Investigate life
Which question will you tackle?
Honours 2017
Discover
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. Others enter environmental consultancy companies, pharmaceutical companies, zoos, museums, hospitals or research institutions such as CSIRO.

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

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.

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.
- continue to engender and encourage enthusiasm and curiosity in science.
How to...

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.

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. After securing a project and supervisor you must complete TWO application forms, one for the Faculty of Science and one for the School of Life and Environmental Sciences.

Step 2: Submit the School online application form
- sydney.edu.au/science/life-environment/study/honours
Step 3: For domestic students submit the Faculty of Science Honours application;

For internal (currently enrolled) international students, submit the Faculty of Science Honours application 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, 2017 applications, the last day for lodging your Step 2 application with the School is **29 November 2016**. The last day for lodging your Step 3 application with the Faculty is **30 November 2016**. The School will contact you in mid December 2016 to confirm your offer.

Deadlines for semester 2, 2017 applications are yet to be determined. Please check the website

The closing date for University of Sydney honours scholarships is January 2017 (exact date to be confirmed).
- [sydney.edu.au/scholarships/prospective/honours](http://sydney.edu.au/scholarships/prospective/honours)
How to...

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 13 September 2016 from 4.30-6pm in New Law Seminar Room 346. Chat with academics and current students in this informal setting and enjoy some drinks and nibbles.

For your chance to ask specific questions of the honours coordinators, come along to the information sessions.
- The biology session is on Monday 12 September 2016 1-2pm in Heydon Lawrence lecture theatre 217.
- The biochemistry and microbiology session is on Thursday 15 September 2016 1-2pm in the Molecular Biosciences level 4 common room.
How to... Discover
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
- 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 and 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

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

Coordinator

Associate Professor Nathan Lo
Room 306, Edgeworth-David
Building (A11)
The University of Sydney
E nathan.lo@sydney.edu.au
T (02) 9036 7649

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

Danya Luo
Honours student 2015
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 (60%) 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 (15%) 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**

Biochemistry honours:  
BCHM4011, BCHM4012, BCHM4013 and BCHM4014

Microbiology honours:  
MICR4011, MICR4012, MICR4013 and MICR4014

**Coordinator**

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

“An honours project in biochemistry and microbiology is so much more than an academic experience. The most important and unique aspect of it is the family you gain the minute you walk into the building. They will push you to excel, catch you when you fail, and encourage greatness in all your endeavours.”

**Caitlin Abbott**  
Honours student 2015
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.

Biochemistry

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Supervisors and projects
Which question will you tackle?

Dr Alyson Ashe

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
- What genes are required for epigenetic inheritance?
- Epigenetics and viral resistance

Professor Peter Banks

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
- How do exotic predators deal with novel foods?
- The ecology of ticks and their hosts at the urban-bushland interface
Professor Madeleine Beekman
madeleine.beekman@sydney.edu.au
Honours stream: Biology

Research interests
The ‘Bee lab’ is interested in behavioural ecology, behavioural genetics and molecular genetics of social insects and slime molds. We study honey bees (particularly Thai and African ones) and Australian native stingless bees. We are particularly interested in cheating behaviour: when workers start laying eggs or changing caste. We also study population genetics of invasive ants and bees, and use the slime mold to address general evolutionary questions.

Projects
- If you want to know more about the specific projects the lab offers, have a look at our website.

Dr Kim Bell-Anderson
kim.bellanderson@sydney.edu.au
Honours stream: Biochemistry

Research interests
The Bell-Anderson Lab investigates the effect of nutrients on insulin action. Specifically, we are identifying novel factors in the mechanism underlying how glucose can resolve insulin resistance in high-fat fed rats. Ultimately we need to optimise nutrition for health to reduce the burden of type 2 diabetes and identify new pathways to target drug action.

Projects
- How nutrients regulate insulin sensitivity
Professor Jennie Brand-Miller

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)

Professor Maria Byrne

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 – speciation in the sea and how echinoderms evolved
- Impacts of climate change on marine invertebrates – adaptation in a changing ocean
Associate Professor Mary Byrne
mary.byrne@sydney.edu.au
Honours stream: Biochemistry

Research interests
We are interested in identifying and understanding gene networks involved in regulating plant shoot development. Our research uses the model species Arabidopsis thaliana. The enormous genetic and genomic tools and resources available in Arabidopsis enable use of a broad range of approaches to investigate details of developmental biology.

Projects
- Transcription factor regulation of leaf development
- Evolution of transcription factor genes

Professor Iain Campbell
iain.campbell@sydney.edu.au
Honours stream: Biochemistry

Research interests
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 employed by different cytokines to alter the gene expression program and phenotype of cells within the central nervous system and how this leads to neurological disease.

Projects
- Analysis of IL-6/gp130 cytokine signalling and actions in brain astroglia and microglia
Associate Professor Dee Carter
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 adapt to changes, making them more able to cause harm and resist treatment. This can be due to their ability to acquire mutations, up-regulate resistance mechanisms and/or to exchange genetic material through sex.

Projects
− Can the sanitisers used to treat foods make fungi more pathogenic and more resistant?
− Sexual reproduction in the pathogenic yeast Cryptococcus and the mysteries of the mating

Professor Min Chen
min.chen@sydney.edu.au
Honours stream: Biochemistry

Research interests
In 2010, the most red-shifted chlorophyll, chlorophyll f, was reported, which gives the potential for extending the limits of natural photosynthesis. The projects will aim to better understand the molecular mechanisms of photosynthesis driven by novel chlorophylls and seek to improve photosynthetic efficiency and biomass production.

Projects
− Chlorophyll biosynthetic pathway, a pathway leading to potential application for increasing crop yield.
Dr Nicholas Coleman

nicholas.coleman@sydney.edu.au
Honours stream: Microbiology or Biochemistry

**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

Associate Professor Ross Coleman

ross.coleman@sydney.edu.au
Honours stream: Biology

**Research interests**
The Coastal and Marine Ecosystems group uses experimental and modelling approaches to understand the basis of animal distributions and interactions in coastal systems and how these interact with oceanic phenomena. My research looks at how and why biodiversity is spatially structured, and how organisms may behave or modify their physiology as to reduce the chances of being eaten.

**Projects**
- Wound-induced defence in seaweed
- Biodiversity and geomorphology of rocky shores under climate change
Associate Professor Charles Collyer
charles.collyer@sydney.edu.au
Honours stream: Biochemistry

Research interests
My research focuses on the fundamental relationship between the atomic structure of molecules and how they function in cells. The method of protein crystallography has made a major contribution to our understanding of enzyme mechanism, molecular recognition, and to our growing knowledge of the mechanics of molecular machines.

Projects
- How do gingipains recognise their host cell targets?
- DNA translocases and the remodelling of chromatin

Professor Arthur Conigrave
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.
Associate Professor Stuart Cordwell

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. I am 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.

Projects
- Investigating the role of N-linked protein glycosylation in Campylobacter jejuni pathogenesis

Associate Professor Mathew Crowther

mathew.crowther@sydney.edu.au
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)
Associate Professor Gareth Denyer

ɡɑrɛθ.dɛnɹɜ@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?

Dr Bradley Evans

bɹdli.ɛvənz@sydney.edu.au
Honours stream: Biology

Research interests
I have expertise in modelling and sensing natural (native) and semi-natural (i.e. agricultural) environments using both ground based sensors, airborne (planes and drones) and satellites. My research focuses on understanding the ecophysiology, climate and environmental constraints affecting biophysical models of plant growth and water use.

Projects
- High-resolution estimation of above ground biomass and plant productivity
- Using drones on farms to improve productivity
Dr Thomas Ferenci
tom.ferenci@sydney.edu.au
Honours stream: Microbiology or Biochemistry

Research interests
We study fundamental aspects of adaptation in bacterial populations. The molecular changes in evolving bacteria are investigated with the aim of defining the multiple mechanisms (especially mutational processes and fitness solutions) that lead to bacterial adaptation.

Projects
- Mutation rates and mutation spectra in a continuous culture (chemostat) model system
- The role of trade-offs in evolution and the molecular basis of trade-off geometries

Dr Sandro Fernandes Ataide
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
- Structural basis of how DNMT3a interacts with IncRNAs
- Exploiting the bacterial SRP receptor as a drug target
Associate Professor William Figueira
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

Associate Professor Neville Firth
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
Professor Ruth Hall

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
- What distinguishes the novel IS26 transposition from other IS?
- Assemble and annotate the genomes of multiple antibiotic resistant bacterium

Dr Dale Hancock

dale.hancock@sydney.edu.au
Honours stream: Biochemistry

Research interests
I am interested in microRNAs and their role in gene expression, particularly in the context of obesity. It has long been known that gene expression is regulated both by transcriptional and post-transcriptional mechanisms and there is now increasing experimental evidence suggesting microRNAs play a major role in the control of mRNA stability and translatability.
Associate Professor Murray Henwood

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)

Professor Simon Ho

simon.ho@sydney.edu.au
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
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
- Are urban ecosystems hostile environments for herbivorous insects?

Dr Markus Hofer
markus.hofer@sydney.edu.au
Honours stream: Biochemistry

Research interests
Inflammation plays a central role in most central nervous system disorders. It protects the brain from infection and drives neurological diseases. My laboratory investigates factors that cause and modulate inflammation in the brain. Using mouse models, we explore how viruses and host mediators modulate neurological diseases.

Projects
- Characterisation of a novel mouse model for Zika virus infection
- The effects of deficient IFN-I signalling on the host response against viruses
Associate Professor Andrew Holmes

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

Professor David James

david.james@sydney.edu.au
Honours stream: Biochemistry

Research interests
Our overarching goal is to predict the future health of individuals and to provide optimal strategies for health and longevity. Our immediate disease focus is metabolic disease like Type 2 diabetes. We have discovered that metabolism and signal transduction pathways are interlinked. This has important implications for diabetes and cancer as in both cases, cells undergo major adaptations in both of these systems.

Projects
- Mapping new functions of insulin and exercise
- Mechanistic analysis of the Adipocyte
Dr Melkam Kebede
melkam.kebede@sydney.edu.au
Honours stream: Biochemistry

Research interests
Insulin degradation is increased in pancreatic beta-cells from patients with type 2 diabetes and contributes to a loss of insulin available for secretion. The molecular mechanisms that control insulin degradation in pancreatic beta-cells remain poorly understood.

Projects
- The role of Sortilin on pancreatic beta-cell insulin degradation
- Proteome of the pancreatic beta-cells
- Proteome of the insulin granule with age

Associate Professor Michael Kertesz
michael.kertesz@sydney.edu.au
Honours stream: Microbiology

Research interests
As a molecular microbial ecologist, my interests target questions of functional microbial interactions, especially in soil and rhizosphere environments. Soil and roots constitute a highly dynamic and complex ecosystem and understanding who is doing what, when and with whom can yield a host of new insights, many of which have practical implications for sustainable agriculture.

Projects
- Stimulation of bacterial sulfatase activity by plants – importance of ubiquitin proteins
Dr Ann Kwan
ann.kwan@sydney.edu.au
Honours stream: Biochemistry

Research interests
My laboratory is focused on understanding and utilising proteins which can self-assemble into robust structures and coatings for biotechnological and medical applications. I use an interdisciplinary approach to solving biological problems including molecular biology, protein biochemistry, biophysics, structure determination and modelling, microscopy, surface measurements and amyloid assays.

Projects
- Applications of fungal hydrophobins
- Characterisation and modelling of the self-assembly of fungal hydrophobins

Dr Mark Larance
mark.larance@sydney.edu.au
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
- How does the liver regulate protein-protein interactions during fasting to affect protein function?
Dr Tanya Latty
tanya.latty@sydney.edu.au
Honours stream: Biology

Research interests
We are insect ecologists focused on: 1) Swarm intelligence in bees, ants and slime moulds and 2) insect pollination ecology, especially in urban and rural agriculture. We also have projects available on slime mould behaviour, the response of ant colonies to disasters, and insects as food for livestock/humans.

Projects
- Ants as engineers: how do meat ants build efficient roadways?
- Bee hotels: important conservation tools or parasite-riddled death traps?

Dr Osu Lilje
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
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, focusing on genomic data.

Projects
- Bird strike at Australian airports: characterisation of diet in relevant bird taxa using metagenomics
- How predictable is evolution? Investigating parallel genetic evolution in bacterial symbionts of native Australian cockroaches

Professor Joel Mackay
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, DNA, mass spectrometry, cloning, protein expression and purification, protein biochemistry, structural biology.

Projects
- How does the Nucleosome Remodelling and Deacetylase complex remodel chromatin?
- Can we design targeted epigenetic modifier enzymes using CRISPR/Cas9 fusion proteins?
Professor Jacqui Matthews

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

Associate Professor Clare McArthur

clare.mcarthur@sydney.edu.au
Honours stream: Biology

Research interests
My research explores the ecological interactions of herbivores with plants and predators: how herbivores solve the key foraging problem of eating without being eaten, how plants defend when they can’t escape and how the fear of predators modifies these interactions. These projects can be applied to conservation and management of both herbivores and plants.

Projects
− Quantify how mammalian herbivores such as swamp wallabies use odour and visual cues of plants when searching for food in complex natural landscapes (with Professor Peter Banks)
Associate Professor Greg Neely
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
- Lifespan extension while preserving brain function
- How does diet alter taste perception?
- Environmental factors that suppress synaptic function

Dr Timothy Newsome
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. Viral infection impacts cell survival, adhesion, the propensity to divide and migrate, all of which contribute to enhancing virus replication and spread.

Projects
- Signalling mechanisms shared by virally-infected cells and metastatic tumours?
- Co-option of the cytoskeleton to promote virus spread
Dr Hannah Nicholas

hannah.nicholas@sydney.edu.au
Honours stream: Biochemistry

Research interests
We study neuronal development and aging using the nematode Caenorhabditis elegans as a model system. With fluorescent reporters we track the growth of neurons during development and monitor age-related neuronal changes in order to understand the mechanisms by which these processes are regulated.

Projects
- Investigating the roles of transcriptional repressor CTBP-1 in neuronal development
- Monitoring neuronal aging using iTRAQ mass spectrometry

Professor Ben Oldroyd

benjamin.oldroyd@sydney.edu.au
Honours stream: Biology

Research interests
The ‘Bee lab’ is interested in behavioural ecology, behavioural genetics and molecular genetics of social insects and slime molds. We study honey bees (particularly Thai and African ones) and Australian native stingless bees. We are particularly interested in cheating behaviour: when workers start laying eggs or changing caste. We also study population genetics of invasive ants and bees, and use the slime mold to address general evolutionary questions.

Projects
- If you want to know more about the specific projects the lab offers, have a look at our website.
Dr Rosanne Quinnell
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
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
Honours stream: Microbiology or Biochemistry

Research interests
This research applies computational simulation to address questions that are impossible to answer with traditional approaches. Using simulation we can marry hypothesis with real data to better understand a system. There are no ethical or practical experimental limitations, we can even break the laws of physics to answer a question.

Projects
- How do motility decisions at the individual-leukocyte level affect the immune system’s response efficiency?

Professor Peter Reeves
stuart.cordwell@sydney.edu.au
Honours stream: Microbiology or Biochemistry

Research interests
Genetics and biosynthesis of bacterial surface antigens, critical for both pathogenesis and host immune response. These antigens are extremely variable even within species. Projects involve combinations of mutation, cloning, gene knockouts, and gene replacement, followed by expression and function studies. Aim is better understanding antigen diversity and its role.

Projects
- Functional analysis of selected genes/proteins for O-antigen synthesis in one of the pathogenic enteric bacteria
Dr Jennifer 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
- Actin in root branching in Arabidopsis thaliana
- The role of energy partitioning in root branching in Arabidopsis thaliana

Professor Frank Seebacher

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

Research interests
My research focuses on the fundamental relationship 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.
Professor Richard Shine

rick.shine@sydney.edu.au
Honours stream: Biology

Research interests
I study the ecology and evolution of reptiles and amphibians – partly because they are so damn interesting, and partly because we need to understand these creatures if we are to have any hope of conserving their populations. My studies span the range from tropical snakes and invasive cane toads, through to endangered snakes and lizards in New South Wales.

Projects
- Rapid evolution in cane toads
- Novel approaches to cane toad control

Professor Steve Simpson

stephen.simpson@sydney.edu.au
Honours stream: Biology

Research interests
My group works at the interface of physiology, ecology, and behaviour. As well as discovering the mechanisms that induce swarming in locusts, we have developed state-space models for nutrition. The Geometric Framework arose from experiments on insects, but is now being applied in a wide variety of contexts, including human health and aquaculture.

Projects
- Locust ecology and physiology
- Investigation into the protein appetite signal in humans
- Evolution of sociality
Dr Samantha Solon-Biet
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 remains unknown. My work investigates the underlying nutrient signalling pathways that drive these responses with the goal of using nutritional interventions to delay the ageing process.

Projects
- Protein restriction and metabolic health: Exploring the role of FGF21

Dr Charmaine Tam
charmaine.tam@sydney.edu.au
Honours stream: Biology

Research interests
My research focuses on understanding the physiology behind the development of obesity and type 2 diabetes and spans preclinical studies in mice to cross-sectional and interventional studies in humans.

Projects
- Effects of yo-yo dieting on energy metabolism and adipose tissue function
**Associate Professor Charlotte Taylor**

charlotte.taylor@sydney.edu.au  
Honours stream: Biology

**Research interests**  
My research focuses on an integration of urban ecology, scientific literacy and biodiversity education. My students work across a wide range of topics, from the ecology of urban birds (parrots, mynas and noisy miners) to the ecological literacy of kindergarten children and pre-service teachers.

**Projects**  
- Urban biodiversity and resource availability  
- Eco-literacy – how do you think like a biologist?

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**Professor Mike Thompson**

mike.thompson@sydney.edu.au  
Honours stream: Biology

**Research interests**  
We are primarily interested in studying the evolution of viviparity (live birth). In collaboration with other staff in the School and elsewhere, we use a variety of methods to address specific questions in reproduction, including microscopy, immunohistochemistry, molecular biology and various physiological methods in lizards, fishes, marsupials and some invertebrates.

**Projects**  
- Cellular preparation of the uterus for pregnancy  
- Mechanisms of nutrient transport across the placenta
Dr Murray Thomson
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

Associate Professor Ashley Ward
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
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
Honours stream: Biology

Research interests
My lab investigates plant function and ecosystem processes. The scope of this research includes the chemical and physical processes associated with life (e.g. photosynthesis, respiration, gas exchange, nutrient uptake) and the roles of plants and soil in ecosystem cycles of carbon, nitrogen and phosphorus.

Projects
- Ecosystem processes at cold temperatures
- Nitrogen economy of contrasting plant species
- Plant and soil strategies for dealing with P deficiency
Dr Camilla Whittington  
camilla.whittington@sydney.edu.au  
Honours stream: Biology

Research interests  
I am interested in evolutionary innovations including viviparity (live birth/pregnancy), an important biological innovation that has evolved convergently many times in mammals, reptiles, amphibians, fish, and invertebrates. I study viviparity using state-of-the-art transcriptome sequencing techniques as well as methods in histology, morphology and physiology, in lizards, sharks, seahorses, marsupials, and invertebrates.

Projects  
- The fundamental biology of shark pregnancy  
- Physiology of male pregnancy in seahorses

Professor Anthony Weiss  
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
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
Student services coordinator
Level 5, Carslaw Building (F07)
The University of Sydney
E soles.teaching@sydney.edu.au
T (02) 9114 1535
“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!