

BIOLOGY Honours and Masters (Advanced) Programs

BIOL4001/BIOL8701

Biology Honours is an exciting, challenging and rewarding year. By working on a research project under the guidance of a supervisor, and through training courses and workshops, you will develop valuable skills in research planning, laboratory, field, or computational techniques, data analysis and inductive inference. You will develop an advanced understanding of a particular field of biology and an enthusiasm for the process of scientific discovery.

Admission Requirements

- Satisfactory completion of an undergraduate degree with an average score of at least 70%, calculated from six 2000 and 3000 level courses relevant to the proposed field of research.
- The availability of a research supervisor.

How to apply

For information on how to apply: <http://biology.anu.edu.au/education/degree-programs/honours/apply-honours>

Application deadline

The application deadline is 15 December (Feb start) or 31 May (July start).

How do you find a project and supervisor?

Before you apply, you should have a topic of research and the agreement of a Lab Leader in RSB to supervise your project. Well before applications close, get in touch with potential supervisors to discuss your research interests. Supervisors may offer “off the shelf” projects to choose from, or be willing to tailor a project to your interests. You might consider talking to honours or PhD students from RSB to get an idea of the research environments in different labs. Many RSB academics co-supervise projects with CSIRO, so a project based at CSIRO is also a possibility.

What type of research is being done in RSB? Find out here: <http://biology.anu.edu.au/research/divisions>.

What projects are available? See list below

Are there any scholarships available?

Yes there are, see p4.

What does an Honours research year entail?

The Honours year is entirely based on independent research. Most of your year will be spent working on **your research project**, under the guidance of a supervisor and typically with staff or/and students in their group.

- The year begins with a few weeks of **training courses and workshops** to equip you with important research skills.
- Early in the year you will present a 15 min **Introductory Seminar** to outline your project to RSB staff and students.
- A few weeks later you will submit a **Research Proposal** outlining the background, aims and methods for your project and then meet with your *panel of examiners* to discuss your project plan. The Research proposal is worth 15% for Honours students. For Masters students it is compulsory, but does not contribute to your final score.
- You will meet with your *panel of examiners* mid-way through the year to review your progress and then near the end of the year present your findings and conclusions in a 15 min **Final Seminar**. This is a good chance to organize your thoughts and get feedback before writing your thesis.
- The major piece of assessment is your ~10,000 word **Thesis**. This is worth 85% of your final score for Honours students and 100% for Masters students. The thesis presents the background and literature review relevant to your project, your project aims, a description of the methods and results, a discussion of your findings and their implications, and your conclusions. Plenty of support and guidance is provided to help you prepare your thesis.
- After your thesis is submitted, you will meet again with your examiners for a discussion of your thesis.

As a member of a research group you will be expected to participate in your group’s regular activities such as lab meetings are encouraged to actively participate activities at the School or Division level, such as journal clubs, workshops, weekly seminars, and various social events.

Available Research Projects:

Below are some of the projects on offer. You can also contact academic staff directly and tell them what your general interests are. Also see <http://biology.anu.edu.au/education/degree-programs/honours/apply-honours>.

[Maja Adamska](#) - *Genomic and evolutionary basis of animal development*

- Using sponges and corals to understand animal evolution and development

[Owen Atkin, Onoriode Coast and Andrew Scafaro](#) – *Plant respiration in a changing world*

- Small heat shock proteins and their role in the response of plants to heat stress
- Exploring relationships between photosynthesis and the critical temperature of photosystem II function
- High night temperature and photosynthesis in wheat

[Joseph Brock](#) – *Membrane structural biology, biochemistry and biophysics*

- Molecular mechanisms of Omega-3 derived resolution of inflammation
- [Structural basis of cell adhesion in health and disease](#)
- [Structural basis of drug resistance in the Malaria parasite](#)

[Caitlin Byrt](#) – *Engineering plant membrane proteins and solute transport to increase yield security*

- Salinity and drought tolerance mechanism in plants

[Marcel Cardillo](#) – *Biodiversity, biogeography, conservation*

- Global patterns of extinction risk in vertebrates
- Phylogenetics, macroevolution, and conservation the plant family Proteaceae

[Tory Clarke](#) – *CO₂ fixation and water loss of leaves*

- Targeted engineering of photosynthetic pathways to increase crop yields

[Paul Cooper](#) – *Macroinvertebrates and water quality*

- [Using macroinvertebrates to determine water quality in the Mulloon Creek catchment](#)
- [Effect of scale insects on grapevine cultivars \(cv. Shiraz and cv. Pinot Noir\) grown in a greenhouse](#)

[Ben Corry](#) - *Membrane channels, transporters and computational biophysics*

- Designing new channel inhibitors for treating chronic pain
- Understanding the channel proteins responsible for our sense of touch
- Biologically inspired membranes for the efficient water filtration
- Simulating parasite membrane transporters

[Giel van Dooren](#) - *Cell biology and metabolism of apicomplexan parasites*

- Uncovering connections between nutrient uptake and mitochondrial metabolism in *Toxoplasma* parasites

[David Gordon](#) – *Population biology of micro organisms*

- Enteropathogenic *E.coli* in flying foxes
- Evolution of genome size in *E.coli*

[Denisse Leyton](#) - *Assembly, structure and function of bacterial nanomachines*

- Functional characterisation of RpeA, a putative autotransporter adhesin from Rabbit enteropathogenic *Escherichia coli*
- Structural characterisation of Ag43, an adhesin from uropathogenic *Escherichia coli*
- Subcellular localisation and structural biology of individual Mla components from *Acinetobacter baumannii*

[Alex Maier](#) – *Molecular mechanisms of malaria pathogenesis*

- Analysis of sex-specific phosphorylation in the malaria parasite *Plasmodium falciparum*
- Incommunicado - Impact of host signaling on the survival and development of the malaria parasite
- Fighting malaria with fat – analysis of the lipid metabolism of the malaria parasite
- Power unseen – in-situ visualisation of parasites of medical and veterinary importance

[Sasha Mikheyev](#) – *Evolutionary genomics*

- How animals adapt to rapid changes in their environments

[Anthony Millar](#) – *Plant RNA biology*

- Using plant miRNAs to trigger disease resistance in plants

[Craig Moritz](#) – *Understanding and protecting Australia's unique biodiversity*

- Modeling spatial patterns of genetic and phylogenetic diversity to identify refugia for conservation across Australia's tropical north
- Comparing speciation and range-shifting of species under past climate change
- Identifying genes under selection for desiccation resistance in geckos

- Understanding divergence and genetic erosion in island mammals
- Molecular evolution and phylogenetics of Australian marsupials

[Adrienne Nicotra](#) – *Plant physiological ecology, evolutionary biology*

- [The evolution of plasticity in thermal tolerance](#)
- [Sequencing the genome of an Australian alpine plant](#) (Top Up Scholarship available, Benjamin Schwessinger as lead supervisor)

[Daniel Noble](#) – *Climate change, development plasticity and lizard ecophysiology*

- How do early thermal environments impact thermal behaviour in lizards?
- How do early thermal environments affect metabolic thermal acclimation responses in lizards?
- How do early thermal environments affect growth across different lizard species?

[Barry Pogson](#) - *Intra cellular signalling during light and drought stress in plants*

- Gene expression 2.0: Uncovering new gene regulatory mechanism by examining RNA fate under stress.

[John Rathjen](#) – *Plant immunity and pathogen genomics*

- Directed evolution of plant disease resistance proteins
- Role of nitric oxide in plant disease resistance
- How does a fungal super-parasite deploy its genes?

[Benjamin Schwessinger](#) – *Plants fungi, evolution*

- Enhancing agricultural and environmental biosecurity using cutting edge genomic & bioinformatics.

[Peter Solomon](#) - *Wheat Biosecurity*

- Improving food security by understanding how pathogens infect and kill crop plants

[Kara Youngentob](#) and [Karen Ford](#) – *Nutritional ecology*

- How plant nutrients and toxins affect animals

ARC Centre of Excellence for Translational Photosynthesis

- Deciphering C4 photosynthesis to boost crop production: [Robert Furbank](#), [Susanne von Caemmerer](#), [Maria Ermakova](#).
- Using aquaporins to enhance photosynthesis and plant performance: [John Evans](#), [Michael Groszmann](#)
- Capturing light, driving productivity: [John Evans](#), [Susanne von Caemmerer](#)
- Using cyanobacterial bicarbonate transporters to enhance crop photosynthesis: [Dean Price](#)
- Supercharging CO₂ fixation in plants: [Spencer Whitney](#), [Robert Sharwood](#)
- Tailoring a golden crop for a warmer future: [Spencer Whitney](#)

CSIRO

Dr Manny Delhaize (manny.delhaize@csiro.au)

- Characterizing root mutants of wheat- the case of the gravity-defying Twisted Sisters.

[Gonzalo Estavillo](#), [Robert Furbank](#), [Tony Condon](#), [J Zhang](#) and [Thomas Vanhercke](#)

- Tools and techniques for measuring photosynthesis in the field
- Effects of abiotic stress on plant oil production in super tobacco plants

Dr Bob Godfree (Robert.Godfree@csiro.au), National Research Collections Australia.

- Impact of current and historical extreme drought on native vegetation.

Dr Cecile Gueidan (cecile.gueidan@csiro.au)

- Molecular systematics of lichenised fungi and fungal-algal interactions in the lichen symbiosis

Dr Lydia Guja (lydia.guja@csiro.au)

- Seed biology, seed ecology, and plant conservation

Dr Rebecca Haling and *Dr Richard Simpson* (rebecca.haling@csiro.au and richard.simpson@csiro.au)

- Foraging for better root traits: identifying novel variation to develop pasture legumes for phosphorus deficient soils

Dr Alexander Schmidt-Lebuhn (alexander.schmidt-lebuhn@csiro.au)

- Species delimitation, cytology, biogeography and phylogenetics of plants, especially Asteraceae (daisy family)

Dr Colin Scott (colin.scott@csiro.au)

- Hacking nature: Rewiring RNA based bacterial sensors to detect new signals
- Sweet Biochemistry: Enzyme cascades for making novel sugars

Dr Jose Barrero (Jose.Barrero@csiro.au)

- How mother's temperature can affect kids sleep?

Can I get research training before Honours?

The Research School of Biology offers Summer Research Internships (SRI, for ANU students) and Summer Research Scholarships (SRS, for non-ANU students). The SRI/SRS programs are designed for talented students interested in just trialing research or/and considering undertaking postgraduate research in the future. Successful applicants are awarded a weekly allowance for the 8 week program and are invited to participate in social events, workshops and seminars over summer. For information see <https://biology.anu.edu.au/education/summer-research-scholarships>

Are there any scholarships available?

Applications for the following scholarships are available for Biology Honours students:

- [ANU Honours Scholarship](#) (\$5000)
- [Angus Nicholson Honours Scholarship in Science](#) (\$7500)
- [Anjeli Nathan Memorial Scholarship](#) (\$7000)
- [Bassett Downs Honours Scholarship in Zoology](#) (\$7000) – This scholarship is offered in alternate years, next offer is in 2020.
- [The ARC Centre of Excellence in Plant Energy Biology](#) – Warwick Hillier Honours Scholarships (\$7000): Please apply to rsb.studentadmin@anu.edu.au by 30 November.
- Centre for Biodiversity Analysis Honours Awards (\$10,000). Information can be found at <http://cba.anu.edu.au/opportunities/cba-grants-funding/honours-awards>
- Miscellaneous Scholarships (\$1000-\$5000). Occasionally supervisors may be in a position to offer a scholarship from their research funds. This should be discussed with your supervisor.
- External or Industry Scholarships: Your supervisor may know of other scholarships offered by industries, government agencies, Grains Research and Development Corporation (GRDC), CSIRO, or Australian Biological Resources Study (ABRS). Please discussed with your supervisor directly.