms to catalyse useful reactions. We are interested in the interface between microbes and anthropogenic chemicals; this includes studies of pollutant biodegradation, biocatalysis, and the movement of antibiotic resistance genes.



### Projects

- Development of biocatalysts for green synthesis of epoxides
- Engineering bacteria for enhanced biodegradation of organochlorines
- Making new cloning vectors for cyanobacteria

## Professor Ross Coleman

[ross.coleman@sydney.edu.au](mailto:ross.coleman@sydney.edu.au)  
Honours stream: Biology

### Research interests

I have broad interests in rocky shore, estuarine and coastal ecology. The two main thrusts of my research activity are (i) the behavioural ecology of limpets; as these molluscs exert the strongest effect on algae of any grazer in marine systems - they are the definitive structuring force on rocky shores and (ii) how urban structures and cities generally, can be improved for marine biodiversity.



### Projects

- Spatial ecology and individual identity- location effects on limpet grazing
- Herbivore-induced responses in algae leading to alterations in subsequent grazing
- Habitat enhancements on seawalls and artificial habitats



## Professor Arthur Conigrave

[arthur.conigrave@sydney.edu.au](mailto:arthur.conigrave@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Our research focuses on the molecular and cellular mechanisms that underlie nutrient sensing with a particular interest in nutrient-sensing G-protein coupled receptors including amino acid/calcium-sensing receptors and amino acid/glucose/fructose-sensing receptors that coordinate responses to nutrients.

Our work involves cell culture, molecular engineering, transfection and transduction of vectors and plasmids, protein detection and purification, analysis of protein interactions, biochemical pathway analyses and phenotypic characterisation of transgenic mouse models.



Supervisors and projects

## Professor Stuart Cordwell

[stuart.cordwell@sydney.edu.au](mailto:stuart.cordwell@sydney.edu.au)

Honours stream: Biochemistry or Microbiology

### Research interests

The tools of proteomics have become essential in the study of health and disease in the post-genome era. Our group is primarily interested in understanding disease processes with the aim of discovering new protein- and peptide-based targets for the diagnosis of disease, as well as novel vaccines and better therapies. We investigate two broad biological systems; bacterial pathogens and ischemic heart disease.



Which question will you tackle?

### Projects

- The role of N-linked protein glycosylation in bacterial pathogenesis
- Crosslinking mass spectrometry to define protein complexes in bacterial disease
- Post-translational modifications in cardiovascular disease

## Dr Angela Crean

[angela.crean@sydney.edu.au](mailto:angela.crean@sydney.edu.au)

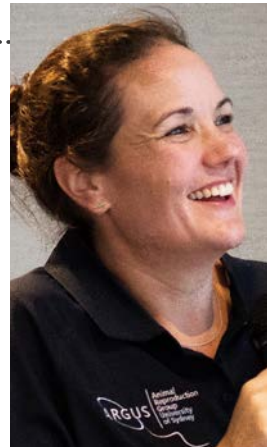
Honours stream: Biology

### Research interests

Not all sperm are created equal; they vary in size, shape, viability, motility, and swimming speed. The causes and consequences of this variability in sperm quality are often unknown. I am interested in how a male's environment influences his sperm quality, and whether changes in sperm quality can influence traits in his offspring.

### Projects

- Can males enhance their fertility through diet?
- Sperm physiological predictors of IVF success



## Associate Professor Mathew Crowther

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Honours stream: Biology

### Research interests

My research involves the ecology and evolution of native and introduced fauna, using a combination of field, laboratory and statistical approaches.

### Projects

- What environmental factors determine the distribution, density and movement of koalas on a fragmented landscape
- What chemicals in cat fur cause a fear response in rodents (with Prof Iain McGregor, Psychology)
- Do native and introduced rodents show the same fear response to cat odours? (with Prof Iain McGregor, Psychology)



## Dr Mark de Bruyn

[mark.debruyn@sydney.edu.au](mailto:mark.debruyn@sydney.edu.au)

Honours stream: Biology

### Research interests

I am a population geneticist focussing on molecular ecology, with an interest in the development and application of novel tools, such as environmental DNA, ancient DNA and wildlife forensics, for biodiversity science. I work across taxonomic groups, but have a keen interest in freshwater systems.



### Projects

- Developing environmental DNA tools for rapid bio-assessment
- Has past climate change caused 'reverse speciation' in freshwater fishes?
- Assembling a phylogenetic framework for the Australia biota
- Sydney Harbour Fish and Crustacea Environmental DNA Project
- Lizard Island Fish Environmental DNA Project
- Northern NSW Vagrant Tropical Fish Environmental DNA Survey

## Associate Professor Gareth Denyer

[gareth.denyar@sydney.edu.au](mailto:gareth.denyar@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Obesity causes disease through the secretion of cytokines from adipocytes and macrophages in adipose tissue. We discovered that the expression of inflammatory genes in adipocytes has a memory, with prior exposure causing larger responses. Our aim is to understand the ramifications of this phenomenon and define its underlying molecular mechanisms.



### Projects

- Epigenetic regulation of adipocyte inflammatory gene expression
- Do human adipocytes show transcriptional memory?

## Professor Chris Dickman

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Honours stream: Biology

### Research interests

The major focus of the Terrestrial Ecology Lab is to explore the factors that influence the distribution and abundance of terrestrial vertebrates. This research is inherently fascinating because it allows us to uncover and explain the causes of many intriguing patterns of vertebrate distributions in the Australian fauna. It is also of practical importance because so many species have declined or become extinct with the advent of European settlement, and there is a clear imperative to prevent further losses.



## Dr Sandro Fernandes Ataide

[sandro.ataide@sydney.edu.au](mailto:sandro.ataide@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

We use biophysical tools to investigate the structure and function of RNA-protein complexes and how they regulate cellular process. Especially, we are interested in how non-coding RNAs mediate epigenetic regulation in cancer and other related diseases. Our goal is to harness their functions for biomedical and biotechnological purpose.



### Projects

- Biochemical characterization of a versatile transposase Tnp26
- Exploiting the bacterial SRP receptor as a drug target

## Associate Professor William Figueira

[will.figueira@sydney.edu.au](mailto:will.figueira@sydney.edu.au)

Honours stream: Biology

### Research interests

The focus of research within my lab is the population ecology of marine fishes and includes a variety of projects from demographic studies to climate change and management. My group has an emphasis on quantitative analytical methods and we work in temperate and tropical environments using a variety of in-situ data collection techniques.



### Projects

- Understanding the processes of seasonal persistence of tropical marine fishes
- Understanding linkages between environment and growth in settlement stage fishes
- 3D mapping of benthic marine systems and evaluating the role of structural complexity on the dynamics of biodiversity in these systems

Supervisors and projects



Which question will you tackle?

Page 31

## Associate Professor Neville Firth

[neville.firth@sydney.edu.au](mailto:neville.firth@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

Strains of *Staphylococcus aureus* that are resistant to antibiotics are a significant medical problem. My laboratory investigates the roles of mobile genetic elements in the evolution of antimicrobial resistance, with a focus on the molecular biology of plasmids that facilitate the acquisition, maintenance and dissemination of resistance genes in staphylococci.

### Projects

- Genetics of *S. aureus* conjugative multiresistance plasmids
- Protein-protein interactions responsible for horizontal transfer of resistance plasmids



## Dr Roslyn Gloag

[ros.gloag@sydney.edu.au](mailto:ros.gloag@sydney.edu.au)

Honours stream: Biology

### Research interests

The Bee Lab is interested in the behaviour, ecology and genetics of various organisms, particularly bees. Bees have a critical ecosystem function because they pollinate many food crops and native plants, but they are also fascinating models for understanding key evolutionary and genetic processes. Our research aims to shed light on these processes while at the same time safeguarding Australian bee populations against pathogens, invasive species and other threats. Projects can be lab-based, field-based or both.

### Projects

- How do invasive species evolve and adapt in their new environment?
- Can Australian native bees adapt to a changing climate?

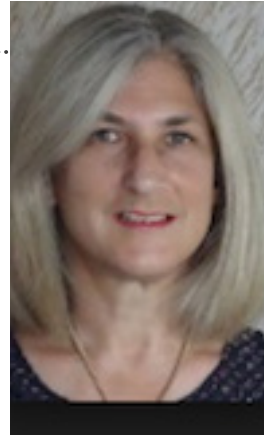




## Associate Professor Merran Govendir

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Honours stream: Microbiology



### Research interests

My laboratory investigates how effective medicines are in animals. We do a lot of research into how antimicrobials work in koalas. We all know how unique koalas are, but because of their specialised Eucalyptus diet they have some very active metabolism pathways to eliminate eucalypt toxins and thus they can do some unusual metabolism conversions of antimicrobials. We have identified some koala specific antimicrobial metabolites. This project will involve the student working out a method to check whether these metabolites have some antimicrobial activity. You will be taught antimicrobial susceptibility testing and the successful student will need to have enthusiasm and high attention to detail.

### Projects

- Investigating whether selected antimicrobial metabolites made by koalas have any antimicrobial activity

## Dr Aaron Greenville

[aaron.greenville@sydney.edu.au](mailto:aaron.greenville@sydney.edu.au)

Honours stream: Biology



### Research interests

We use a strategic combination of population biology and trophic ecology, along with cutting-edge statistical techniques, to predict how ecosystems (both natural and modified) respond to climate change and the introduction of exotic species. Our research is organised around three themes: 1) Ecosystem responses to climate change, 2) Species interactions (competition and predation) and 3) Technology for ecology and agricultural sciences.

### Projects

- Smart farming: incorporating biodiversity into farming decisions
- Simpson Snapshots: designing Citizen Science programs for identifying wildlife in remote camera trap images (collaboration with Australian Museum)
- WildCount: can machine learning be used to accurately identify wildlife in remote camera trap images? (collaboration with NPWS)
- Identifying species of high conservation value for restoring ecosystem function after wildfire

## Dr Catherine Grueber

[catherine.grueber@sydney.edu.au](mailto:catherine.grueber@sydney.edu.au)

Honours stream: Biology

### Research interests

My research investigates how animal populations respond to natural and “unnatural” conditions: whether bringing threatened species into captivity to prevent extinction, or securing a more productive food supply through animal breeding. We use evolutionary theory, population genetics, computational modelling and meta-analysis to learn how to maximise species resilience for the future.

### Projects

- Natural selection in small populations: how to maintain diversity of South Island robins
- New group housing designs to improve the Tasmanian devil breeding program
- From agriculture to conservation: evolutionary genetic lessons from poultry
- Evolutionary ecology of Tasmanian devil white markings - why do they vary so much?



## Professor David Guest

[david.guest@sydney.edu.au](mailto:david.guest@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

Demethylation inhibitors (DMIs) are the principle treatment for fungal infections in humans, animals, and plants. However, widespread DMI use in agriculture is leading to resistance in fungal pathogens. We will determine soil DMI concentrations using traditional chromatographic and novel infra-red spectroscopic methods, and investigate the relationship to resistance in Australia.

### Projects

- Does exposure to DMI fungicides in soils increase the risk of insensitivity in fungal pathogens? (with co-supervisor Dr Justin Beardsley)



## Professor Ruth Hall

[ruth.hall@sydney.edu.au](mailto:ruth.hall@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

Projects in the Hall laboratory focus on the mechanisms that lead to accumulation of resistance to many different antibiotics in Gram-negative bacteria such as *Acinetobacter*, *Escherichia coli*, and *Klebsiella*. In particular, we study where resistance genes come from and how they are brought into and maintained in human pathogens.



### Projects

- Becoming pan resistant - evolution of *Acinetobacter baumannii* multi-resistant clones
- Role of plasmids in the accumulation of resistance genes to generate pan resistance
- What distinguishes transposition of IS26 from other IS?

Supervisors and projects

## Associate Professor Marcus Heisler

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Honours stream: Biochemistry

### Research interests

Our research focus is on developmental patterning in plants using the model species *Arabidopsis thaliana*. In particular, we are interested in how plants create their wonderful symmetrical arrangements of leaves and flowers and how particular organ shapes are formed. Our approach is to analyse development dynamically at cellular resolution using confocal microscopy and by using fine scale genetic perturbations to dissect intercellular signalling pathways. See: [www.heislerlab.com](http://www.heislerlab.com)



### Projects

- Dissecting cell-cell communication underlying cell polarity coordination
- Investigating a developmental organiser involved in leaf morphogenesis

Which question will you tackle?

## Associate Professor Murray Henwood

[murray.henwood@sydney.edu.au](mailto:murray.henwood@sydney.edu.au)

Honours stream: Biology

### Research interests

Our research focuses on the molecular and cellular In the Plant Systematics Laboratory, our research is concerned with the recognition and documentation of patterns of variation in time and space within all elements of the Australian flora. To achieve these goals we use a variety of techniques and data-sources including fossils, geographic distributions, morphology and anatomy, and nucleotide sequences.



### Projects

- Southern connections: understanding the role of Gondwana in the divergence and radiation of the ivies (Araliaceae)

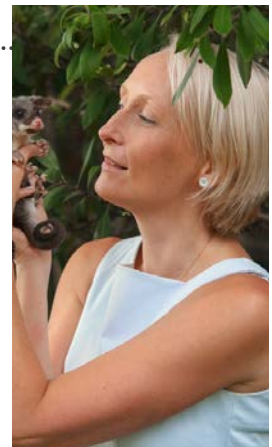
## Dr Catherine Herbert

[catherine.herbert@sydney.edu.au](mailto:catherine.herbert@sydney.edu.au)

Honours stream: Biology

### Research interests

My research team investigates key biological processes influencing the management of marsupial populations. We focus on having a solid foundation of knowledge to facilitate evidence-based wildlife management, with two key themes: (1) Understanding baseline population parameters and the basis of human-wildlife conflicts; and (2) Understanding how wildlife management approaches affect individual animals and broader population dynamics.



### Projects

- Wildlife rehabilitation, “stress” and survival in brushtail possums
- Understanding factors influencing the survival of hand-reared brushtail possums post-release
- Understanding the movement behaviour of kangaroos and wallabies within the context of rapid urbanisation in Western Sydney

## Professor Simon Ho

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Honours stream: Biology

### Research interests

I am a computational evolutionary biologist and my research is based on analyses of genetic data to answer evolutionary questions. This usually involves the study of molecular clocks, evolutionary rates and timescales, and phylogenetic methods. My work spans a broad range of taxa, including vertebrates, insects, fungi, plants, and viruses.

### Projects

- Rates of molecular evolution across the Tree of Life
- Phylogenomic estimation of evolutionary timescales



## Associate Professor Dieter Hochuli

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[dieter.hochuli@sydney.edu.au](mailto:dieter.hochuli@sydney.edu.au)

Honours stream: Biology

### Research interests

My research focuses on insect-plant interactions, community ecology and conservation biology. Much of my work examines the ecology of urban environments and their biodiversity, identifying responses to landscape degradation and ecosystem stressors, as well as how to enhance greenspace in cities. I'm interested in projects scaling responses from individuals to landscapes in a range of systems.

### Projects

- The ecology of greenspace in cities
- Are urban ecosystems hostile environments for biodiversity?
- How does biodiversity adapt to life in the city?



## Dr Markus Hofer

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Honours stream: Biochemistry

### Research interests

Cytokinopathies are a group of debilitating diseases that are caused by inappropriate production of cytokines such as interferon-alpha and interleukin-6. Examples of cytokinopathies include Aicardi-Goutières syndrome and systemic lupus erythematosus. Our research group aims to identify the molecular mechanisms and key cellular targets that underlie cytokinopathies using in vivo and in vitro models. For more information, visit [www.hoferlab.com](http://www.hoferlab.com)



### Projects

- Targeting the brain vasculature as a treatment for cerebral type I interferonopathies
- The pathogenic and protective effects of microglia in cerebral cytokinopathies
- How different cell types of the brain contribute to cerebral cytokinopathies
- Effects of type I interferons in chronic viral infections

## Associate Professor Andrew Holmes

[andrew.holmes@sydney.edu.au](mailto:andrew.holmes@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

Our gut microbiome has an enormous impact on our health through its contribution to digestion and interaction with the enteric endocrine, lymphoid and nervous systems. A dysfunctional host-microbiome interaction is a factor in many diseases including obesity, diabetes and inflammatory disorders.



### Projects

- Quantifying the microbiome impact on nutrition and immune function
- Computer simulation of the diet-microbe-health interaction axis



## Dr Lachlan Ingram

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Honours stream: Biology

### Research interests

Dr Ingram is interested in not only understanding grassland ecosystems but also how we can better manage them in a sustainable manner. As a result it is necessary to understand the many factors, and the interactions between these factors, that make up a grassland system: soil-roots/plants-animals-atmosphere.



### Projects

- Dendrochronological mapping of carbon sequestration in the NSW high country
- Selectively controlling African lovegrass in native areas and pastures of the Monaro region

## Professor David James

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[david.james@sydney.edu.au](mailto:david.james@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Our lab is interested in how metabolism contributes to diseases like diabetes, liver disease or certain cancers. This involves studying how signal transduction pathways are coordinated within cells or tissues that are perturbed in various ways and how such signalling pathways convey messages to specific biological outcomes. Technologies include proteomics, metabolomics, cell biological analysis of proteins in living cells and bioinformatics.



### Projects

- Mapping new functions of insulin and exercise
- The interaction between diet and the genome in mice
- Mechanism of insulin resistance
- Mechanism by which insulin regulates lipolysis in adipocytes
- Role of mitochondria in insulin resistance
- Use of novel proteomic methods for measuring Protein-Protein interactions

## Associate Professor Brian Jones

[brian.jones@sydney.edu.au](mailto:brian.jones@sydney.edu.au)

Honours stream: Biology

### Research interests

From understanding the basis of gene function to producing designer life forms, the breakthrough CRISPR/Cas and related technologies have opened a new world of possibilities. We are exploring ways to improve CRISPR/Cas function and are using it to manipulate one of the fundamental processes in biology, reproductive development in plants.

### Projects

- Optimising gene knockout in embryonic cells
- Reproductive cell-specific CRISPR/Cas function



## Dr Melkam Kebede

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Honours stream: Biochemistry

### Research interests

A major feature in the pathogenesis of type 2 diabetes (T2D) is the loss of pancreatic  $\beta$ -cell function. This manifests mainly as a reduction in glucose-stimulated insulin secretion. The molecular mechanisms that control  $\beta$ -cell failure during the progression to T2D remain poorly understood. Our research interest is to understand the mechanisms of  $\beta$ -cell failure in the pathogenesis of T2D. The current projects in the lab focus on understanding the mechanisms behind insulin biogenesis, maturation, stability and targeting for secretion.

### Projects

- Role of Golgi proteins on insulin secretory granule biogenesis.
- Role of cytosolic adaptor proteins on insulin secretory granule biogenesis.
- Proteomics of insulin secretory granules.



## Associate Professor Michael Kertesz

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[michael.kertesz@sydney.edu.au](mailto:michael.kertesz@sydney.edu.au)

Honours stream: Microbiology

### Research interests

As molecular microbial ecologists, we are interested in the functional microbial interactions between bacteria, fungi, plants and soil or compost. Soil and compost constitute highly dynamic and complex ecosystems and understanding microbial activity and interactions in these environments has major practical implications for sustainable food production.



Supervisors and projects

### Projects

- How bacteria provide crops with essential sulfur for growth
- Hot fungi - the role of thermophilic fungi in mushroom compost production
- Why fungi need bacteria for button mushroom cropping

## Dr Ali Khoddami

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[ali.khoddami@sydney.edu.au](mailto:ali.khoddami@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Cannabis is an Indian hemp plants such as Cannabis sativa and Cannabis indica. It has several active chemicals and the main active chemical is called THC (delta-9 tetrahydrocannabinol). Cannabis has been applied as a medicine for many centuries and being used to treat several diseases such as: nausea and vomiting, cancer, pain relief, and glaucoma.



Which question will you tackle?

### Projects

- Physico-chemical properties of Cannabis seed and plant oil

## Dr Sergey Kurdyukov

[sergey.kurdyukov@sydney.edu.au](mailto:sergey.kurdyukov@sydney.edu.au)

Honours stream: Biochemistry and Biology

### Research interests

- CRISPR genome-wide screening for identification of venom and toxin molecular targets with the aim to develop “molecular antidotes”. Current screens involve jellyfish, snake, bacterial and insect-derived venoms and toxins.
- Optimisation of genome editing tools for in vitro and in vivo applications
- Synthetic biology; construction of artificial chromosomes containing biochemical pathways for use in biotechnology and plant science.

### Projects

- Investigation of molecular mechanisms of action of the African snake venoms.
- Investigation of molecular pathways of the assassin bug (*Pristhesancus plagipennis*) venom
- Stem cells differentiation using CRISPR tools.
- Cell death; comparative analysis of different mechanisms triggered by natural venoms.



## Dr Ann Kwan

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Honours stream: Biochemistry

### Research interests

My lab is focused on solving interesting biological problems using a cross-disciplinary approach that encompasses molecular biology, structure biology, computational biology and metabolomics. Ongoing projects in the lab include: protein engineering to make biocompatible coatings, drug design to fight antibiotics resistance and using metabolomics to assess and help develop new cancer treatments. For more details, please visit <https://www.kwanlabusyd.com>

### Projects

- Engineering of fungal spore coat proteins for biocompatible bone scaffolds
- Developing new antibiotics by targeting specific bacterial interactions (co-supervisors: Dr Sandro Ataide and Dr Lorna Wilkinson-White)
- Investigating cellular signaling in novel cancer therapies using multi-omics (co-supervisors: A/Prof Nataalka Suchowerska and Prof David McKenzie)



## Dr Mark Larance

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Honours stream: Biochemistry

### Research interests

In animals, short periods of nutrient deprivation, such as intermittent fasting, have been shown to provide benefits with regard to cancer risk and ageing. I aim to identify how this is occurring at the protein-level, determine how intermittent fasting can improve metabolic health and improve the nutrient deprivation regimes for implementation in humans, for the prevention and treatment of cancer.



### Projects

- Mapping Liver Protein-Protein Interactions Using Crosslinking and the Fusion Tribrid Mass Spectrometer
- Analysis of Human Plasma Protein Changes after Intermittent Fasting using Proteomics
- Identification of Transcription Factor Networks Regulated by Intermittent Fasting in Liver

## Dr Tanya Latty

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[tanya.latty@sydney.edu.au](mailto:tanya.latty@sydney.edu.au)

Honours stream: Biology

### Research interests

We are invertebrate ecologists focused on: 1) Swarm intelligence in bees, ants and slime moulds and 2) insect pollination ecology, especially in urban and rural agriculture. 3) general invertebrate behaviour, especially social behaviours and foraging behaviour.



### Projects

- Ants as engineers: how do meat ants build efficient roadways?
- Bee Group hunting in glue-shooting velvet worms
- Foraging behaviour of hoverflies
- Collective behaviour in soldier fly larvae
- Flower choice and irrationality in pollinators (bees or flies)

## Dr Osu Lilje

[osu.lilje@sydney.edu.au](mailto:osu.lilje@sydney.edu.au)

Honours stream: Microbiology or Biology

### Research interests

My research interest focuses on microbial ecology and how the eukaryotic microorganisms respond to changes in the environment. My research involves aseptic culture work, in vitro modelling, microscopy, environmental sampling, molecular analysis, conceptual and statistical modelling and molecular techniques such as next generation sequencing.



### Projects

- Characterising isolated Labyrinthula, potential protistan pathogens of seagrasses
- Do environmental and anthropogenic factors influence aquatic microbial diversity?

## Associate Professor Nathan Lo

[nathan.lo@sydney.edu.au](mailto:nathan.lo@sydney.edu.au)

Honours stream: Biology

### Research interests

We are interested in the nexus between evolution, ecology, and genetics/molecular biology. We study evolution at a broad range of temporal scales and in diverse taxa. We use a variety of computational and molecular techniques, focussing on genomic data.



### Projects

- The role of the bacterial symbiont Midichloria mitochondrii in Australian paralysis tick biology (with co-supervision by Professor Eddie Holmes)
- How predictable is evolution? Investigating parallel genetic evolution in bacterial symbionts of native Australian cockroaches



## Dr Lipin Loo

[lipin.loo@sydney.edu.au](mailto:lipin.loo@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Utilising genetic screens and single-cell transcriptomics, I aim to identify and map transcriptional changes underlying different cellular trajectories during development and also under pathophysiological conditions such as chronic pain and neuropathy. Elucidating these orchestrated transcriptional changes will have a far-ranging impact on our understanding of disease-causing developmental aberrations, our capacity to restore normal function in damaged or diseased neurons, and our capability to generate substitute neurons from stem cells.

### Projects

- Deciphering the transcriptional networks regulating neuronal development



Supervisors and projects

## Professor Joel Mackay

[joel.mackay@sydney.edu.au](mailto:joel.mackay@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

How are genes switched on and off? We are exploring the mechanisms underlying transcriptional and epigenetic gene regulation and trying to design new molecules to modulate gene expression, with a focus on cancer. Projects may involve the following methods: mammalian cell culture, cloning, protein biochemistry, protein design, structural biology.

### Projects

- How does the Nucleosome Remodelling and Deacetylase complex remodel chromatin?
- Design of bromodomain inhibitors using high-throughput peptide library screening
- Design of intracellular monobodies to inhibit disease-associated transcription factors



Which question will you tackle?



## Dr Ziggy Marzinelli

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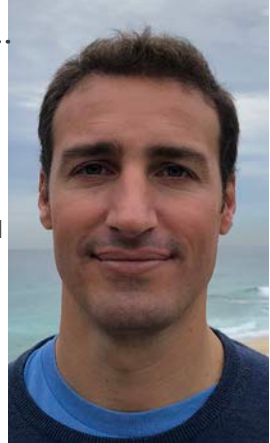
Honours stream: Microbiology or Biology

### Research interests

I am broadly interested in marine ecology and microbial ecology. My research focuses on understanding the ecological processes that generate, maintain and impact marine ecosystems, and aims to develop solutions to environmental problems. I am particularly interested in the role microbes play on the resilience of habitat-forming hosts (kelps, seagrass, corals) to environmental stressors such as warming and pollution, and on restoration of these systems (see e.g. [operationcrayweed.com](http://operationcrayweed.com)). My research combines manipulative experiments with molecular tools, and its mostly field-based.

### Projects

- Disturbance and phase-shifts in marine ecosystems
- - Host-microbiome interactions and resilience
- - Any aspects of marine ecology



Supervisors and projects

## Professor Jacqui Matthews

[jacqueline.matthews@sydney.edu.au](mailto:jacqueline.matthews@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

The LIM-only (LMO) proteins play essential roles in normal development and disease. All of these proteins form multiprotein complexes that regulate gene expression, and we use predominantly in vitro techniques (molecular biology, protein engineering and chemistry, structural characterisation) to work out how complexes assemble, what they look like and how to modulate complex formation to treat disease.



### Projects

- LMO2 - blood cell development/ T-cell leukemia
- LMO4 - brain development/ in breast cancer

Which question will you tackle?



## Associate Professor Clare McArthur

[clare.mcarthur@sydney.edu.au](mailto:clare.mcarthur@sydney.edu.au)

Honours stream: Biology

### Research interests

I am fascinated in the behavioural ecology of mammalian herbivores; animals with substantial influence in shaping ecosystems. I answer the question of how animals forage—crucial to ecology because food fuels fitness. My research unites plant-herbivore and predator-prey concepts, tests how animal personality shapes foraging decisions, and explores problem-solving and heuristics in mammals. Harnessing this research, I develop novel ways to reduce human-wildlife conflict, particularly conflict triggered by foraging.

### Projects

- Foraging by swamp wallabies using plant odour cues (with co-supervisor Peter Banks)
- Problem-solving by possums (or rats): how smart are they? (with co-supervisor Peter Banks)
- Urban ecology: which possums are where and why? (with co-supervisor Dieter Hochuli)

## Dr Arjun Muralidharan

[arjun.muralidharan@sydney.edu.au](mailto:arjun.muralidharan@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Dr Muralidharan's research aims to understand the pathobiological mechanisms that underlie chronic pain and to identify novel 'pain targets' to better treat this intractable disease condition. To reach these goals, he combines a variety of experimental approaches including animal behaviour, molecular and cellular biology, pharmacology and genetics.

### Projects

- Targeting central disinhibition to treat chronic pain
- Chronic pain and cellular ageing interface in mice and humans



## Associate Professor Greg Neely

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[greg.neely@sydney.edu.au](mailto:greg.neely@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

Our lab is focused on functional annotation of the genome. Our objective is to identify genes and coding mutations that participate in major age-related and neurological diseases. We combine human genomics data with functional validation in vivo to identify new genes that contribute to human neurological disease.

### Projects

- CRISPR screening to identify deadly venom mechanisms of action
- Genome editing and single cell sequencing to understand nervous system development and function.
- New conserved genes that control synaptic function



Supervisors and projects

## Dr Thomas Newsome

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[thomas.newsome@sydney.edu.au](mailto:thomas.newsome@sydney.edu.au)

Honours stream: Biology

### Research interests

Dr Newsome established the Global Ecology Lab in 2018. Much of our work seeks to understand how species respond to human-induced changes to the landscape. Our work provides solutions to the challenges of wildlife conservation and management in a rapidly changing world.

### Projects

- Can artificially distributed carcasses curb the cat threat and save the endangered night parrot from extinction?
- Can the sound of dingoes howling induce a landscape of fear?



Which question will you tackle?



## Associate Professor Timothy Newsome

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[timothy.newsome@sydney.edu.au](mailto:timothy.newsome@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

What viral pathogens have learnt about their host's biology is written down in their genomes, a toolbox used to prise open their hosts, subvert signalling pathways and assemble viral progeny. Our research seeks to understand how viruses spread in a multicellular host and the role of viral infection on the host cytoskeleton and cell behaviour. We use viral genetics, biochemistry, cell biological analyses and advanced light microscopy to gain insight into these processes.

### Projects

- Viral co-option of cancer signalling pathways to promote virus spread
- Virus transport mediated by microtubule motor complexes and the actin cytoskeleton



## Dr Benjamin Parker

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[benjamin.parker@sydney.edu.au](mailto:benjamin.parker@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

My research aims to elucidate the pathways perturbed during metabolic stress. We use systems biology to understand how metabolic pathways are regulated during development, how they become dysregulated during disease, and how we can control pathways to prevent and / or treat disease.

### Projects

- Mapping signal transduction pathways in exercise and type-2 diabetes
- Quantifying protein post-translational modifications during muscle development



## Dr Catherine Price

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[catherine.price@sydney.edu.au](mailto:catherine.price@sydney.edu.au)

Honours stream: Biology

### Research interests

My research investigates how animals (herbivores and predators) find food, and aims to develop new techniques to solve conservation and wildlife management challenges, particularly foraging problems. I focus on odour cues and use manipulative field experiments to test new ideas.

### Projects

- Protecting endangered orchids from swamp wallabies (with Associate Professor Clare McArthur and Professor Peter Banks)



## Dr Matthew Pye

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[matthew.pye@sydney.edu.au](mailto:matthew.pye@sydney.edu.au)

Honours stream: Biology

### Research interests

I am interested in the population dynamics of plants with a focus on those species which are rare endangered, or a key species in a community which is itself endangered or rare (i.e. conservation management of plant species and communities). I am also interested in the teaching of Biology. As a member of SyBERG (Sydney Biology Education Research Group), we offer a number of ways to explore the effectiveness of how we teach Biology in a modern world (e.g. curriculum, innovation, assessments etc.)

### Projects

- Impacts of smoke and/or fire on Banksia spp. recruitment: implications for endangered community management.
- No Banksias in the Eastern Suburb Banksia Scrub? Community structure and recruitment across small, fragmented endangered ESBS populations.
- Sydney Biology Education Research Group: a range of topics including new ways to develop core skills in scientific report writing; (Un)learning Examinations; the (virtual) reality of ethics and animal dissections and many more.



## Associate Professor Rosanne Quinnell

[rosanne.quinnell@sydney.edu.au](mailto:rosanne.quinnell@sydney.edu.au)

Honours stream: Biology

### Research interests

My main research area is in science education. I am interested in how students learn to practice science and I have a particular interests in student numeracy and in eLearning. I have been investigating student numeracy using several theoretical frameworks including the Thresholds Concepts Framework and Mindfulness with colleagues in School of Mathematics and Statistics and at UNSW.



### Projects

- Please contact me to discuss a project in either science education or plant science

## Professor David Raubenheimer

[david.raubenheimer@sydney.edu.au](mailto:david.raubenheimer@sydney.edu.au)

Honours stream: Biology

### Research interests

I am a comparative nutritional ecologist, with a particular interest in the ways that nutrients influence the behaviour, physiology, life history and fitness of animals. My work spans species from insects to fish, birds, rodents and large mammals, including non-human primates (monkeys, lemurs and gorillas) and humans, and includes both field and lab studies.



### Projects

- Foraging strategies of the Kakapo parrots
- Sex differences in foraging strategies in Australasian gannets in New Zealand

## Dr Mark Read

[mark.read@sydney.edu.au](mailto:mark.read@sydney.edu.au)

Honours stream: Microbiology or Biochemistry

### Research interests

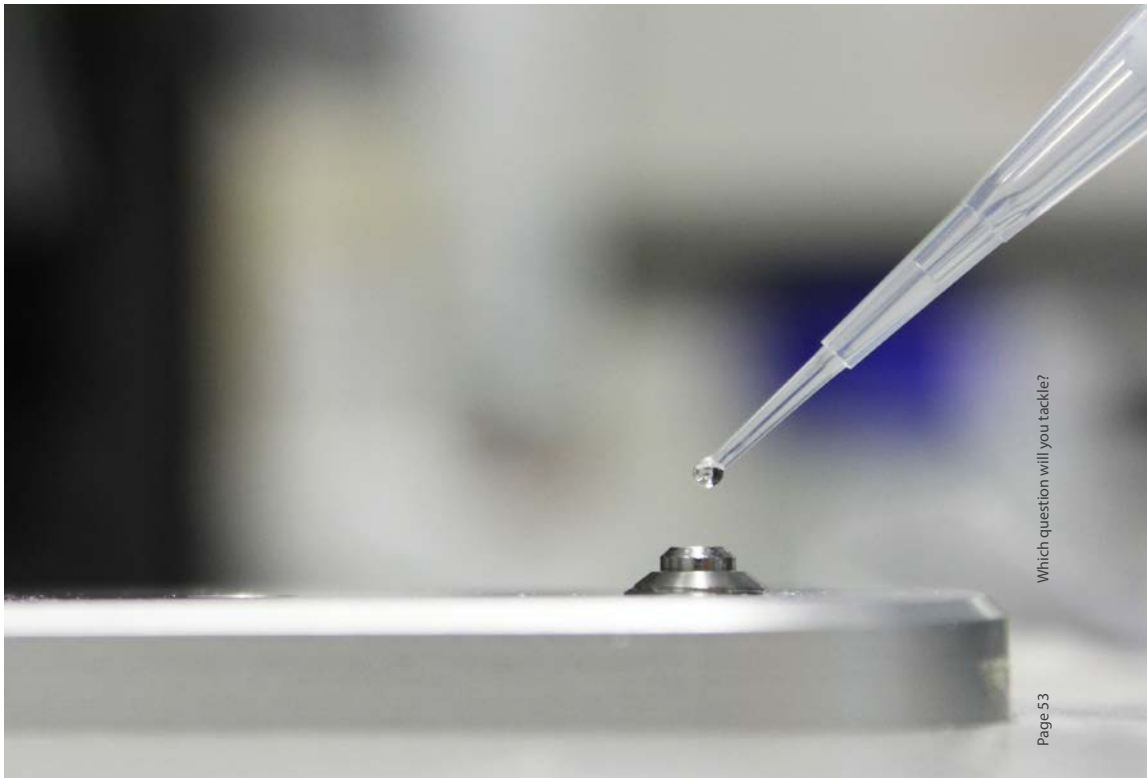
Understanding the complex nature of biological systems requires new “constructionist” techniques. How do emergent states such as health or disease manifest from biological components? How do we intervene? These projects couple high-throughput technologies with modelling and machine learning answer these questions, predominantly in the gut microbiome and the immune system.



Supervisors and projects

### Projects

- Disease diagnostics and prognostics based on the gut microbiome
- Designing interventions to correct a dysbiotic gut microbiome
- How do immune cells hunt for pathogens and cancers?



Which question will you tackle?

## Professor Peter Reeves

peter.reevesl@sydney.edu.au  
Honours stream: Microbiology

### Research interests

O antigen is a polysaccharide covering Gram-negative bacterial cells. It helps pathogens survive the host innate immune system, but also is immunogenic and used in vaccines. The individual sugars and their linkages vary even within species, so they are antigenically diverse, with many serotypes each with a distinct set of genes for synthesis. We work on the genetics of this diversity, regulation of O-antigen biosynthesis, and vaccine development.

### Projects

- Specificity of each Wzx flippase protein for its own O antigen
- Assembling new gene clusters for novel polysaccharides



## Dr Emily Remnant

emily.remnant@sydney.edu.au  
Honours stream: Biology  
Note: Unavailable for 2020 but will be available from 2021

### Research interests

"The 'Bee lab' is interested in behavioural ecology, behavioural genetics and molecular genetics of social insects and slime moulds (yes, you have read that correctly). We study honey bees, their viruses, and Australian native stingless bees. My research investigates honey bee virus evolution and competition, the genetics of host-parasite interactions, and the functional role of epigenetics in bees.

### Projects

Check out the range of lab projects at our website at <http://sydney.edu.au/science/biology/socialinsects/>. There is a special link under 'prospective students' for our project offerings.





## Professor Pauline Ross

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[pauline.ross@sydney.edu.au](mailto:pauline.ross@sydney.edu.au)

Honours stream: Biology

### Research interests

Pauline leads the internationally recognised research group at the University of Sydney investigating the impact of climate change on molluscs. Her team is developing oysters with resilience to ocean acidification to sustain an industry that generates more than \$1 billion a year in sales and employs thousands of Australians.

### Projects

- Microplastics and climate change in native oysters
- Resilience to climate change of Sydney rock oysters
- Stress and biochemistry of oysters
- Stress and resilience of marine organisms



Supervisors and projects

## Associate Professor Guy Roth

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[guy.roth@sydney.edu.au](mailto:guy.roth@sydney.edu.au)

Honours stream: Biology

### Research interests

We are interested in agriculture and its interaction with the surrounding landscape. I live on the University farm at Narrabri where we grow wheat, chickpeas, canola, cotton and run cattle. Also on the farm is a considerable amount of wildlife and some feral animals; birds, reptiles, ants, bees, insects, kangaroos, mice, wild pigs and plants. We want to know more about the ecology and ecosystem services of the native species and how they co exist with agriculture. The sustainability of modern agriculture means ensuring that biodiversity and ecological processes continue. So if you are interested in agriculture and biology there is potential to conduct a field project in your area of interest. We would partner with a Sydney based staff member relevant to your area of interest.

### Projects

- Cypress Pine. Friend or foe. What wildlife inhabits cypress pine areas.
- Native grains and indigenous food plants
- Using digital technologies to study the biology of farms



Which question will you tackle?

## Dr Jenny Saleeba

jenny.saleeba@sydney.edu.au  
Honours stream: Biochemistry

### Research interests

My philosophy is that scientific progress at the molecular level comes into its own when small molecular changes affect the phenotype of the whole organism. For this reason, we investigate the effect that small genetic changes have on the whole organism and the way in which phenotypic differences are encoded by the genome.

### Projects

- Genetics of complex traits
- Genomics of an inherited eye disorder, superficial chronic keratitis, in the Australian Racing Greyhound



## Professor Frank Seebacher

frank.seebacher@sydney.edu.au  
Honours stream: Biology

### Research interests

I am interested in how environmental change and variability affect the physiology of animals, and thereby movement, behaviour, and ecology. I use techniques ranging from molecular to whole-animal observations. For recent projects, have a look at my publications on Google Scholar or Web of Science, and contact me if you are interested in doing an honours project in this field.



## Dr Alistair Senior

[alistair.senior@sydney.edu.au](mailto:alistair.senior@sydney.edu.au)

Honours stream: Biochemistry, Biology  
and Microbiology

### Research interests

I am interested in the effects of diet on organismal life-history. That is, how does what an organism eat affect how long it lives and how much it reproduces? I address these questions using a range of techniques including experiments, meta-analysis and computational simulation.

### Projects

- The nutritional geometry of developmental noise
- The quantitative genetics of diet and life-history
- Comparative meta-analytic insights in to diet and variation in lifespan



Supervisors and projects



Which question will you tackle?

## Dr Erin Shanahan

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[erin.shanahan@sydney.edu.au](mailto:erin.shanahan@sydney.edu.au)  
Honours stream: Microbiology

### Research interests

We are interested in understanding how host-microbiome interactions influence health. Disruption to the gut microbial community is implicated in the development and progression of chronic gastrointestinal diseases, metabolic disorders and colorectal cancer. Diet is a key factor driving host-gut microbiota interactions. Therefore we aim to understand how nutrient availability influences functional properties of the microbiota, and how microbial metabolites influence the gut epithelium, immune homeostasis and colorectal cancer risk.

### Projects

- Host-microbiome interactions in the intestinal microenvironment
- How do microbes contribute to tumour development in the gut



## Dr Samantha Solon-Biet

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[samantha.biet@sydney.edu.au](mailto:samantha.biet@sydney.edu.au)  
Honours stream: Biochemistry

### Research interests

Diets low in protein and high in carbohydrate delays ageing and extends lifespan in mice. Exactly how this occurs is unclear. My work investigates the underlying nutrient signalling pathways that drive these responses with the goal of using nutritional interventions to delay the onset age-related disease and extend healthy lifespan.

### Projects

- Is reducing branched chain amino acid intake the key to improving metabolic health?



## Dr Brigitte Sommer

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[brigitte.sommer@sydney.edu.au](mailto:brigitte.sommer@sydney.edu.au)

Honours stream: Biology

### Research interests

My research focuses on understanding patterns and drivers of marine biodiversity. I am particularly interested in subtropical ecosystems, where tropical and temperate species overlap at their range limits, including corals on rocky reefs in NSW. My research combines field data with environmental and species trait information to understand the ecology of subtropical reefs and how they will respond to climate change.

### Projects

- The ecology of corals in NSW
- Ecological dynamics on coral reef ecosystems

## Dr Murray Thomson

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[murray.thomson@sydney.edu.au](mailto:murray.thomson@sydney.edu.au)

Honours stream: Biochemistry or Biology

### Research interests

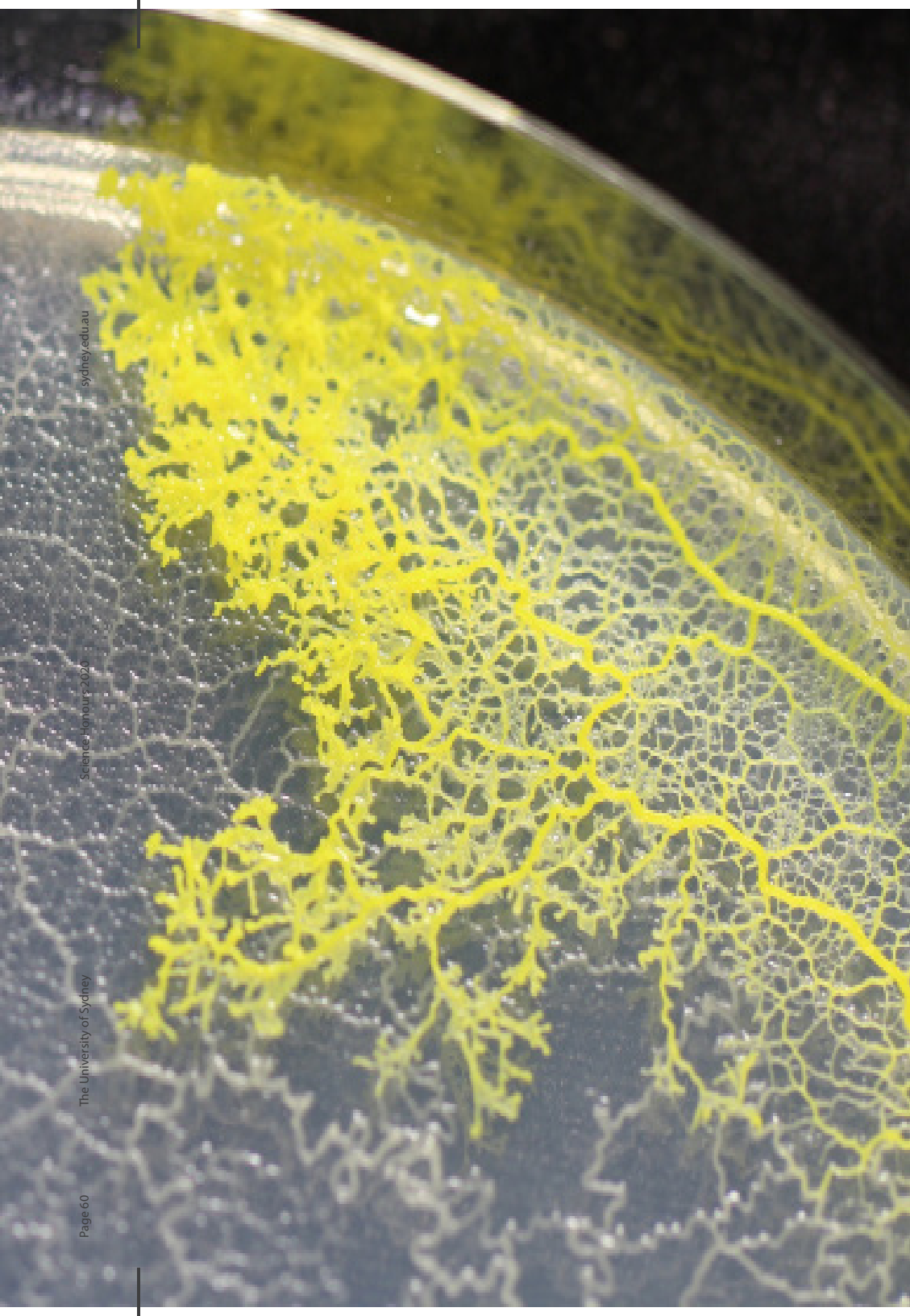
Stress and reproduction in animals can be investigated using diverse approaches including behavioural studies, physiology, cell biology and microscopy. Most of my recent research focuses on the marine isopod *Cirolana harfordi* that, gives live birth, is a social animal and represents the evolutionary transition from sea to land.

### Projects

- Social and amphibious behavior of the marine crustacean *Cirolana harfordi*
- How *Cirolana harfordi* deals with the stress of salinity changes
- Changing eating behaviour and anatomy in isopod pregnancy







## Dr Jibran Wali

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[jibran.wali@sydney.edu.au](mailto:jibran.wali@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

My research focuses on the role of dietary carbohydrates in causing obesity and diabetes. I am investigating the differences in the metabolic effects of major carbohydrates in our diet (glucose, fructose, starch, sucrose and fibre). This involves in vivo assessment of the metabolic health of laboratory mice maintained on experimental diets and examination of insulin and nutrient signalling in their liver, fat and muscle tissues.



### Projects

- Comparing the impact of the glucose vs fructose intake on metabolic health.
- How are the effects of consuming different types of carbohydrates influenced by the protein and fat content of the diet?

## Professor Ashley Ward

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[ashley.ward@sydney.edu.au](mailto:ashley.ward@sydney.edu.au)

Honours stream: Biology

### Research interests

I'm interested in all aspects of animal behaviour. I have supervised a diverse range of honours topics: cleaner wrasse behaviour on the reef, courtship behaviour and mate choice decisions, the physiology that underlies behaviour, and, predator-prey interactions. My main research is focussed on collective behaviour in animals, how animal groups work and how the function.



### Projects

- How the many become one: collective behaviour in natural systems
- Learning and information use in animal groups

## Professor Glenda Wardle

[glenda.wardle@sydney.edu.au](mailto:glenda.wardle@sydney.edu.au)

Honours stream: Biology

### Research interests

My research explores why plants, animals, populations and ecosystems vary and how this contributes to their persistence. I especially love arid ecology and using experiments and models in clever ways to advance the knowledge we have to manage and conserve the ecosystems that support us.

### Projects

- Study the population biology of *Plantago lanceolata* as part of a global team
- Experimentally test how adding nutrients or imposing drought changes the species composition and ecosystem processes of arid grasslands



## Associate Professor Charles Warren

[charles.warren@sydney.edu.au](mailto:charles.warren@sydney.edu.au)

Honours stream: Biology

### Research interests

My lab investigates how plants function and interact with soil. The scope of this research includes the roles of plants and soil microbes in processes at the ecosystem scale, for example, ecosystem cycles of carbon, nitrogen and phosphorus.

### Projects

- Diversity and co-existence of plant species, is it related to strategies of nitrogen uptake?
- Co-evolution of plant and microbial strategies for dealing with P deficiency



## Professor Anthony Weiss

[tony.weiss@sydney.edu.au](mailto:tony.weiss@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

We are building elastic tissue components in the Charles Perkins Centre. Our biomaterials have been used in four human clinical trials. We now seek Honours students interested in participating in making the next generation of elastic biomaterials for organ and tissue augmentation and repair.

### Projects

- Cell: molecule interplay in the assembly of human elastic tissue
- Accelerated wound repair for human burn patients
- 3D artery constructs



Supervisors and projects

## Dr Thomas White

[thomas.white@sydney.edu.au](mailto:thomas.white@sydney.edu.au)

Honours stream: Biology

### Research interests

We are interested in all aspects of animal behaviour and evolution, and enjoying using charismatic invertebrates — such as butterflies, flies, and spiders — to answer fundamental questions. Much of our current work is centred on communication, for which we use experiments, field observation (on beaches and in forests), and modelling to understand how animals perceive and interact with one another and the world at large.



### Projects

- Visual communication in the wild
- Iridescent wings and dynamic dances
- Sexual selection and speciation

Which question will you tackle?

## Dr Camilla Whittington

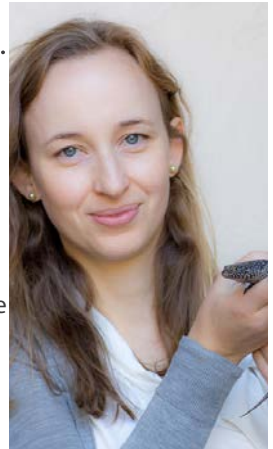
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[camilla.whittington@sydney.edu.au](mailto:camilla.whittington@sydney.edu.au)

Honours stream: Biology

### Research interests

My group studies the biology and evolution of pregnancy, which has evolved convergently hundreds of times in animals. We use a range of techniques including genetics/genomics, histology, morphology and physiology, to study the reproductive biology of seahorses, sharks, lizards, and other taxa.



### Projects

- Do egg-laying and live bearing lizards interbreed in the wild?
- Can male-pregnant seahorses transport nutrients to embryos?
- How do male seahorses give birth?

## Dr Giselle Yeo

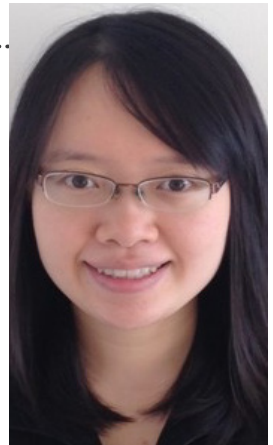
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[giselle.yeo@sydney.edu.au](mailto:giselle.yeo@sydney.edu.au)

Honours stream: Biochemistry

### Research interests

My research spans the basic characterisation of stem cell behaviour to translational applications in tissue engineering and regenerative medicine. I am interested in the interconnected roles of extracellular matrix proteins and growth factors in modulating a range of stem cell responses, including recruitment, growth, maintenance of stemness and functional differentiation. I am also interested in harnessing the bioactivity of molecules to develop functional materials for stem cell expansion, directed specialisation and targeted delivery for therapeutic applications.



### Projects

- Investigating tropoelastin-activated signalling in mesenchymal stem cells
- Development of implantable hydrogels encapsulated with stem cells







# Additional information

## Checklist and contact

### Local students

- Read about the available projects and arrange to meet with potential supervisors
- Submit your online Honours and Graduate Diploma Projects Application Form by the closing dates listed on page 5.
- Submit your online Faculty of Science Honours Application Form to the Faculty of Science by the closing date listed on page 5.

### International students

- Read about the available projects and arrange to meet with potential supervisors
- Submit your online Honours and Graduate Diploma Projects Application Form with your choice of three supervisors by the closing dates listed on page 5.
- Submit an International Undergraduate Student Application Form to the International Student Office for visa processing.
- Submit your online Faculty of Science Honours Application Form to the Faculty of Science by the closing date listed on page 5.

### Contact

SOLES Education Support  
Level 5, Carslaw Building (F07)  
The University of Sydney  
E [soles.education@sydney.edu.au](mailto:soles.education@sydney.edu.au)  
T (02) 9351 5819



# NOTES

# NOTES

“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 do Honours with us?

Our School is made up of world class researchers and experienced and effective mentors. You will find a broad range of research projects available to meet your specific interests spanning biochemistry, ecology, microbiology, animal behaviour, genetics and evolution. Finally, our Honours alumni find employment in a wide variety of fields - with an Honours degree in life and environmental sciences behind you, the choice is yours!

School of Life and Environmental Sciences  
[sydney.edu.au/science/life-environment](http://sydney.edu.au/science/life-environment)  
+61 2 9351 5819  
[soles.education@sydney.edu.au](mailto:soles.education@sydney.edu.au)