Faculty of Science ARC Postgraduate Research Scholarship November 2026

Current Projects

1. **Dr Linh Nghiem - School of Mathematics and Statistics**

   Project title:
   Statistical methodologies for complex data settings

   Project summary:
   We are seeking up to two PhD students to join our team in developing new theory, methods, and applications of statistical dimension reduction for data with complex structures, including but not limited to, multi-way clustered, spatial-temporal, and network dependence. The student will be undertaking research in connection with the Australian Research Council Discovery Project (DP260100579), addressing important challenges of distilling high-dimensional regression and classification relationships, with little to no loss of information, into results readily understood by domain experts.

   The supervision team will include Dr Linh Nghiem, Dr Shila Ghazanfar, A/Prof Rachel Wang (all from the School of Mathematics and Statistics, University of Sydney), and A/Prof Francis Hui from the Australian National University.

   Requirements:
   - Minimum USyd requirements for all PhD candidates, typically by completing an undergraduate Honours or Master's degree with a research component of at least 25% in the final year of study.
   - Pre-requisite courses:
     - Calculus-based probability (equivalent to USyd STAT2x11), introductory statistical inference (equivalent to STAT3x23)
     - At least two courses in applied statistics or relevant, e.g., linear models, statistical/machine learning, deep learning, correlated data analysis
     - Familiar with R and/or Python, Latex, and GitHub
     - Desirable: A (mathematical) real analysis course (measure theory is optional.

2. **Dr Renjie Feng - School of Mathematics and Statistics**

   Project title:
   Universal laws for extreme gaps in random structures

   Project summary:
   This project aims to develop a unified framework for studying extreme gaps in random systems, focusing on rare, extreme gap events in two fundamental settings: the eigenvalues of random matrices and the zeros of stationary Gaussian processes. By integrating techniques from random matrix theory, Gaussian process theory, and extreme value analysis, the project seeks to create a coherent framework that unifies previously fragmented results and uncovers universality phenomena in correlated systems. It will also investigate the conditions under which these universal laws break down and analyse how such breakdowns are influenced by underlying correlations.

   Requirements:
   Ideal HDR candidates should have a strong interest in probability theory, especially random matrix theory, random geometry, U-statistics, random polynomials, and random analytic functions. Applicants must have background in Probability Theory and Stochastic Processes. Additional background in PDEs or Riemannian Geometry is a plus.

3. **A/Professor Ellis Patrick - School of Mathematics and Statistics**

   Project title:
   Statistical methods for the analysis of spatial omics technologies

   Project summary:
   We invite applications for a fully funded PhD position to join an ARC-funded project developing statistical and computational methods for the analysis of emerging spatial omics technologies. These technologies map the molecular profiles of individual cells directly within tissue, revealing how cells organise, communicate and change in health and disease. As datasets become increasingly large and complex, there is a growing need for rigorous statistical approaches that can meaningfully characterise the structure of these cellular environments.

   This project will focus on creating new analytical frameworks that help researchers interpret complex spatial relationships between many types of cells, compare these patterns across heterogeneous tissues, and understand how upstream processing decisions influence biological conclusions. All methods will be released as open-source software to support widespread adoption in biology, medicine and data science.

   The PhD candidate will be jointly supervised by Dr Shila Ghazanfar and A/Prof Ellis Patrick and will join an active research environment spanning statistics, bioinformatics and biomedical collaboration. The School of Mathematics and Statistics and the Sydney Precision Data Science Centre offer strong mentoring, regular training activities and opportunities to connect with leading researchers in spatial omics.

   Requirements:
   This scholarship is ideal for candidates with a background in statistics, data science, computer science or bioinformatics.

4. Dr Sophie Webber – School of Geosciences

Project title:
Reclaiming Cities from the Sea: Coastal Futures for the Asia Pacific

Project summary:

This research project aims to examine land reclamation projects in vulnerable coastal cities of the Asia-Pacific: Jakarta, Manila, Funafuti, and North Tarawa. Using methods and concepts from urban and economic geography, the project will identify the financial, social and material relations which sustain coastal cities in the context of climate risks and urbanisation dynamics. We will map the social and spatial dynamics of land, labour, resources and finance for land reclamation in these cities and their hinterlands. A focus is contested urban transformations and community-led alternatives to land reclamation.

The successful candidate will have previous research experience in human geography or a closely related field, a capacity to engage with concepts, theories and methods from the critical social sciences (particularly human geography), an interest in the social, ecological and spatial dynamics of land reclamation in the Asia Pacific, and the willingness to conduct independent extended fieldwork in one or two of the case study sites (Jakarta, Manila, Funafuti and North Tarawa).

Requirements:
Applicants should submit a short research proposal on the topic of contested land reclamation in the Asia-Pacific (2 pages) and a statement of how they meet the eligibility criteria (1 page).

5. **Professor Elizabeth New – School of Chemistry**

Project title:

Array-on-a-molecule: a novel platform to measure metals in cells

Project summary:

We are seeking a PhD student to join our team on a project supported by ARC Future Fellowship FT260100275. The goal of this project is to develop a new and highly innovative method to determine metal concentrations within living cells by generating materials that contain multicoloured metal-sensitive elements. This project will facilitate expanded collaborations with leading international researchers to uncover new knowledge about the cell biology of metals. The PhD student will be involved in all aspects of the project, from synthesis of new sensors to development of data analysis methods to biological deployment.

Requirements:

- Meet the minimum University of Sydney admission requirements for PhD candidates, typically by completion of an undergraduate Honours degree or a Master's degree with a research component of at least 25% in the final year of study.
- A strong background in synthetic chemistry, with experience in the purification and spectroscopic characterisation of small molecules.
- Familiarity with techniques relevant to chemical biology, such as cell culture, microscopy, biological assays.
- Desirable: experience in statistical analysis, coding and/or machine learning.

6. **Dr Ros Gloag – School of Life and Environmental Sciences**

Project title:
Mito-nuclear drivers of biodiversity (Evolutionary ecology of Australian native bees)

Project summary:
This project aims to advance understanding of the evolutionary processes that generate and maintain biological diversity. You will apply field-based and genomic approaches in wild populations of native bees on Australia's East Coast to test new theories of how interactions between different genomes in the same cell – mitochondrial and nuclear – can impede hybridization in nature and drive the formation of new species. The project goal is to provide new knowledge of the molecular basis of species boundaries, with potential to guide diverse endeavours in agriculture, biosecurity and conservation. By working with wild bees, this project also aims to produce new knowledge of bee biology, distributions and behaviour that will supports efforts to conserve these remarkable pollinators in Australia's tropical ecosystems, and promote their sustainable in crop pollination.

You will work within the supportive team environment of the Behaviour, Ecology and Evolution (BEE) Lab and wider community of the School of Life and Environmental Sciences at USyd.

You will acquire skills and training in field entomology and population genomics of wild insects.

Requirements:

- Honours or Masters in a relevant discipline (evolutionary biology, genetics/genomics and/or ecology).
- Experience in population genetics/genomics or a keen interest to acquire these skills.
- Experience with fieldwork or a keen interest to develop field skills.
- Driver's licence.

7. **Dr Thomas Newsome – School of Life and Environmental Sciences**
   Project title:
   Trophic signals: monitoring ecosystem services through carrion use

   Project summary:
   This project will develop a novel framework to measure the ecosystem service of scavenging by pioneering a new approach to measure the efficiency of carcass removal by both vertebrate and insect scavengers. PhD 1 will analyse an extensive dataset of scavenger interactions with carrion from field data collected across Australia, with the aim of uncovering relationships between vertebrate and insect scavenger diversity and carcass biomass loss. PhD 1 will suit a student with interest and experience in complex ecological modelling. PhD 2 and 3 will conduct field studies to monitor vertebrate and insect scavenger use of carrion using a standardised experimental design across different ecological gradients in Australia and Internationally. PhD 2 and 3 will suit students interested in field ecology and ecological modelling, with one student focusing on vertebrate scavengers, and the second focusing on insect scavengers.

   Results from these PhD projects will be used to establish a method to derive a single metric of scavenger efficiency so that government and non-government land management agencies in Australia and globally can use it as an indicator of ecosystem function/health.