ASPinS Projects for second and third year students for 2015

Things to remember to ask when you speak to the project supervisor:

1. How many hours per week can I / would you expect me to work in the lab? Are there specific times I can come in each week that are suitable?
2. Who is my contact person in the lab for day to day affairs? Who should I speak to if I have questions regarding my project? Who should I email/call if I cannot make it on a day I had arranged to come?
3. Will I have an induction? Or when is the next group induction that I can join?
4. Do you have group/lab meetings and can I attend?
5. What are your expectations of me?
6. When would you like me to begin? Second Year Students are unable to begin their project before semester 1 2015 commencement.

2015 Projects are available across the following Schools and Institutes:

<table>
<thead>
<tr>
<th>Supervisor</th>
<th>School/Institute</th>
<th>Project Description</th>
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<tbody>
<tr>
<td>Dr Allen Cheung</td>
<td>Queensland Brain Institute</td>
<td>Capturing and deciphering the neural code of a rat. The hippocampus is a brain structure that has long been implicated in spatial navigation and episodic memory. One hypothesis suggests that hippocampal neural networks form “attractors” that switch between multiple stable states, each corresponding to the bottom of a “basin of attraction”. Direct recordings of groups of rat hippocampal place cells are consistent with this hypothesis, at least inside constrained laboratory settings. Further evidence to disambiguate the attractor hypothesis from others may come from observing the behaviour of these place cells under environmental manipulation in the presence of strong global cues, as would be present in outdoor environments. The student will assist in obtaining and analysing tetrode recordings from rats navigating in different outdoor arenas.</td>
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Queensland Brain Institute: http://www.qbi.uq.edu.au/
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<thead>
<tr>
<th>Dr Massimo Hilliard</th>
<th>Queensland Brain Institute</th>
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<tr>
<td><a href="mailto:m.hilliard@uq.edu.au">m.hilliard@uq.edu.au</a></td>
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<tr>
<td>+61 (7) 334 66390</td>
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**Project Option One:** Discover and study novel genes involved in axonal degeneration in C. elegans neurons.

How neurons can maintain their axonal structure and function over time is not well understood. Axonal degeneration is a critical and common feature of many peripheral neuropathies, neurodegenerative diseases and nerve injuries. The genetic factors and the cellular mechanisms that prevent axonal degeneration under normal conditions and that trigger it under pathological ones are still largely unknown. We aim to use C. elegans genetics to identify the molecules and the mechanisms that control these processes.

**Project Option Two:** Characterize the membrane dynamics and synaptic distribution during axonal regeneration in C. elegans neurons.

How some axons can regenerate after nerve damage while others cannot is a crucial question in neurobiology, and the answers will be of great value for the medical handling of neurodegenerative diseases and of traumatic nerve injuries. Largely unknown are the molecules and the mechanisms underlying this important biological process. In C. elegans, a new laser-based technology allows single neuron axotomy in living animals, and axonal regeneration can now be visualised in real-time and tackled with a genetic approach. Our goal is to identify the genes and conditions that control this fascinating process.

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<thead>
<tr>
<th>Dr Bradley Launikonis</th>
<th>Biomedical Sciences</th>
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<tr>
<td><a href="mailto:b.launikonis@uq.edu.au">b.launikonis@uq.edu.au</a></td>
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**Effects of temperature and reactive oxygen species on force production in muscle.**

Muscle function is critical to normal & independent living of individuals in society. How muscles function is not completely understood. This project will explore the effects of changing temperatures on muscle function and whether such changes cause reactive oxygen species to be generated in the muscle to affect function.

**Proposed Start:** February 2015

*An background in physiology would be an advantage.*

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<tr>
<th>A/Prof Peter G. Noakes</th>
<th>Biomedical Sciences</th>
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<tr>
<td><a href="mailto:p.noakes@uq.edu.au">p.noakes@uq.edu.au</a></td>
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<td>3365 1640</td>
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**Project Option One:** Role of Central synaptic activity in regulating the development of Motor Neurons and their innervation patterns with muscle. *There are two sub projects (activities under this title):*

1.1. For this project candidates will be working with our postdocs - Dr Fogarty and Dr Kahjhan - Our interest is to determine how the motor neuron responds when we take out selected inhibitory synaptic inputs onto motor neurons during their development. This focus will be to examine the cellular morphology of motor neurons including mapping their synaptic inputs.

1.2. Similar to project 1.1 - but with a focus on examining the muscle innervation patterns - when central synaptic inputs have been manipulated

**Proposed Start:** February 2015

*For both projects some knowledge of the neuromotor system (e.g. BIOM2011, NEUR3001) along with some cell biology and or histology would be ideal. Techniques to be learnt - advance immuno-staining of tissue - advance microscopy including image reconstructions (2D and 3D rendering).*
### Project Option Two: Mapping the infiltration of pre-immune cells into diseased muscles

This project will be in collaboration with A/Professor Trent Woodruff and Dr John Lee from our school.

**Proposed Start:** February 2015

**Techniques to be learnt:** advance immuno-staining of tissue - advance microscopy including image reconstructions (2D and 3D rendering). Some background in immunology and cell biology would be ideal.

### Dr Kylie Tucker  
k.tucker1@uq.edu.au  
Biomedical Sciences

**Altered movement control during acute and chronic pain**

No two repetitions of a movement are the same. Variation in movement is critical for healthy function - to share the load between tissues and help search for optimal movement strategies. We aim to determine if optimal movement variability is linked to maintenance and recovery from musculoskeletal pain. Projects within this stream consider motor adaptations with pain in healthy participants using novel acute and persistent pain models, and in clinical pain populations. Understanding the mechanisms that underlie the change in movement in response to pain is a critical step in the development of new rehabilitation strategies, and improving outcomes for people living with musculoskeletal pain.

**Proposed Start:** February 2015

*All of our work is conducted with human volunteers. Within this role you would likely be asked to assist with data collection of numerous movement control projects being run in the laboratory with the aim to broaden your research experience.*

### Johan Rosengren  
j.rosengren@uq.edu.au  
Biomedical Sciences

**Project One: Design and synthesis of relaxin-3 hormone analogues for the control of food intake.**

Relaxin-3 is a neuropeptide hormone that is involved in the control of stress, arousal, addiction and food intake. An antagonist of relaxin-3 can reduce food intake in rodents, suggesting it is a drug lead for obesity. This project will aim to synthesise novel analogues of this antagonist to further develop it for in vivo applications.

**Proposed Start:** February 2015

*This project is ideally suited to a student interested in peptide chemistry.*

**Project Two: Structure-Activity Relationships of Conotoxins.**

Conotoxins are peptide components of the complex venom of conesnails. They have unique potential in drug design due to their high selectivity for various receptors. This project will aim to resolve 3D structures of conotoxins using NMR spectroscopy in order to identify features relevant for their function.

**Proposed Start:** February 2015

*This project is ideally suited to a student interested in Nuclear Magnetic Resonance and protein structure.*

### Dr Richard Clark  
richard.clark@uq.edu.au  
3365 1527  
Biomedical Sciences

**The development of novel peptides targeting the C5a receptor for the treatment of inflammatory diseases.**

The innate immune complement system is a cascade of serum and cell-bound molecules that ultimately mobilise the immune and inflammatory response in reaction to infection and injury. This project seeks to development new drug leads that target a key receptor in the complement system, the C5a receptor, for the treatment of inflammatory diseases.

**Proposed Start:** February 2015

*This project is ideally suited to a student interested in chemistry and/or pharmacology and drug design.*
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<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Address</th>
<th>Department</th>
<th>Research Proposal</th>
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</table>
| Dr. Ethan Scott             | ethan.scott@uq.edu.au     | +61 7 3346 9471 |                               | Biomedical Sciences               | Analyzing circuits for motor learning in zebrafish  
Fish and other animals are capable of astonishing acts of motor coordination and learning, but we do not understand the functioning circuits in the brain that make this possible. Our lab uses a combination of highspeed imaging, automated computer analysis, genetics, and behaviour to study the cerebellum and the circuits that compose it. Most of our projects involve optogenetics, where we use flashes of light to observe, trigger, or silence activity in cerebellar circuits in fish larvae that are intact, alert, and behaving. As we make links between the circuits that we are manipulating and the impacts that the manipulations have on motor behaviour, we learn more about how the circuits normally function. There are a lot of facets to this work, so there are projects available for students interested in genetics, behaviour, optogenetics, high-performance microscopy, and coding. |
| Dr. Sean Millard            | s.millard@uq.edu.au       | 3365-2991 | 520 Otto Hirschfeld Bld (#81) | Biomedical Sciences               | The research project may include the following topics:  
- The role of Dscam2 alternative isoforms during neurodevelopment.  
- The molecular requirements for Dscam2 repulsion.  
- How Dscam2 neural wiring contributes to visual behaviours and sleep (2 projects).  
- Building new molecular tools for the fly using CRISPR/Cas9 genome editing. |
| Dr Trent Woodruff           | T.woodruff@uq.edu.au      | 3365 2924 |                               | Biomedical Sciences               | Exploring inflammatory pathways in motor neuron disease and Huntington’s disease patients.  
Huntington’s Disease (HD) and motor neuron disease (MND) are incurable neurodegenerative disorders characterised by progressive motor and cognitive dysfunction. Our laboratory is interested in the innate system, and its role in inducing inflammation to drive brain cell death in HD and MND. This project will explore blood and tissue from patients suffering MND and HD, and examine the expression and activation of innate immune pathways, in order to identify novel therapeutic targets which may halt inflammation, and thus disease progression.  
Proposed Commencement Date: February 2015. Possibility for up to two students for this project.  
Students should ideally have an interest in neurodegenerative disease. A background in immunology is useful, but not essential. |
| Karin Borges                | k.borges@uq.edu.au        |         |                               | Biomedical Sciences               | Project Option One: New approaches to inhibit seizures  
Our laboratory developed a new metabolic approach that inhibits seizures in mice. This approach is currently being tested in clinical trials. In this project, it will be investigated how changes in brain metabolism contribute to the protective effects.  
Project Option Two: Role of metabolic impairment in Motor Neurone Disease  
There is evidence for impairments in energy metabolism contributing to Motor Neurone Disease (MND). This project will investigate the exact changes in energy metabolism in affected muscles in a mouse MND model. |
### School of Mathematics and Physics: [http://www.smp.uq.edu.au/](http://www.smp.uq.edu.au/)

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<th>Name</th>
<th>Email</th>
<th>School of Mathematics and Physics</th>
<th>Research Interests</th>
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<tbody>
<tr>
<td>Dr Jonathan Spreer</td>
<td><a href="mailto:j.spreer@uq.edu.au">j.spreer@uq.edu.au</a></td>
<td></td>
<td>The principal objects of study in geometry and topology are surfaces or higher dimensional analogues which can be triangulated (that is, decomposed into triangles) to make them accessible to computers. My research interests include the development and analysis of new methods and algorithms to study triangulated surfaces (or higher dimensional analogues). Available projects include developing more efficient methods to compute important properties of triangulated surfaces, studying maps between triangulated surfaces, and many further tasks which are part of current research projects. Feel free to drop by my office to learn more about these and other possible projects.</td>
</tr>
<tr>
<td>Prof. Joseph Grotowski</td>
<td><a href="mailto:grotow@maths.uq.edu.au">grotow@maths.uq.edu.au</a></td>
<td></td>
<td>Geometric and Nonlinear Analysis                                                                                              My research involves a number of aspects of mathematical analysis, ranging from very pure through to very applied. Possible topics include existence theory for various classes of partial differential equations; geometric evolution equations; the mathematics of bone implants; image segmentation; and the mathematical modelling of chemotaxis. Projects can be computational in nature, theoretical in nature, or a combination of both.</td>
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<tr>
<td>Dr Holger Baumgardt</td>
<td><a href="mailto:h.baumgardt@uq.edu.au">h.baumgardt@uq.edu.au</a></td>
<td></td>
<td>Detecting tidal streams in the Milky Way with GAIA                                                                                          GAIA is an ambitious satellite mission started by the European Space Agency at the end of 2013. It will provide astronomers with positions, distances, and proper motions of about 1 billion stars in the Milky Way and throughout the Local Group. Using the GAIA data, astronomers will be able to investigate the formation and past history of the Milky Way with unprecedented precision. In this project you will create a simulated version of the GAIA catalogue and use it to develop search strategies in order to identify tidal tails coming from dissolving star clusters and dwarf galaxies.</td>
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<tr>
<td>Prof Ross McKenzie</td>
<td><a href="mailto:mckenzie@physics.uq.edu.au">mckenzie@physics.uq.edu.au</a></td>
<td></td>
<td>Theoretical chemical physics: Quantum mechanics of hydrogen bonding                                                                                                                        Hydrogen bonding and proton transfer play a central role in the functionality and properties of a diverse range of chemical systems: from water to DNA base pairs to proton sponges. Furthermore, quantum physics is needed to describe the dynamics of the protons that are involved. This project will investigate the properties of a simple model for hydrogen bonding. It is suitable for a student with a strong background in physics and mathematics and a desire to work at the interface of chemistry and physics. More information about my research interests and philosophy can be found on my blog at condensedconcepts.blogspot.com</td>
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<tr>
<th>Name</th>
<th>Email</th>
<th>Diamantina Institute Translational Research Institute</th>
<th>Research Interests</th>
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<tbody>
<tr>
<td>Professor Ian Frazer</td>
<td><a href="mailto:emma.lee@tri.edu.au">emma.lee@tri.edu.au</a></td>
<td>Diamantina Institute Translational Research Institute</td>
<td>The research project will focus on Host-pathogen interactions as determinants of skin cancer development. Interested students should contact researcher and say they would like to do a SCIE3011 project in the area listed.</td>
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<tr>
<td>Name</td>
<td>Contact Information</td>
<td>Institute</td>
<td>Research Topics</td>
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<td><strong>Associate Professor Brian Gabrielli</strong>&lt;br&gt;07 3443 7092&lt;br&gt;<a href="mailto:briang@uq.edu.au">briang@uq.edu.au</a></td>
<td></td>
<td>Diamantina Institute</td>
<td>The research project may include the following topics:&lt;br&gt;• Identifying the molecular basis for defective checkpoints in melanoma.&lt;br&gt;• Targeting defective cell cycle responses to ultraviolet radiation and TopoII inhibitors in melanoma.</td>
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<tr>
<td><strong>Dr Pascal Duijf</strong>&lt;br&gt;07 3443 6937&lt;br&gt;<a href="mailto:p.duijf@uq.edu.au">p.duijf@uq.edu.au</a></td>
<td></td>
<td>Diamantina Institute</td>
<td>The research project may include the following topics:&lt;br&gt;• The cancer biology of chromosome instability in a transgenic mouse model.&lt;br&gt;• Identification of pathways that cause chromosome instability/aneuploidy.&lt;br&gt;• Transcriptional regulation of cell cycle genes.&lt;br&gt;• Development of strategies to specifically target aneuploid tumour cells.</td>
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<tr>
<td><strong>Associate Professor Nikolas Haass</strong>&lt;br&gt;07 3443 7087&lt;br&gt;<a href="mailto:n.haass1@uq.edu.au">n.haass1@uq.edu.au</a></td>
<td></td>
<td>Diamantina Institute</td>
<td>The research project may include the following topics:&lt;br&gt;• Targeting the actin cytoskeleton as a strategy for melanoma therapy.&lt;br&gt;• Disarming Tumor Escape Mechanisms in Human Melanoma With Epigenetic Modifiers.&lt;br&gt;• Real-time cell cycle imaging of melanoma cells in vitro and in vivo.&lt;br&gt;• Defining the role of Microphthalmia-associated Transcription Factor (MITF) in melanoma growth by real-time cell cycle imaging.”</td>
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<tr>
<td><strong>Associate Professor Kiarash Khosrotehrani</strong>&lt;br&gt;07 3443 7088 (UQDI)&lt;br&gt;07 3346 6077 (UQCCR)&lt;br&gt;<a href="mailto:k.khosrotehrani@uq.edu.au">k.khosrotehrani@uq.edu.au</a></td>
<td></td>
<td>Diamantina Institute</td>
<td>The research project may include the following topics:&lt;br&gt;• Understanding the role of the underlying dermis in the genesis and progression of basal cell carcinoma.&lt;br&gt;• Study of epidermal clonal progression towards cancer.&lt;br&gt;• Tumour heterogeneity towards metastasis.&lt;br&gt;• To understand differences between basal cell carcinoma subtypes at the genomic, transcriptomic and proteomic level.</td>
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<td><strong>Dr Rehan Villani</strong>&lt;br&gt;<a href="mailto:r.villani@uq.edu.au">r.villani@uq.edu.au</a></td>
<td></td>
<td>Diamantina Institute</td>
<td>Investigating the parallels between hair follicle and tumour niche in skin cancer development.&lt;br&gt;This project is available to 3rd year students only.</td>
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</table>
| Dr Emma Hamilton-Williams          | Diamantina Institute (TRI) | Project Option One: Defective thymic selection in type 1 diabetes.  
This project utilises a mouse model of type 1 diabetes. The project will compare whether mice that are predisposed to develop diabetes have altered T cell receptor signalling compared to protected mice, leading to the escape of auto reactive cells. Techniques will include calcium flux assay, flow cytometry and real-time pcr.  
Proposed Start: February 2014  
*Students should be enrolled in an immunology course.*  
Project Option Two: The role of the gut microbiome in type 1 diabetes.  
This project will investigate whether changes in the gut microbiome alter the activation of auto reactive T cells that cause type 1 diabetes. Techniques will include adoptive T cell transfers, flow cytometry and proliferation assays.  
Proposed Start: February 2014  
*Students should have an interest in immunology or microbiology.* |
| Dr Tony Kenna                     | Diamantina Institute       | The research project may include the following topics:  
• Transcriptional regulation of inflammation in autoinflammatory diseases.  
• Intestinal inflammation in ankylosing spondylitis.  
• Innate inflammatory pathways in ankylosing spondylitis.  
Interested students should contact researcher and say they would like to do a SCIE3011 project in the area listed. |
| Dr Stephen Mattarollo             | Diamantina Institute       | Project Option One: Immunosuppressive myeloid cell populations induced by B cell lymphomas.  
This project investigates how B cell lymphomas hijack the myeloid cell compartment to create an immunosuppressive environment which supports tumor growth.  
*It is required that students have basic knowledge in immunology, and should have an interest in cancer immunotherapies.*  
Project Option Two: NKT cell and Toll-like receptor-driven therapeutic vaccination against blood cancers.  
This project investigates a therapeutic vaccine strategy against lymphoma and leukaemia using immune adjuvants targeting different cell populations.  
*It is required that students have basic knowledge in immunology, and should have an interest in cancer immunotherapies.* |
| Dr Gethin Thomas | Project Option One: Functional characterisation of a novel ncRNA in joint and gut disease  
One of the key genetic associations underlying ankylosing spondylitis (AS) lies in a gene desert, a genomic region containing no known genes. Using an ultra-deep targeted RNAseq approach we have identified a novel non-coding RNA (ncRNA) expressed from this region that is specifically expressed in monocytes. AS is an autoimmune arthritis and monocytes are thought to play a role in disease pathology. This project will investigate the role of this ncRNA in monocytes and elucidate their role in AS.  
**Proposed Start:** February 2015 (Flexible)  
*Students should ideally have molecular/cell biology experience.* |
| 07 3443 7048  
gethin.thomas@uq.edu.au | Diamantina Institute |

| Professor Peter Visscher | Project Option Two: Analysis of the transcriptome of ankylosing spondylitis patients  
We have undertaken RNAseq to a depth of 50million reads on PBMCs from 80 control and 70 ankylosing spondylitis (AS) patients. AS is a form of arthritis that targets the spine and pelvis resulting in debilitating pain and joint fusion affecting ~20000 Australians. This is the first such study in AS and we are now constructing the first “full” transcriptome of AS patients incorporating both known and unknown genes and non-coding RNAs (ncRNA). Projects are available analysing many different aspects of this unique and powerful dataset.  
**Proposed Start:** February 2015 (Flexible)  
*Students must have bioinformatics/computational skills* |
| 07 3346 1814  
peter.visscher@uq.edu.au | Diamantina Institute |

| Professor David Evans | The research project may include the following topics:  
- Heritability of gene expression.  
- Statistical methods and applications using SNP data to test whether risk factors for disease are causative.  
- Understanding the genetic architecture of complex traits through analysis of DNA sequence data.  
- Development and application of risk prediction models for common diseases.”  
*Interested students should contact researcher and say they would like to do a SCIE3011 project in the area listed.* |
| 07 3443 7051  
d.evans1@uq.edu.au | Diamantina Institute  
Translational Research Institute |
<table>
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<tr>
<th>School of Agriculture and Food Sciences</th>
<th>Project Option One: Identification of genotypic variation for cold temperature tolerance in rice.</th>
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<tr>
<td>Dr Jaquie Mitchell &amp; Prof Shu Fukai</td>
<td>There are a number of opportunities to conduct short term plant physiology experiments in aspects of cold tolerance in rice. Our RIRDC funded project aims to evaluate variation and elucidate the underlying mechanisms in key physiological traits and molecular quantitative trait loci (QTLs) that may contribute to cold tolerance, a major limitation to production for the Australian rice industry. The ASPinS Student will have the opportunity to work alongside a team of researchers with the potential to focus on various aspects including floral architecture, glasshouse experiments or molecular aspects depending on their interest. Happy to discuss project with interested students.</td>
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<tr>
<th>School of Agriculture and Food Sciences</th>
<th>Project Option Two: Determine the effect of drought and/or salinity on the production of aromatics in rice.</th>
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<tr>
<td>Dr Jaquie Mitchell &amp; Prof Shu Fukai</td>
<td>Aromatic rice (like Thai Jasmine rice) is highly prized by rice consumers globally, and command premium financial returns. There are a number of opportunities to conduct plant physiology experiments with the aim of determining the effects of abiotic stress on aroma and flavor of aromatic rice. Our RIRDC funded project aims to identify variation and quantify the production response of 2AP (and other volatile compounds) in rice grain produced under controlled environmental conditions. The ASPinS Student will have the opportunity to work alongside a team of researchers with the potential to focus on various aspects depending on their interest. Happy to discuss project with interested students.</td>
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**Protein expression and functional studies of ERAP1 M1 aminopeptidase in Ankylosing Spondylitis (AS).**

HLA-B27 MHC class I molecules and endoplasmic reticulum aminopeptidase 1 (ERAP1) are the two strongest genetic factors for predisposing Ankylosing Spondylitis (AS) disease. AS is a polygenic, chronic, autoimmune disease that affects primarily the sacroiliac joints & the axial skeleton (spine) but also some inflammation in hip/shoulder/ribs and eyes. ERAP1 contributes to the pathogenesis of AS by altering HLA-B27 peptide presentation. It is widely speculated that ERAP1 may be the missing link in understanding the pathogenesis and the genetic risk for Ankylosing Spondylitis (AS) which HLA-B27 alone cannot fully explain, hence warrants detailed functional investigation of ERAP1 and its haplotypes. The aim of this project is to develop, analyze and compare the effects of various naturally occurring ERAP1 mutant haplotypes on altering the HLA-B27 antigenic peptide repertoire.

The project will involve development of gene constructs, production of recombinant mutant proteins, optimize in vitro and ex vivo functional assays and test the functional consequences of these haplotypes by measuring the rate of peptide cleavage and peptide properties such as length, specificity etc. The results will most likely address the pathogenic role of ERAP1 in HLA-B27 mediated antigen-presentation pathway.

*Students with background in Molecular Biology and Biochemistry and interests in Functional Genomics research will greatly benefit from this project.*

*Suitable for 2/3/4 year students.*
| Dr Jaquie Mitchell | Agriculture & Food Science | Gene expression analysis of cold tolerance genes in rice  
As part of our RIRDC funded research into cold tolerance in rice for the Australian production environment we are investigating gene expression of previously identified genes and QTLs associated with booting stage cold tolerance. The ASPinS Student will have the opportunity to work alongside a team of researchers with the potential to focus on molecular aspects. Happy to discuss project with interested students. |
| Proff Shu Fukai | | |
| Prof Ian Godwin | | |
| Bradley Campbell | | |
| | | |
| Professor Susanne Schmidt | Agriculture & Food Science | Project Option One: Legumes as nitrogen sources for crops.  
Unlocking the potential of native legumes to contribute nitrogen and phosphorus to crops. Glasshouse and laboratory based, with potential field collections of native legumes. |
| | Agriculture & Food Science | Project Option Two: Plant growth promoting bacteria.  
There is much interest in biofertilisers but existing products are often variable or ineffective. Commercial microbial enhancer products will be tested. |
| | Agriculture & Food Science | Project Option Three: Innovation in agriculture by recycling nutrients.  
Intensive livestock manures are considered waste but should be viewed as a high-value product. This product tests the effect of novel formulations aimed at improving soil function and plant growth. |
| Professor Peer Schenk | Agriculture & Food Science | Microalgae for sustainable supply of nutraceuticals, food, feed and biofuels  
Microalgae are highly productive photosynthetic organisms that can be grown for high-value health products, food, animal feed or biofuels. They can be cultivated in nearly any type of water (fresh, brackish, saline or wastewater) without competing for arable land or biodiverse landscapes.  
In this project, you can participate in strain collection, growth optimisation, induction of omega-3, carotenoids, phytosterols or lipids in the lab or get involved in large-scale production at our Algae Energy Farm in Pinjarra Hills. You may also be interested in our new project to build a ‘zero-input’ Solar Power Plant for renewable biofuels production.  
Proposed Start: February 2015  
Students should have an interest in Biology, Biotechnology or Chemical Engineering. |
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<tr>
<th>Professor Steve Adkins</th>
<th>Agriculture &amp; Food Science</th>
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<tr>
<td><a href="mailto:s.adkins@uq.edu.au">s.adkins@uq.edu.au</a></td>
<td>Project Option One: Allelopathic potential of Australian native plants for sustainable weed management.</td>
</tr>
<tr>
<td>07 3365 2072</td>
<td>This project explores Allelopathy, and the potential of Australian native plants to be utilised in cost effective and environmentally friendly weed management.</td>
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<td>Research Area: Weed science, biology of invasive plant species</td>
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<td>Seed science, dormancy mechanisms and establishment</td>
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<td></td>
<td>Plant tissue culture, somatic embryogenesis</td>
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<tr>
<td>Dr Brett Ferguson &amp; Prof. Peter Gresshoff</td>
<td>Agriculture &amp; Food Science</td>
</tr>
<tr>
<td><a href="mailto:b.ferguson1@uq.edu.au">b.ferguson1@uq.edu.au</a></td>
<td>Project Option Two: The utilisation of Australian native species within land restoration projects.</td>
</tr>
<tr>
<td><a href="mailto:p.gresshoff@uq.edu.au">p.gresshoff@uq.edu.au</a></td>
<td>By exploring the characteristics of the seed, this project will identify how best to use Australian native species within land restoration projects; particularly roadside restoration projects and restoration after mining activity.</td>
</tr>
<tr>
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<td>Research Area: Weed science, biology of invasive plant species</td>
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<td>Plant tissue culture, somatic embryogenesis</td>
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<td>Project Option Three: Germination of Australian native species used for land restoration.</td>
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<td>The proposed research aims to investigate the use of ethylene encapsulation and KAR1 to promote the germination of native seeds to enhance vegetation programs through increased and uniform seedling establishment.</td>
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<td></td>
<td>Research Area: Weed science, biology of invasive plant species</td>
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<tr>
<td></td>
<td>Seed science, dormancy mechanisms and establishment</td>
</tr>
<tr>
<td></td>
<td>Plant tissue culture, somatic embryogenesis</td>
</tr>
<tr>
<td></td>
<td>Functionally Characterising Critical Components of Legume Nodulation.</td>
</tr>
<tr>
<td></td>
<td>Nitrogen fertiliser use in agriculture is inefficient, costly and can be environmentally damaging. Legume crops represent an economically and environmentally sound alternative, as their relationship with nitrogen-fixing soil bacteria enables them to thrive in the absence of nitrogen fertiliser. The bacteria are housed in specialised root organs, called nodules. Identifying critical components of legume nodulation is now needed to optimise the process and improve agriculture sustainability. This project aims to discover and functionally characterise novel factors that control root nodule development and regulate root nodule numbers. Findings will considerably enhance the current nodulation model and could help to underpin strategies to reduce the reliance on nitrogen fertiliser use in agriculture.</td>
</tr>
</tbody>
</table>
## Project Option One: Links between water and salt in the landscape

Australia has a wide variability in available water sources, however these water resources can also be highly variable in quality. This project will investigate links between the quality and quantity of water in selected catchments throughout Australia.

*Interested students should contact the researcher and say they would like to do a SCIE3011 project in the area listed.*

## Project Option Two: Water, soil, vegetation and rock in the earth's critical zone

The Critical zone is from the tops of trees, through the soil, and to the groundwater aquifer, and is where the physical processes and biology of earth meet. This project will look at some of these interactions at a new observatory in SE Qld.

*Interested students should contact the researcher and say they would like to do a SCIE3011 project in the area listed.*

## Project Option Three: Nutrient flow to the Great Barrier Reef

The Great Barrier Reef faces a number of land based threats to its overall health, including the supply of excess nutrients. In order to better understand these threats, this project will develop a better understanding of the nutrient fluxes in the catchments draining to the reef.

*Interested students should contact the researcher and say they would like to do a SCIE3011 project in the area listed.*

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## Project Option One: Soda lakes as natural analogues for alkaline, saline mine wastes: comparison of microbial communities

Microbial communities in alkaline, saline mine wastes are poorly characterised, and little is known about their composition and potential contributions to geochemical cycles. This project will involve the comparison of microbial communities present in naturally alkaline, saline environments (soda lakes, salt lakes, estuarine lagoons) with those present in alkaline, saline mine wastes to identify key similarities and differences between the communities in these systems, and the influence of environmental factors on microbial community composition and putative functions.

Preference would be for a third year student as these projects assume a certain amount of maths/stats and lab skills proficiency.
### Project Option Two: Physicochemical drivers of structure development during desiccation in tailings

Desiccation cracking, resulting from volume shrinkage during solar-driven evaporation, is a major mechanism of structure development in tailings. The physicochemical properties underpinning the polygonal geometry of the crack networks formed during desiccation are not understood. Encouraging particular geometries to form during desiccation may be beneficial to minimising environmental risks (dust generation, structural stability) associated with tailings. This project will involve physical and chemical analysis of tailings and image analysis of tailings during drying to track and describe the development of desiccation crack networks and identify drivers of structure development during desiccation.

Preference would be for a third year student as these projects assume a certain amount of maths/stats and lab skills proficiency.

### Project Option Three: Pulse or drip? Irrigation intensity in leaching salts from mine wastes

After processing, mine wastes and tailings materials can contain substantial amounts of salt in both pore water and as sparingly soluble minerals. The slow dissolution of these minerals poses problems for long term management as salinity is maintained during rainfall leaching. This project aims to identify whether continuous, slow leaching or episodic, intense leaching is more effective at removing salts from pore water and solid phases.

Preference would be for a third year student as these projects assume a certain amount of maths/stats and lab skills proficiency.

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<table>
<thead>
<tr>
<th>A/Prof Hamis McGowan</th>
<th>Geography, Planning &amp; Environmental Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:h.mcgowan@uq.edu.au">h.mcgowan@uq.edu.au</a></td>
<td>Is global warming the real cause of coral bleaching?</td>
</tr>
<tr>
<td></td>
<td>This project will investigate evidence for the link between coral bleaching events and reef to regional scale meteorology to establish whether mass coral bleaching is a direct consequence of global warming or large scale ocean-atmospheric teleconnections.</td>
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<td><strong>Proposed Start:</strong> February 2015</td>
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<tr>
<td></td>
<td><em>Students must have a background in analysis of remote sensing data. Ideally, some experience in geospatial statistics would be beneficial, and knowledge of atmospheric processes.</em></td>
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<table>
<thead>
<tr>
<th>Dr Karyn Johnson</th>
<th>Biological Sciences</th>
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<tbody>
<tr>
<td><a href="mailto:karynj@uq.edu.au">karynj@uq.edu.au</a></td>
<td>Wolbachia and antiviral defence in Drosophila</td>
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<tr>
<td></td>
<td>Insects transmit important virus diseases of both animals and plants and many insects are infected with the symbiotic bacteria Wolbachia. We have shown that Wolbachia protects insects including Drosophila and mosquitoes from infection with pathogenic viruses. This interaction may be harnessed to control the spread of virus disease. My group is investigating the host-bacteria-virus interaction and the molecular mechanisms that underlie antiviral defence using Drosophila as a model organism. Students can be involved in a number of different projects in the lab depending on their interests and academic background.</td>
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<thead>
<tr>
<th>Dr Margaret M Mayfield</th>
<th>Testing for drought tolerance/growth trade-offs in Australia’s semiarid flora</th>
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<tbody>
<tr>
<td><a href="mailto:m.mayfield@uq.edu.au">m.mayfield@uq.edu.au</a></td>
<td>With climate change driving more variable, less predictable rainfall and more extreme and frequent droughts across much of the planet and Australia, there is a growing need to understand how mechanisms of drought tolerance mediate the range limits of native plants. In this study, you will contribute to understanding whether Australian native trees have trade-offs in growth and rough tolerance and if so the ways the mechanisms driving these trade-offs.</td>
</tr>
<tr>
<td></td>
<td>Students must have completed BIOL1030. Students should also have taken ecology or any course in plant science, but this is not required.</td>
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<table>
<thead>
<tr>
<th>School of Psychology:  <a href="http://www.psy.uq.edu.au/">http://www.psy.uq.edu.au/</a></th>
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<table>
<thead>
<tr>
<th>Dr Katie Greenaway</th>
<th>How do people regulate their emotions?</th>
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<tbody>
<tr>
<td><a href="mailto:k.greenaway@psy.uq.edu.au">k.greenaway@psy.uq.edu.au</a></td>
<td>I have several projects underway that investigate emotion regulation, focusing on how people control and express their emotions to ensure smooth social interactions. I am particularly interested in an emotion regulation strategy called expressive suppression, which involves the inhibition of outward expressions of emotion. My recent line of work shows that suppression can have some surprising social benefits. I have a range of video stimuli of participants expressing and suppressing their emotions that are a rich data source for students who would like to devise and test their own hypotheses regarding emotion regulation.</td>
</tr>
<tr>
<td>Psychology</td>
<td>Proposed Start: April 2015</td>
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<tr>
<td></td>
<td>Students should have completed all 1st year core Psychology courses (PSYC1020, PSYC1030, PSYC1040).</td>
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<tr>
<th>Dr Stacey Parker</th>
<th>Emotion Regulation and Heart Rate Variability</th>
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<tbody>
<tr>
<td><a href="mailto:s.parker@psy.uq.edu.au">s.parker@psy.uq.edu.au</a></td>
<td>I conduct research in the areas of occupational health psychology and positive organisational behaviour. In particular, I am interested in the interrelationships of stress, recovery, and Heart Rate Variability (HRV). HRV is a physiological indicator of emotion regulation, which captures recovery from physiological arousal by measuring parasympathetic system down-regulation of sympathetic system activation. In early 2015, I would like to conduct an experiment on the effects of various stressful tasks (e.g., mental subtraction, tiers of social stress, various work simulations, etc) on emotion regulation capacity; both physiological (i.e., HRV) and for self-reported outcomes (i.e., emotion regulation strategies).</td>
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<tr>
<th>A/Prof. Julie Henry</th>
<th>Social perception in late adulthood</th>
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<tbody>
<tr>
<td><a href="mailto:julie.henry@uq.edu.au">julie.henry@uq.edu.au</a></td>
<td>Social perception refers to the ability to understand and react appropriately to the social signals sent out by other people. There are now over 100 publications focused on social perception in late adulthood, and with few exceptions, these studies suggest that social perceptual function declines as we grow older. However, nearly all of these studies have used measures that lack ecological validity, and do not represent the way that we decode and use cues to socioemotional states in everyday life. This project would use innovative measures to gain a more accurate understanding of the effects of normal adult ageing on this critical human capacity.</td>
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<td>Name</td>
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<tr>
<td>Kana Imuta</td>
<td><a href="mailto:k.imuta@uq.edu.au">k.imuta@uq.edu.au</a></td>
</tr>
<tr>
<td>Bernadette Watson</td>
<td><a href="mailto:bernadette@uq.edu.au">bernadette@uq.edu.au</a></td>
</tr>
<tr>
<td>Ms Christina Kulis</td>
<td><a href="mailto:c.kulis@imb.uq.edu.au">c.kulis@imb.uq.edu.au</a></td>
</tr>
</tbody>
</table>
| **Dr Mark Smythe**  
| m.smythe@imb.uq.edu.au |
| **Project Two:** Development of New Spin Label Probes |
| Electron paramagnetic resonance (EPR) spectroscopy is a powerful technique for studying the structure and dynamics of proteins. However, its effectiveness is limited by the spin labels employed, which are either too flexible or bulky and do not resemble natural amino acids. This project is focused on the development and synthesis of amino acid based spin label probes to improve EPR measurements in biological systems. |

| **Dr Mark Butler**  
| m.butler5@uq.edu.au |
| **Institute for Molecular Bioscience (Cooper Lab)** |
| **Identification of biologically active natural products** |
| As part of an ongoing efforts to identify new anti-infective leads, we have identified extracts with antifungal and antibacterial activity. Bioassay-guided isolation will be used to identify the active components and their structures determined using spectroscopic techniques that include NMR and MS.  
**Proposed Start:** Anytime in 2015  
*Students should have knowledge in analytical and/or organic chemistry.* |

| **Professor Rob Capon**  
| r.capon@uq.edu.au  
| 07 334 62979 |
| **Institute for Molecular Bioscience** |
| **Project Option One:** Marine-derived microbial biodiscovery |
| Cultivation of bacterial and fungal isolates from marine substrates, followed by chemical and biological profiling leading to the detection and identification of valuable new bioactive molecules.  
**Proposed Start:** February 2015  
*Students must have a background and interest in Microbiology.*  
**Project Option Two:** Synthesis of thiophanes synthons |
| Optimized stereo-controlled chemical synthesis of four-membered sulfur heterocycles (thiophanes), as building blocks to explore new bioactive chemical space.  
**Proposed Start:** February 2015  
*Students must have a background and interest in Organic Chemistry.* |

| **Prof. Mark Ragan**  
| m.ragan@imb.uq.edu.au |
| **Dr Sriganesh Srihari**  
| s.srihari@uq.edu.au |
| **Institute of Molecular Bioscience** |
| **Mining patterns of genetic events from cancer genome datasets** |
| This project will deal with the design and development of novel computational methods to mine interesting and therapeutically valuable genetic patterns from cancer genome databases. In particular, the project will focus on identifying genetic events mutually exclusive to inactivation of known tumour-suppressor genes (e.g. TP53, BRCA1 and BRCA2) in breast cancer, the idea being that the co-occurring genetic events would possibly lead to cancer-cell death and therefore surviving cancer-cell populations have evolved to avoid these co-occurring combinations.  
**Proposed Start:** April 2015  
*Student should have:*  
- Computer programming skills in at least one of C/C++, Python, R.  
- Ability to handle large bioinformatics datasets.  
- Interest in cancer biology.* |
| **Prof. Mark Ragan**  
| m.ragan@uq.edu.au  
| **Dr Cheong Xin Chan**  
| c.chan1@uq.edu.au  
| **Institute of Molecular Bioscience**  
| Genetic exchange and genome innovation in microbes  
Whole-genome sequencing is increasingly applied to study the pathogenicity, evolution and environmental adaptation of microbes. Young researchers increasing need skills in large-scale data management, computing and analysis to be internationally competitive for postgraduate positions and jobs.  
Two projects are available in our group:  
1. Genetic exchange within the sugarcane rhizosphere microbial community, and its impact on nitrogen assimilation capacity of the crop.  
2. Genome dynamics and innovation in Symbiodinium (the algal symbiont of coral), and their impact on the health and resilience to climate change of the Great Barrier Reef.  
Working in a Linux environment, the student will apply state-of-the-art computational methods to detect patterns of genetic exchange within the defined microbial community, infer phylogenetic relationships, and/or de novo assemble and annotate idiosyncratic algal genomes. This includes a new, highly scalable phylogenetic approach that was recently developed in our group (Chan et al. 2014 Scientific Reports 4:6504). These projects will offer hands-on experience in experimental design, data management, bioinformatic workflows, genome analysis, phylogenetics, network reconstruction and inference, advanced computing and scripting. The student will compare results within a statistical framework, and gain experience in the preparation of publication-quality reports and figures. On the biological side, the student will gain experience in genome biology and evolution of microbes from the environment. This project will be primarily informatic and computationally based, i.e. will not involve wet laboratory work.  
Proposed Start: February 2015, or earlier by agreement  

| **Matt Sweet**  
| **Institute of Molecular Bioscience**  
| Innate immunity in infections and inflammation  
This project will investigate the roles of specific pattern recognition receptors (e.g. Toll-like Receptors) in responding to danger signals (e.g. infections). The project will focus on either pro-inflammatory signalling pathways in innate immune cells or macrophage antimicrobial responses against bacterial pathogens.  
Proposed Start: April 2015  
A background in molecular and cellular biology, as well as an interest in immunology and infectious diseases, is highly desirable. Ideally, some previous research experience is also desirable.  

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Proposed Start: April 2015  
A background in molecular and cellular biology, as well as an interest in immunology and infectious diseases, is highly desirable. Ideally, some previous research experience is also desirable.
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<tr>
<th>Project Option One:</th>
<th>Design and fabrication of polymer microprojection arrays for needle-free detection of dengue biomarkers through the skin</th>
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<tbody>
<tr>
<td></td>
<td>New diagnostic technologies are urgently required to direct appropriate treatment to the right people at the right time. In our group we have developed silicon and polycarbonate microneedle arrays which can be applied to the skin of live mice to extract and detect specific proteins and antibodies that are circulating in the blood stream. We are currently applying this technology to the detection of dengue infections in a mouse model of the disease. There are several aspects to this project, namely (1) design, fabrication and mechanical testing of the polymer microneedle arrays; (2) chemical modification of array surfaces to attach dengue-specific antibodies for high capture efficiency in blood fluids, and (3) testing devices in vivo in comparison to standard assays (ELISA, PCR, etc).</td>
</tr>
</tbody>
</table>
|                     | Individual projects are available for students with an interest in:  
- Diagnostics  
- Polymer biomaterials design and fabrication  
- Surface modification and characterization  

**Proposed Start:** February/March 2015  
*This project would suit students with a chemistry, biophysics or chem/bio engineering background.*

<table>
<thead>
<tr>
<th>Project Option Two:</th>
<th>Immunodiffusion diagnostics: a new look at an old method</th>
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<td></td>
<td>Rapid diagnostic technologies are urgently needed to direct appropriate treatment to the right people at the right time. This is particularly true of infectious diseases, where clinical symptoms may not be informative enough for definitive diagnosis. “Immunodiffusion” refers to a suite of medical and veterinary diagnostic assays that rely on the formation of antigen/antibody complexes (visible to the naked eye) in a hydrogel material such as agarose. First discovered in the 1920’s and commercialised soon thereafter, they have since been replaced by new techniques including ELISAs, lateral flow strips, etc. The key drawback is that the assay is severely diffusion-limited, and hence can take up to 24-48 hours until complexes are visible. We propose that by “re-discovering” this robust method with modern research tools in our experiments (e.g. nanoparticle labels, fluorescence microscopy, protein mass spectrometry), we can significantly reduce assay time while increasing assay sensitivity. We are looking to use this technology to develop new rapid diagnostic tests for infectious diseases, particularly for dengue and malaria infections.</td>
</tr>
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|                     | Individual projects are available for students with an interest in:  
- Diagnostics  
- Polymer biomaterials design and fabrication  
- Surface modification and characterization  

**Proposed Start:** February/March 2015  
*This project would suit students with a chemistry, biophysics or chem/bio engineering background.*
| **Dr Claudia Vickers**<br> c.vickers@uq.edu.au | **Australian Institute for Bioengineering & Nanotechnology** | **Metabolic engineering to produce sustainable and renewable bio-based replacements for petrochemicals.**<br>Projects are available in the Industrial Isoprenoid Engineering group (part of the Systems and Synthetic Biology group at the Australian Institute for Bioengineering and Nanotechnology). This group is focused on engineering microbes for bulk-scale production of industrially-relevant isoprenoid compounds. Isoprenoids are a large and diverse group of biochemicals with many biological activities and industrial uses. Our target compounds are isoprene (a chemical feedstock for synthetic rubbers), higher-order isoprenoids with aviation fuel properties, and isoprenoid vitamins (vitamins E and K). Students will require a background/interest in biochemistry, molecular biology, biotechnology, bioengineering, or a related discipline. Projects will be designed in consultation with the student and may involve protein engineering, cloning, advanced analytics, systems biology, synthetic biology, etc. Target organisms for engineering are yeast and E. coli. This project contributes to an emerging area of research in the group with high publication potential.<br>We also have research projects available in our recently established beer systems biology program.<br>More information: [http://web.aibn.uq.edu.au/cssb/Projects/Isoprenoid.html](http://web.aibn.uq.edu.au/cssb/Projects/Isoprenoid.html) [http://www.uq.edu.au/~uqvicke/](http://www.uq.edu.au/~uqvicke/) |
| **A./Prof. Lutz Gross**<br> l.gross@uq.edu.au | **Earth Sciences** | **Data Recovery using Low-Rank-Sparse Matrix Decomposition**<br>Observations (e.g. satellite images) are the superposition of background and dynamic components. The recover of background information can mathematically expressed as a decomposition on the matrix representing the data into a low rank and sparse matrix. The low rank matrix contains the background information (e.g. landscape) while the sparse matrix contains the dynamic components (e.g. clouds, noise). In the project we will study the mathematical formulation of the problem and methods to solve the problem.<br>**Proposed Start:** February 2015 or later<br>*Students should have knowledge in linear algebra and python programming skills.* |
| **A/Prof. Vito Ferro**<br> v.ferro@uq.edu.au | **Chemistry & Molecular Biosciences** | **Project Option One: Synthesis of Pharmacological Chaperones for Lysosomal Storage Diseases (LSD)**<br>Normally, cells use enzymes to degrade and recycle biomolecules in the lysosome. In LSDs, missing or insufficient enzyme activity disrupts the proper recycling process, resulting in accumulation of undegraded substrate. The result is progressive damage throughout the body, including the heart, bones, joints, respiratory system and central nervous system. New drugs are urgently required to treat LSDs. The aims of this project are to synthesise carbohydrate derivatives as pharmacological chaperones for mutant lysosomal carbohydrate-degrading enzymes involved in LSDs. Such compounds have the potential to be exciting new drugs for the treatment of LSDs.<br>**Proposed Start:** February 2015<br>*Students should be majoring in Chemistry.* |
| Project Option Two: Synthesis of novel inhibitors of virus-cell attachment. | **Chemistry & Molecular Biosciences**  
Dr Elizabeth Krenske  
e.krenske@uq.edu.au |
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<td>Many viruses, including HSV, HIV and Dengue use heparan sulfate (HS) as an entry receptor or co-receptor. This project will focus on the synthesis of novel HS mimetics that inhibit virus-cell attachment and possess virucidal activity.</td>
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| **Proposed Start:** February 2015  
*Students should be majoring in Chemistry.* |

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<tr>
<th>Modelling chemistry by computer</th>
<th>Queensland Alliance for Agriculture and Food Innovation (QAAFI): <a href="http://www.qaafi.uq.edu.au/index.html">http://www.qaafi.uq.edu.au/index.html</a></th>
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<tr>
<td>We use computer simulations to explore the mechanisms of chemical reactions, especially new reactions that are being developed by synthetic chemists for the construction of useful molecules. Our simulations provide information about what favours the formation of a certain product, how the reaction could be tailored to achieved better yields, or how the properties of a product could be altered for improved performance in a certain application (e.g. catalyst activity or smart material).</td>
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| **Proposed Start:** February/March 2015  
*Knowledge developed in this project would provide a useful complementary skill set for a student who is considering later work in a practical laboratory-based research project.* |

| Project Option One: Hypertension and NaCl appetite | Queensland Alliance for Agriculture and Food Innovation  
Dr. Eugeni Roura  
e.roura@uq.edu.au  
Website: http://researchers.uq.edu.au/researcher/2344 |
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<td>Cardiovascular diseases are the leading cause of death in Australia, being high Na+ intake one of the main risk factors. Recent scientific evidence shows that hypertension reduces sensitivity to NaCl, which may explain why hypertensive individuals tend to increase dietary NaCl. However, the genetic bases related to differences in salt taste sensitivity have not been yet identified. The objective of the current research project is to study salt taste sensitivity in normo vs hypertensive volunteers and related the changes to genetic markers such as alterations in the sequence of taste receptor genes.</td>
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| **Proposed Start:** February 2015  
*Students will preferably have some molecular biology skills and an interest in nutrition/Food science and/or digestive physiology.* |

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<th>Project Option Two: Molecular basis of food allergy: how do we sense allergies?</th>
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<td>Food allergies have become one of the main nutritional problems in the public health system. However, a more detailed understanding of the receptors responsible for dietary proteins causing allergies is missing. The release of the interleukins mediating an immune response seem to affect appetite and food intake by altering taste sensitivity. However, a systematic study of the link between food allergies and taste perception has never been done to date. The current project will assess the genetic bases of potential differences in taste acuity of panellists with and without known food allergies.</td>
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| **Proposed Start:** February 2015  
*Students will preferably have some molecular biology skills and an interest in nutrition/Food science and/or digestive physiology.* |
### School of Veterinary Science (Including Centre for Animal Welfare and Ethics)

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<tr>
<th>Professor Clive Phillips</th>
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<tr>
<td><strong>Email:</strong> <a href="mailto:c.phillips@uq.edu.au">c.phillips@uq.edu.au</a></td>
</tr>
<tr>
<td><strong>Phone:</strong> Gatton (07) 5460 1158</td>
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<tr>
<td><strong>School of Vet Science/Centre for Animal Welfare and Ethics</strong></td>
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<td><strong>Evaluation on sampling schemes for ammonia gas monitoring on live export shipments</strong></td>
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<td>Australia is the largest exporting country sending cattle and sheep mainly to the Middle East and Asia. Our studies showed that ammonia accumulation could affect animals' health and welfare. Based on the ammonia measurements during two voyages from Australia to the Middle East, we aimed to evaluate the probable errors of the sample-spatial average concentrations using different sampling point densities, in order to determine the confidence level and error distribution for different sampling scenarios. This project provides an opportunity for a student to explore the measurement efforts and uncertainties associated with the sampling method and contribute to live export welfare.</td>
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<td><strong>Requirements:</strong> Interest in animal welfare, good knowledge of mathematics and standard probability and statistics.</td>
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### Combination of Schools/ Institutes Offering

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<tr>
<th>Prof Geoffrey Goodhill</th>
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<td><strong>3346 6431</strong></td>
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<td><strong><a href="mailto:g.goodhill@uq.edu.au">g.goodhill@uq.edu.au</a></strong></td>
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<tr>
<td><strong>Queensland Brain Institute and Mathematics &amp; Physics</strong></td>
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<tr>
<td><strong>Computational, Systems and Developmental Neuroscience.</strong></td>
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<td>Our lab uses a combination of mathematical, computational and experimental techniques to investigate how brains become wired up during development, and how they represent sensory information. People in the lab come from a variety of backgrounds, including maths, physics, engineering, neuroscience and medicine. Projects available range from purely mathematical/computational to purely experimental. Our experimental methods include imaging of nerve fibre growth in vitro and in vivo, and imaging of neural activity via calcium signals in the zebrafish brain.</td>
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<th>Dr Jana Vukovic</th>
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<td><strong><a href="mailto:j.vukovic@uq.edu.au">j.vukovic@uq.edu.au</a></strong></td>
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<td><strong>Biomedical Sciences &amp; Queensland Brain Institute</strong></td>
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<td><strong>Our laboratory is interested in the process of neurogenesis in the adult brain. More broadly, our research seeks to understand how the natural production of new neurons in the adult hippocampus contributes to learning and memory, and how the immune system influences neurogenesis and related cognitive functions. To understand and link cellular events to altered behaviour, we employ a range of approaches e.g. testing transgenic mouse lines in behavioural experiments, tissue processing and immunohistochemistry, imaging. Available projects include:</strong></td>
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<tr>
<td>➢ At what stage do adult-born neurons contribute to learning and memory?</td>
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<td>➢ How do microglia regulate neurogenesis?</td>
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<td><strong>Proposed Start:</strong> February 2015</td>
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