Honours - 2020

https://fvas.unimelb.edu.au/study/honours

Prof Paul Taylor - Director Honours
Antony Walker Honours Academic Programs Coordinator
Honours

Apply science to significant real-world issues — whether improving animal health and well-being or addressing climate change, food security and environmental sustainability.
Honours

FVAS Honours streams

B Ag
BSc Agriculture
BSc Food Science
BSc Animal Science and Management
BSc Veterinary Bioscience

Advanced, specialised study that extends students’ knowledge and skills through a supervised research project together with advanced coursework in related areas of study.
Why do honours?

• Interest / curiosity in science
• Develop skills in critical thinking, data interpretation, reviewing the literature and scientific writing
• Career as a scientist
• Academic career
• Other career opportunities (Honours could make you a more competitive candidate for other job options)
Learning outcomes during an honours year

• Draw together your previous science, biomedical or health science studies and focus your knowledge, skills and intellect on an exciting piece of original research

• Demonstrate your capacity for independent study and research

• Develop the skills necessary for transition to employment in a range of occupations and industries or a research higher degree

• Think like a scientist
Course structure

• Students complete 25 points of advanced coursework - Students must complete one of:
  
  • AGRI90075 Research Methods for Life Sciences 12.5 pts Semester 1
  • MAST90075 Data and Decision Making 12.5 pts Semester 1
  • BIOL90002 Biometry 12.5 pts July
  • NRMT40005 Social Research Methods 12.5 pts Semester 1
  • BIOM40001 Introduction to Biomedical Research 12.5 pts February
  
  Plus
  
  • SCIE40001 Critical Thinking in Research 12.5pts Semester 1

• Research project - Students complete 75 points of research:
  
  • Research Project 25 pts Semester 1
  • Research Project 50 pts Semester 2
How do I apply?

Procedure checklist for applying for honours

1. Decide which project(s) you wish to apply for (Research project list - http://fvas.unimelb.edu.au/study/honours). To do this, you must speak with potential supervisors when deciding.

2. Complete an “Expression of Interest Form”

3. Make a formal application through my.unimelb (for current University of Melbourne students) or through the Future Students website (for non-University of Melbourne students).

First round applications close 30 November 2019
Second round 20 January 2020
Entry Requirements (Refer to https://handbook.unimelb.edu.au/ for full details)

BH-SCI

In order to be considered for entry, applicants must have completed:

within the last 10 years a Bachelor of Science with a weighted average mark of at least H3 (65%), or equivalent, with a major relevant to the discipline stream within the Bachelor of Science (Degree with Honours) that they seek to enter

• BH-AGR

In order to be considered for entry, applicants must have completed:

within the last 10 years a Bachelor of Agriculture with a weighted average mark of at least H3 (65%), or equivalent, with a major relevant to the discipline stream within the Bachelor of Agriculture (Degree with Honours) that they seek to enter
Expression of Interest Form
https://fvas.unimelb.edu.au/study/honours

Honours application:
Project and supervisor details

INSTRUCTIONS FOR COMPLETION
1. Print out this form, and have potential supervisor(s) sign it
2. Ensure sections 1.7 are filled in
3. Scan both pages and email to Antony Walker: awalker@unimelb.edu.au
4. Keep a copy for your records
5. Submit an online application for the course through my.unimelb.edu.au, or Future Students website

1. PERSONAL DETAILS
   Student Surname: ___________________________ Student Given Names: ___________________________
   Student ID: ___________________________________ Phone: ___________________________

2. PREVIOUS/CURRENT STUDIES
   Course(s): ___________________________________________ Institution: ___________________________
   ___________________________________________ ___________________________________________
   ___________________________________________ ___________________________________________
   ___________________________________________ ___________________________________________

3. AREA(S) OF PROPOSED RESEARCH: ________________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

4. PROJECT PREFERENCES (IN ORDER):

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Provisional Supervisor Approval</th>
<th>Supervisors Name</th>
<th>Supervisors Signature</th>
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*S*Please note: Projects are competitive and will generally be confirmed once 2nd Semester 3rd Year results are released.

5. If you cannot be accommodated with any of the above supervisors do you wish us to:
   □ Have your application considered by any other supervisors who might be available?
   □ Proceed no further with your application for now?

6. APPLYING FOR (TICK ONE):
   □ Bachelor of Agriculture (Honours)
   □ Bachelor of Science (Honours in Agricultural Science)
   □ Bachelor of Science (Honours in Food Science)
   □ Bachelor of Science (Honours in Animal Science and Management)
   □ Bachelor of Science (Honours in Veterinary Bioscience)

7. APPLICANT SIGNATURE
   Signed: ___________________________ Date: ___________________________

FACULTY USE ONLY

COMMENTS:

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

SOPA
   (attach paperwork) | Subjects/Major Requirements Met
   □ Yes □ No | □ Yes □ No

PRELIMINARY APPROVAL TO UNDERTAKE HONOURS YEAR (pending supervisor acceptance):

Honours Degree Approvals
   □ Yes □ No

FVAS Honours Coordinator
   Name: ___________________________ Signature: ___________________________

Faculty Honours Program Director
   Name: ___________________________ Signature: ___________________________

Honours application: Project and supervisor details (Last updated on 24/06/2018)
Honours year

- Essential for any employment in a lab setting

- Choose project
  - Uses techniques that are widely applicable
  - Select a supervisor carefully (technical and personal attributes)

- Unlike any undergraduate study
  - “Apprentice-type” learning
  - Learn to troubleshoot
  - Prepares for research
  - Prepares for work in laboratory

- Counts for little in DVM selection
Employment

• Science graduate entry programs
  – Many large companies employ BSc/BAg graduates
  – Learn on the job

• Work your way up in industry
  – Depends on industry (academia requires Hon or PhD)
  – Very dependent on “drive” and “soft skills”

• Remember that you do not need to be a vet to work with animals

• Start your own business
Research disciplines

- Agricultural and Resource Economics and Agribusiness
- Agricultural and Veterinary Biosciences
- Veterinary Clinical Sciences
- Animal Sciences, Health and Welfare
- Crop and Soil Sciences
- Food Systems and Natural Resource Management
- Social sciences (food policy, innovation, change management, extension)
Research discipline leaders
Sustainable Agriculture - Dookie

Research leaders: Dr Dorin Gupta, Dr Graham Brodie
Plant Sciences & Biotechnology

- Molecular control of germline initiation in flowering plants
- Transgenic approaches for developing climate challenge resilient crops
- Gene networks controlling flowering and yield in legume crops
- Biotechnology of grass pollen allergens - allergy diagnosis and therapy
- Flowering time controls greening and drought response in plants
- Physiology and molecular biology of stress responses in plants
- Plant nutrition and nutrient transport

Research leaders: Prof Herbert Kronzucker, Prof Prem Bhalla, Prof Mohan Singh, Dr Rene Richter
Plant Breeding and Genetics

- **Cereal domestication**
  Investigating of the molecular genetics of crop domestication to domesticate new crops.

- **Grain dispersal mechanism**
  Understanding the evolution of grain dispersal mechanism in cereals to prevent grain loss for agriculture.

- **Cereal inflorescence architecture**
  Exploring the mechanism of spike architecture in wheat and barley to increase grain yield.

Research leader: Dr Mohammad Pourkheirandish
Plant Health and Disease

- **Plant soil health**
  Fungal pathogens associated with yield decline of pyrethrum, tomato, potato

- **Biosecurity**
  Mitigating risk of incursion of exotic plant pathogens
  Development of diagnostic tools

- **Fungal pathogen genomics**
  Taxonomy
  Identification of pathogenicity factors

Research leader: Prof Paul Taylor
Agricultural Technology

Research leaders: Prof Pablo Zarco-Tejada, Assoc Prof Sigfredo Fuentes
Nutrient cycling in agro-ecosystems
Real-time quantification of gaseous emissions in agro-ecosystems
Novel fertiliser technologies
Soil molecular ecology
Modelling and decisions support tools for efficient fertilisers use
Recycle & reuse of wastes in agriculture

Research leaders: Prof Deli Chen, Prof Jim He, Dr Clayton Butterly, Dr Tony Weatherly, Dr Helen Suter
Primary Industries Climate Challenges Centre
Climate change research
Methane from dairy cattle
Nitrous oxide emissions from intensive grazing
Whole farm systems adaptation
Nitrogen cycling in intensive grazing systems

Research leader: Prof Richard Eckard
Animal Production, Health and Nutrition

- **Animal nutrition and metabolism**
  Influence of feeding systems on animal production & efficiency

- **Whole farm systems analysis**

- **Genetic improvement**
  Genomic selection

- **Animal diseases**
  Biosecurity

**Research leaders:** Profs Frank Dunshea & Brian Leury
Cattle and Sheep Health

*Improving cattle and sheep health through industry-relevant research in Australia and internationally*

**Dairy medicine**
- Dairy veterinary resident program
- Outcomes for dairy industry include calf health, preventing anthelmintic resistance and improving cow fertility
- Large herds research project
- Benefits of dairy crossbreeding

**Research leader:** Prof Andrew Fisher

**Beef, sheep and goat health**

*The Mackinnon Project – 33 years of serving the livestock industries*

- On-farm disease surveillance research
- Preventing disease caused by *Campylobacter*, *Toxoplasma* and *Yersinia* spp
- Diagnosis, epidemiology & control of Q fever in cattle, sheep and goats
- Improving livelihoods of small-scale livestock producers in south & SE Asia
Animal Welfare Science Centre

World leaders in human-animal relationships

Major research areas

1. Effects of Housing and Husbandry
2. Novel animal welfare assessment
3. The attitudes and behaviour of animal carers & the community

Research ranges from fundamental & novel investigations to solving practical problems for industry

We have an ethical ‘duty of care’ towards the animals in our control and this translates into a practical obligation to safeguard their welfare at acceptable levels

animalwelfare.net.au

Director Professor Andrew Fisher

Core scientists Professor Paul Hemsworth | Professor Grahame Coleman
Dr Rebecca Doyle | Dr Lauren Hemsworth | Dr Ellen Jongman
Agricultural Resources and Agribusiness

Farm Systems Economics
Natural Resource Economics
Agribusiness Value Chains

Both Australia and overseas:
Identifying benefits, costs and risks of innovative opportunities to increase productivity and profitability of farm systems, to inform public management of natural resources, and to evaluate innovation along agribusiness value chains.

Research leaders: Prof Bill Malcolm and Dr Bob Farquharson
Food Science and Policy

- **Food safety and packaging**
  Extending shelf life of fresh produce

- **Sensory science**
  Improving sensory attributes of food

- **Food and wine chemistry**

- **Meat Science**
  On farm and post-farm impacts on meat quality

- **Food policy**
  Social science research on issues related to food production, processing, distribution & consumption

**Research leaders:** Associate Prof Said Ajlouni, Dr Gyorgy Scrinis, Prof Robyn Warner and Prof Frank Dunshea
**Food Value Chain**

**MARKET ANALYTICS**

- Accessing and analyzing intellectual property asset of Asia Pacific to deepen understanding of Asian premium market trends and opportunities.
- Research focused on IP database analysis, novel usage of consumer inputs for unlocking investments in knowledge spaces.

**CONSUMER INSIGHTS**

- Developing deep insights into the Asian consumer for application to the Australian export opportunity.
- Research focused on: Country of Origin vs Providence gifting.

**SENSORY**

- Understanding the Asian export market: measuring consumer engagement and brand/product positioning with Asian consumers.
- Research focused on: Biometric app development for emotion measurement, qualitative analysis method (QMA), analysis of product/package category cultural differences.

**SUPPLY CHAIN**

- Modelling supply chain decisions to optimize supply chain design and maximize export returns.
- Research focused on: Monte Carlo trade-off of 16 elements across supply chain for decision analysis guide for export readiness.

**ENGAGEMENT**

- SME engagement.

**PACKAGING**

- Food security through innovative packaging.
- Research focused on: Novel thermocromatic inks, anticounterfeiting map inclusive of anticounterfeiting IP review and consumer impact.

**ENCAPSULATION/ EMULSION**

- Premium product engineering through technology.
- Research focused on: Flavour and nutrient enhancement of confectionary model systems.

**Research leader:** Prof Frank Dunshea
# Rural Innovation Research Group

**Social science research and impact**

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<thead>
<tr>
<th>Improving transitions in farming systems</th>
<th>Improving knowledge utilisation and practice</th>
<th>Improving extension and change management</th>
<th>Improving processes in resource management</th>
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<tr>
<td>• farm decision making</td>
<td>• knowledge and learning systems</td>
<td>• advisory capacity and public-private sector roles</td>
<td>• water and drought</td>
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<tr>
<td>• workforce development (entry, exit and retention)</td>
<td>• social implications of technological developments</td>
<td>• extension design and delivery</td>
<td>• land management</td>
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<tr>
<td>• business management and risk</td>
<td>• communities of practice</td>
<td>• capacity building</td>
<td>• resilience</td>
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<td></td>
<td>• collaboration and collective action</td>
<td>• sustainable change</td>
<td>• adaptation</td>
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<td></td>
<td>• multidisciplinary and transdisciplinary research design</td>
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<td>• community development</td>
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</table>

**Research leader:** A/Professor Ruth Nettle
Meat Research

Quality, safe, healthy meat. Consumers / market insights.

Smart, traceable, packaging and storage to meet consumer / market specs.

Innovative technologies for quality, efficiently deliver to market / consumer.

Genetics and feed to meet market specs. Non-invasive monitoring of animal stress.

Market, consumer → Packaging, storage → Processing → Pre-harvest, on-farm → Consumer

Flavour chemistry
Consumer eye-tracking, thermal imaging. Market analysis QMA

Meat biochemistry, metabolomics, temperature modelling, chemical engineering of packaging.

Pressure/ sound to tenderise.
Muscle biology/ meat structure.
Protein chemistry.

Non-radiometric, infra-red cameras.
Genomics, nutritional physiol.

Research leaders: Prof Robyn Warner, Prof Frank Dunshea, A/Prof Brian Leury
Muscle and Bone

- **Muscle**
  Effect of trobin on muscle development

- **Bone**
  Bone repair
  Bone formation and resorption

**Research leader:** Prof Eleanor Mackie
Prevention of Equine Limb Injuries

Multidisciplinary: equine veterinarians, bone biologists, mechanical engineers & epidemiologist

Investigating:
• Limb loading in the galloping horse
• High load microdamage and bone failure
• How bone adapts to its loading environment
• How bone repairs microdamage

Outputs: Training and regulatory strategies that prevent excessive accumulation of bone damage, allow bone repair and identify horses at risk of severe injury so that they can be withdrawn from training and racing.

Research leader: Prof Chris Whitton
Advanced Veterinary Imaging

- Radiography
- Computed tomography
- MRI
- Scintigraphy
- Small animal medicine
  - Canine inflammatory bowel disease
  - Canine pancreatitis
- Equine medicine

Research leader: Prof Ted Whittem, A/Prof Caroline Mansfield, Prof Chris Whitton
Animal Biotechnology

Pathogens

Vaccines

Immunology

Asthma

Hatchtech

BIO21

Research leaders: A/Prof Ken Snibson, Prof Jean-Pierre Scheerlinck
Asia Pacific Centre for Animal Health

• Poultry health
  Viral diseases in chickens (Infectious laryngotracheitis virus)

• Equine
  Equine influenza
  Equine herpes virus

• Feline
  Feline upper respiratory infections

• Ruminants
  Mastitis

Research leader: Prof Glenn Browning
Vector-borne Virus Diseases

Zoonotic Viruses and One Health

**Virus / mammal interactions**
Cell biology, disease pathogenesis

**Virus / vector interactions**
Cell biology, dissemination and transmission

**Vaccines & prevention strategies**

Chikungunya
Rift Valley fever
Tick-borne encephalitis
Zika

Research leader: Prof John Fazakerley
Parasitology

• **Parasite genetics and genomics**
  Using new generation sequencing to identify novel drug and vaccine targets for economically important parasites

• **Parasite epidemiology**
  Water-borne diseases including giardia

• **Parasite biology**
  *Haemonchus contortus* developmental biology
  Hookworm vaccine candidates

• **Parasite-host interaction**
  *Schistosoma, Theileria, Fasciola*

**Research leaders:** Prof Robin Gasser, Dr Neil Young
Veterinary microbiology and virology

- Host – pathogen interactions
- Virus discovery
- Vaccine development

Research leader: Prof Carol Hartley
Vet Epi @ Melbourne

• Epidemiology
  – the study of the frequency, distribution and determinants of health-related states in populations, and the application of this knowledge to the control of health problems

• Ongoing VE@M research activities
  – the epidemiology and control of Q fever
  – disease modelling to inform animal and human health policy
  – enhancing surveillance for endemic animal disease
  – diagnostic test validation science
  – community interventions to for free-roaming dog control

Research leader: Dr Mark Stevenson
Functional Anatomy and Biomechanics

1. Functional locomotory anatomy of athletic animals (horses and dogs).

2. Hoof/surface interactions.

3. Fascial/joint anatomy and function in horse/dog/cloven-hoofed animals (sheep/cows).

4. Modelling bones and joints

Research leader: Assoc Prof Helen Davies