2025-26 Adelaide Summer Research Scholarships.

Researchers listed in this document are interested in supervising students for Summer Research Scholarships in the Faculty of Sciences, Engineering and Technology.

Eligible students are encouraged to contact Researchers to discuss their research projects and potential supervision for a Summer Research Scholarship.

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SCHOOL OF AGRICULTURE, FOOD AND WINE:

Researcher:	Research Area:	Available Project(s):
Dr Emily Buddle	Food values, rural studies, responsible research and innovation	**Understanding Food Values: A Review of Current Research and Emerging Themes** This project involves a desktop review of recent research on food values, exploring how individuals and communities define and prioritise values associated with food production and consumption. The student will identify key themes and gaps, contributing to a report or potential academic publication to inform future research.
David Logan	Entomology	**The biology and management of scale insects on grapevines** 1. Biodegradable food packaging plastic films made from food waste 2. Upcycling brewer's spent grain into high-value products 3. Outsmarting fungal plant pathogens to find ways to improve food crops
Dr Steven Hussey	Plant developmental biology and synthetic biology	**Functional gene testing in plants** The summer project will expose you to the use of reverse genetics methods to explore the functions of novel genes in plants, particularly genes controlling how wood is formed. You will work on a component of a plant transformation experiment. Contact researcher for discussion.
Professor Jenny Mortimer	Synthetic biology	Explore plant synthetic biology through this project tackling key challenges in gene expression for sustainable agriculture and space exploration. Apply engineering principles to optimize multi-gene pathways in model plants and future crops. Contact the researcher to discuss alternative project opportunities.
Dr Tatiana Soares da Costa	Biochemistry	**Learning Lessons from Drug Resistance to Tackle Herbicide Resistance** This exciting project will draw on parallels with drug resistance to investigate a new molecular mechanism of herbicide resistance transfer in weeds. The student will work in a vibrant, multi-disciplinary team and develop skills in biochemistry, molecular biology and plant science. The findings from this project have long-term social, economic, and environmental benefits arising from improved crop yields safeguarding food security.
Dr Bo Wang	Food Science	**3D-printed plant-based high-protein Omega-3 enriched foods for dysphagia management** Dysphagia is common among older adults, particularly in hospital and aged-care settings, and is often associated with

		malnutrition. This project will develop a plant-based, high-protein, omega-3 enriched food system using hydrogels, texture modulation, and 3D food printing to create nutritious, safe-to-swallow products.
A/Prof Bryan Coad	Applied chemistry, materials & agri/food science	Multiple projects available in the following areas (contact researcher for discussion) - Bioplastics - Plasma food processing - Seed treatments to improve germination - Biomass valorisation - Plant / fungi interactions - Plant physiology - Fungal pathogenesis
Dr Laura Wilkinson	Plant Genetics, Hops and Amaranth Breeding	Laura conducts research with two different plant species, hops (for beer) and amaranth (a leafy veg & grain crop). Projects are available for each crop, please contact Laura for a discussion. Students can expect to gain experience in genetic analysis, molecular lab work, glasshouse experiments, and phenotyping field trials. Example projects: Genetic regulation of amaranth germination under temperature stress. Influence of light intensity and wavelength upon amaranth plant architecture and antioxidant biosynthesis. Characterisation of drought stress responses in hops. Modulation of ethylene signalling to manipulate inflorescence meristem development in hops.
Dr Tina Bianco-Miotto	Ag, Food and Wine	**Native foods for health using First Nation Knowledge** Australia has a unique and diverse range of plants and fruits which are not found anywhere else in the world. The native food industry is growing in Australia and working with First Nations peoples we have focused on exploring native plants and fruits for novel food products and for health benefits.
Sam Rogers	Ag, Food and Wine	**Evaluation of R Shiny User Interface Frameworks** The *shiny* package in R has revolutionised how data professionals and researchers communicate their findings,

		enabling interactive exploration and visualisation via the internet. Alongside the *shiny* framework, numerous user interface (UI) packages have been developed over the years, offering different features, styles and capabilities for both developers and end users. This project will examine the current UI frameworks available for *shiny* apps, evaluating their features, user experience (UX), usability for developers, and the activity level of their maintainers. Would suit a student with an interest in programming, statistics and data science, data visualisation, accessibility, UI/UX, and outreach. **Data Stories at Waite** *Creating 'Data Stories' from Waite to Demystify and Illustrate Agricultural Data Science* aimed to develop a publicly accessible online educational resource focused on agricultural data science, showcasing the diverse data types and methodologies used in modern agricultural research at the University of Adelaide Waite campus. The resource, available at https://biometryhub.github.io/datastories/, has already had a positive impact on the agricultural research community, particularly for researchers learning statistics and data science. These data stories empower researchers to engage with real-world datasets and apply practical examples to their own projects. This project aims to build on the original work by creating additional data stories from datasets available at the Waite campus. The student undertaking this project would learn about the analyses involved in a variety of real-world research projects and how these can be communicated to researchers as an educational resource. Would suit a student interested in statistics/statistical theory, writing and communication, data visualisation, education, and outreach.

SCHOOL OF ANIMAL AND VETERINARY SCIENCES:

Researcher:	Research Area:	Available Project(s):

Farhid Hemmatzadeh	Virology and infectious diseases	Development of rapid antigen test for mycoplasma bovis.
Farhid Hemmatzadeh	Virology and infectious diseases	Development of latera flow assay for mycoplasma ovipneumoinae.
Dr Caitlin Evans, Dr Mandi Carr and Dr Nicky-Lee Willson	Livestock Health	**Water Quality and Water Security for Australian Livestock.** This project aims to identify the quality of water made available to livestock, how changes in water quality influence livestock health and productivity and options to improve the water available to our livestock. This project involves water sample interpretation and analysis, development of producer reports and a literature review.
Dr. Karolina Drozdzewska	Equine internal medicine (endocrinology, oncology, weight loss investigations)	The faecal sand sedimentation test (FSST) is used to predict the severity of sand accumulation in the large colon of horses, but its sensitivity remains poor. This study aims to evaluate the sensitivity and specificity of standardised FSST performed on three faecal samples collected over consecutive days, using abdominal radiography as a reference. In addition, the relationship between the greatest sand accumulation in a rectal sleeve and the Keppi score will be examined.
Dr. Marina Salles Munerato	Veterinary Anaesthesia and Simulation-based education	1. Small-animal CPR Simulation Join a study assessing whether simulated clinical scenarios improve DVM students' competence and confidence in small-animal cardiopulmonary resuscitation—addressing a major gap in veterinary education research. 2. Swab Placement & Pulse Oximetry in Horses Investigate whether lingual swabs (wet/dry, with/without light protection) affect pulse oximeter ear-probe accuracy in anaesthetised horses—practical findings for improved equine monitoring. 3. Hoisting & Cardiac Output in Horses Be part of the first study measuring cardiac output in horses during hoisting under isoflurane anaesthesia, using minimally invasive LiDCO monitoring via arterial catheterisation. Curious? Let's talk! Contact the researcher for discussion.
Dr Bobbie Lewis Baida	Heat stress physiology and reproduction in sheep	Contact researcher for discussion. Main project: help investigate how heat stress affects body temperature and fertility in sheep. This project involves using wearable temperature sensors and collecting reproductive data across different sheep breeds. Includes hands-on experience with animal handling, fieldwork, and data collection. Ideal for students interested in livestock, physiology, or climate resilience research.

Dr Rebecca Forder	Poultry Production and Physiology	Broiler breeders face health issues due to fast growth, managed by severe feed restriction, causing hunger and stress. This project explores dietary fibres swelling capacity to induce satiety, reduce negative behaviours, and improve welfare. We will evaluate the impact of high-swelling-capacity diets on broiler breeder feeding behaviour during rearing, using physiological stress markers to assess satiety and welfare outcomes.
Todd McWhorter	Conservation biology and ecology	**Bird heat stress risk at Nature Foundation reserves** Wild birds face increased risk of heat stress as the climate warms. Non-governmental conservation organizations like the Nature Foundation play a key role in protecting natural areas and maintaining quality habitat so wildlife can survive. Several possible summer research projects are available analysing camera trap data at new water points to be installed at Nature Foundation Reserves.

SCHOOL OF ARCHITECTURE AND CIVIL ENGINEERING:

Researcher:	Research Area:	Available Project(s):
Dr Prince Antwi-Afari	Construction Management	**Innovative Strategies for Achieving Full Circularity in the Construction Industry** This project focuses on investigating the use of Artificial Intelligence (AI) algorithms for circular design generation and assessments in construction. In this current project, the deliverables are: (1) to develop a comprehensive overview of all the innovative strategies, their strength and weaknesses to enabling the attainment of full circularity in building product design; (2) to appraise the key challenges and enablers of the use of AI and machine learning platforms to attain full circularity in building product design, (3) to identify and formulate the critical policy frameworks for the adoption of AI and machine learning platforms in building product design, and (4) to optimise the linkages between stakeholders engagement in co-creation and co-design of circular building. The project will seek to publish at least four research papers in high impact.
Associate Professor Nesimi Ertugrul	Renewable Energy, Battery Storage, Power Electronics and Wide Bandgap Devices	**Investigation of Renewable Energy for Smarter Rock Cracking** Using renewable energy to power high-energy microwaves, this project aims to reduce energy consumption in mining. By pre-weakening rocks, making operations cleaner safer, and eliminating curtailment in renewable energy.

Dr Feifei Tong	Civil Engineering	**Interaction of two rivers and their impact on flood inundation** Anecdotal evidence suggests that the flood behaviour at the confluence of two rivers can differ significantly from one flood to another, likely depending on the flow characteristics of each river. This project aims to build a local flood model and investigate how the individual flows in each river might affect flood inundation and floodwater velocity in a flood-prone city in Australia.
Dr Larissa Arakawa Martins	Environmentally Sustainable Design	Project 1 Title - Life cycle energy assessment of small scale residential buildings Project 2 Title - Health and wellbeing outcomes following thermal environment interventions in housing of older people Contact researcher for discussion
Dr Zijie Zeng	Structural engineering/structural health monitoring	**Bayesian methods for damage detection using guided waves in engineering structures** This project explores the application of Bayesian inference techniques for damage detection in engineering structures using guided waves (GW). Students will gain experience in probabilistic modeling, uncertainty quantification, and guided wave signal processing to improve the reliability and robustness of GW-based structural health monitoring. The research provides a solid foundation in statistical inference and nondestructive evaluation techniques
Dr Prince Antwi-Afari	Construction Management	**Exploring the Interconnections Between Stakeholder Engagement, Co-Creation, and Co-Design in Advancing Circular Building Practices in Australia** This research explores the dynamic relationships between stakeholder engagement, co-creation, and co-design in the development of circular buildings within the Australian construction industry. Circular building practices—characterized by resource efficiency, adaptability, and closed-loop material flows—require collaborative approaches that

		integrate diverse stakeholder perspectives across the building lifecycle. The study aims to examine how meaningful stakeholder involvement influences design innovation, material reuse strategies, and long-term sustainability outcomes. By analysing case studies, reviewing published documents and policy frameworks, the project seeks to identify best practices and barriers to effective collaboration. The findings will contribute to the growing discourse on circular economy in construction and offer practical insights for architects, engineers, developers, and policymakers striving to embed circularity into Australia's built environment.
Ehsan Sharifi	Urban Microclimates, Architectural Science	**User-oriented Heat-health and Safety Assessment of Urban Streets: A Cyclist View** The project: Apart from common road hazards, cyclists can experience excessive heat exhaustion, sunburn, electrolyte imbalance and dehydration when exposed to high intensity solar radiation and hot weather in summer. Purposeful changes in schedule and duration of the ride as well as clothing and hydration routines are common practices to minimise the adverse impacts of ambient heat on cyclists so-called optional but rather necessary routines. The question is to what extent the built environment can support this healthy, cheap and fun mode of urban commute. There are several factors that alter the thermal experience of a cyclist compared with a pedestrian counterpart including the speed of air movement around the body, metabolic rate, clothing, safety gear and the duration of the activity. To explore the extent of the problem, pendent air and surface temperature sensors were attached to 100 bicycles being used by volunteers in their daily commutes between Feb 2023 and Feb 2024 in Adelaide Metropolitan area. Your role: The successful applicant will assist the research team to analyse the data, make illustrations, take thermal imagery from urban streets in Adelaide CBD and inner suburbs, and prepare a manuscript. The outputs of the project will be presented in the 7th International Conference on Countermeasures to Urban Heat Islands 2026.

Giang D. Nguyen	Computational mechanics	**Peridynamics and applications in engineering** As an engineering student in Civil/Mechanical/Mining engineering, one of your first lectures into mechanics of materials (or Strength of Materials, or Solid Mechanics) is on the concepts of stress and strain and how to obtain them from lab testing. You then move on with others more advanced lectures that basically centre around differential equations and their solutions for engineering applications. An example is bending theory and applications to beam analysis and design in the 2nd year course Strength of Materials (or Mechanics of Materials, or Stress Analysis, or Mechanics of Materials...). Your curricula include the Finite Element Methods and their applications, which centre around solutions of the governing Partial Differential Equations (PDE) in solid/continuum mechanics. They all rely on stress and strain concepts. Do you ever wonder or question (yes, it might sound very silly) what stress and strain are and how "realistic" they are? They are in fact not measurable but inferred from your measurements in the lab. Are they correct strictly if being inferred but not measurable? And similar questions about the governing PDEs: our systems (structures) are no longer "continuous" beyond a certain stage (cracking is an example that destroys the continuity of the system) and hence what have been assumed earlier (continuity and hence differentiability) are no longer valid. If these are not correct (although extremely useful), then what can we do? Welcome to Peridynamics, where such concepts will only be used after some first principle fundamentals. Instead of stress/strain we resort to things that can be measured (force, deformation) and instead of differential equations, integral ones will be used. Compared to hundred years of history of classical continuum mechanics which is the foundation for all engineering disciplines, the 25-years old Peridynamics is just an infant, but it has enormous potentials. Do you want to embark on this challenge?
Giang D. Nguyen	Computational Mechanics	**Modelling hydrocarbon and hydrogen storage in porous reservoir rocks considering localised failure** Most if not all materials experience localised failure in the form of fractures, or high deformation bands. Such localisation of deformation destroys continuum assumptions

		that most if not all models and numerical methods in engineering are built on. If things are no longer continuous due to the onset and development of fracture or high deformation bands, then the system of governing equations in continuum mechanics and their models are no longer valid. The proposed research will develop a generic framework that integrates highly localised deformation bands and fractures in continuum modelling, with focus on coupled flow deformation modelling.
Giang D. Nguyen	Computational Mechanics	**Delocalisation of deformation for enhancing material/structural performance using 3D-printed tensegrity metamaterials** Most if not all materials fail due to localised deformation in the form of cracks (rocks, concrete, composites), or shear deformation bands (soils, metallic materials). Deformation in such cases localises in a narrow band and the material strength and stiffness in this band degrade with increasing intensive deformation, while outside this band the material is "almost" intact with its elastic behaviour. Is this efficient in your opinion, when the load carrying capacity and also energy absorption are governed by materials in a fraction of the volume? In this project we will look into different ways to enhance the material/structural performance using 3D-printed tensegrity metamaterials where internal structure and their stresses can be used to control the properties of the 3D-printed materials. Simple tests and instrumentation to examine their performance will also be included.
Alex Ching Tai Ng and Zijie Zeng	Structural Engineering, Structrua Health Monitoring, Nondestructive Evaluation	The project is to investigate the feasibility of using minimum number of sensors to update the stress/strain condition of a truss bridge when it submitted to loading. The student will carry out structural analysis of a truss bridge, and implement and demonstrate the concept through numerical simulation. Depending the opportunity, the student may need to work with an industry partner. Please contact researcher for discussion.
Feifei Tong	Civil Engineering / Ocean Engineering / Hydrodynamics	**Modelling Flows around Offshore Jacket Structures** This project aims to conduct numerical modelling using exisiting software to model and visualise the turbulent flow field around an offshore jackets structure used by both offshore traditional and renewable energy industries.

SCHOOL OF BIOLOGICAL SCIENCES:

Researcher:	Research Area:	Available Project(s):
Dr Ilaine Silveira Matos	Plant Ecophysiology	**Are Australia's most endangered plants prepared for climate change?** Do you like plants? Are you worried about climate change? If you responded yes to both questions, then come to the Plant Ecophysiology Lab this summer to develop a hands-on research project on endangered plants' responses to drought and heat.
Sonja Frolich	Infectious diseases, host-pathogen interactions, high-content and super-resolution microscopy, AI-based image analysis (machine and deep learning)	There are number of projects focusing on application of machine learning in microscopy-driven hypothesis testing, please contact researcher for discussion.
Dr Joe Atkinson	Molecular Parasitology	You will investigate the effect of herbivore (kangaroos, goats, rabbits) and predator exclusion (cats and foxes) on the traits of plant communities in the semi-arid zone. Contact researcher for further information.
Assoc Prof Danny Wilson	Marine Ecology	Single celled parasites such as the malaria parasite, Toxoplasma and Cryptosporidium are global problems that cause chronic and severe disease. Projects available will apply molecular, biochemical, imaging and drug screening techniques to explore the unique biology of these parasites and develop new therapeutics (contact researcher for discussion for more detail).
Prof. Ivan Nagelkerken	Marine biology, conservation & climate change ecology	**Impacts of mass seagrass loss on fishes in the Cocos Islands Marine Parks and options for restoration.** The protected Cocos Island lagoon has lost >95% of its seagrasses due to human and natural impacts. The seagrass meadows were a critical feeding and nursery ground many coral reef fisheries species. This project will assess to what degree habitat restoration inside the lagoon has led to recovery of prey abundance for juvenile fishes. Benthic samples collected from restored and impacted areas will be analysed under a microscope to identify and count prey items that act as critical food for fishes.
Prof. Ivan Nagelkerken	Marine biology, conservation & climate change ecology	**Impacts of climate change on Australian mangrove faunal communities** Under a warming climate, tropical mangroves are extending their ranges into temperate ecosystems, outcompeting salt marsh habitats. Both mangroves and salt marsh are important feeding grounds for many fisheries species. This project will assess to what degree the

		replacement of salt marsh habitat with mangroves due to climate change, alters the abundance of prey items for fishes. Benthic samples collected from mangrove and saltmarshes in a climate warming hotspot will be analysed under a microscope to identify and count prey items that act as critical food for fishes.
Dr Jenna Crowe-Riddell	Evolutionary biology	I have multiple projects on offer that use a combination of approaches (morphology - microCT scanning & microscopy, gene expression - RNA-seq and behaviour - captive experiments) to understand the evolution of brains and senses in Australia's snakes and lizards. Please contact me for discussion on any of the following potential projects: - How does heat stress under climate change impact brain development in lizards? - How does olfactory behaviour influence sensory vulnerability of sea snakes to prawn trawl fisheries in Exmouth, WA? - How has the aquatic environment influenced serpent sensory evolution?
Dr Christopher Keneally	Microbial Ecology	Contact researcher for discussion
Prof. Ivan Nagelkerken	Marine ecology, climate change	**Impact of climate change on benthic invertebrate communities of temperate rocky reefs** The project investigates the recolonisation and recovery trajectories of benthic communities change when exposed to different climate change stressors. After simulating a major disturbance by completely removing the plants and animals within quadrats on reefs, small sponges (representing artificial habitat) were established to encourage invertebrate recolonisation. This was done at different analogues of climate change, to understand how community recovery occurs under ocean warming vs ocean acidification. Using stereomicroscopes, you will help identify and count different invertebrate groups within these sponges that were collected from the different climate change analogues.
Dr Alice Jones	Marine ecology - coastal ecosystems and nature-based solutions to climate change	Contact researcher for discussion (we have several opportunities for projects linked to the lab group's ongoing research into carbon storage in coastal wetland ecosystems and seagrass restoration).
Dr. Sami Rifai	Ecosystem ecology, Earth observation	The Koonamore vegetation reserve is a 100 year old livestock exclusion experiment covering 400 ha in the arid rangelands. It offers a rare but vital counterfactual to what Australian rangeland vegetation might be without pastoralism. We have recently acquired very high resolution UAV imagery and LiDAR

		from the site. We week students to use this UAV data to help contextualise historical plant survey data to prepare for more ecological monitoring.
Dr. Sami Rifai	Ecosystem ecology, Earth observation	Contact researcher for discussion on projects
Dan Peet	Biochemistry	**Making recombinant JMJD4, JMJD5 and JMJD 6 proteins.** Overall, this is part of a bigger drug discovery project to identify small molecule inhibitors of the enzyme FIH for therapeutic application in metabolic disease. These inhibitors need to be specific, so we want to compare their effects on the closely related enzymes JMJD5, JMJD6 and JMJD7 using in vitro enzyme assays. For this Summer Research Project we will be cloning the genes encoding these proteins into bacterial expression vectors, then performing preliminary recombinant protein expression and purification for use in enzyme assays. This project will involve molecular biology, protein expression and purification.
Dr Benjamin Liffner	Parasitology, Microbiology, Cell biology, Microscopy	**Understanding how parasites build machinery to invade host cells.** This project will investigate malaria parasites and how they build organelles that are specialised for invasion into the cells they parasitise. To investigate this, we use gene-edited parasites and cutting-edge microscopy techniques.
Erinn Fagan-Jeffries	Entomology / taxonomy	This is a systematics project on the subfamily Microgastrinae (Hymenoptera: Braconidae) that will involve preparing specimens of parasitoid wasps for DNA sequencing using genome skimming to extract mitogenomes, learning bioinformatics, and specimen imaging. The project will also include data curation and labelling of specimens, and learning to build phylogenetic trees.
Prof. Steven Cooper and Dr Elisabeth Williamson	Ecology and Evolution/ molecular evolution	**Molecular evolution of eye pigment genes in blind subterranean water beetles** Western Australia is home to a remarkable diversity of blind water beetle species that live in island-like subterranean aquifers, providing a unique study system to explore the genetic changes that occur during the evolution of cave animals from surface species. This project focuses on genes

		involved in eye pigmentation, investigating whether they show evidence for loss of function mutations. Please contact researcher for discussion.
Chris Perrella	Reproductive Health	**Optical Tweezers** Help us trap microscopic particles to measure cell health. Optical tweezers manipulate and control micron-sized particles. We utilise this to ability to bring particles close to cells of interest, measure their motion, and infer cell health. Help us develop measurements to improve reproductive health and IVF success rates.
Professor Bronwyn Gillanders	Marine biology	Using calcified structures of marine organisms to answer fisheries and ecological questions - contract researcher for discussion
Dr Dominic McAfee	Marine ecology	**Identifying ecosystem resilience to harmful algal blooms** The harmful algal bloom has devastated marine ecosystems. But some species and ecosystems appear resilient to the bloom, which is critical for supporting marine ecosystem recovery. This internship will combine field trips and lab work to help identify ecological resilience to seed recovery.
Dr Dominic McAfee	Marine ecology	**Marine restoration to support social and ecological well-being** The harmful algal bloom is devastating ecosystems and the well-being of coastal communities. Community-led restoration supports the health and well-being of coastal ecosystems and communities. This research team is supporting community-based restorations of oyster reefs. Contact researcher to discuss multiple project options.
Dr. Jack da Silva	Evolutionary Biology	**Monogamy and the Evolution of Eusociality in the Hymenoptera** The evolution of sterile workers in social insects by kin selection is hypothesised to require long term monogamy so that the genetic relatedness between workers and reproductives is maximal. This hypothesis is being tested by estimating evolutionary transition rates between mating systems, colony structures, and worker sterility using a recent large phylogeny of bees.

Dr Sophie Russell and Dr Alice Jones	Ecology	**Blue carbon restoration** Multipe projects available - contact researchers for discussion of what best aligns with your interests

SCHOOL OF CHEMICAL ENGINEERING:

Researcher:	Research Area:	Available Project(s):
Giuseppe C. Tettamanzi	quantum materials, quantum devices, quantum sensing	Supercoducting quantum sensing and other; "Contact researcher for discussion"
Associate Professor Abel Santos	Materials Engineering	**Brain-inspired Fluid-based Computing** The overarching project aim is to develop the first integrated neural circuit based on fluidic memristors that mimic the architecture and functionality of biological neural networks in the brain by modulating ion flow and electric signals across their synapses for brain-like computing. This project will harness the recently discovered intrinsic ion conductive properties of thin layers of solid-state anodic oxides as ideal platforms to control interactions, flow, concentration, and spatiotemporal distribution of ions within these materials.
Mary Gonzalez	Petroleum Engineering	**Machine Learning-Powered Predictive Analytics for Evaluating the Performance of Energised Foams** Accurately predicting the apparent viscosity of nanoparticle-surfactant-stabilised foams under HPHT conditions is crucial for the success of hydraulic fracturing operations. Traditional laboratory experiments under such conditions are expensive and time-consuming. An efficient method to predict the rheological properties of fracturing fluids is needed to design optimal injection strategies. This research will leverage machine learning to address this challenge.
Mary Gonzalez	Petroleum Engineering	**Enhancing Underground Hydrogen Storage: Investigating Hydrogen Migration and Reservoir Integrity.** This project contributes to the development of UHS by offering a refined understanding of hydrogen behaviour in geologically complex environments and outlining best practices for safe, efficient hydrogen storage. These insights can provide the industry with findings that have bridged critical gaps in the literature, supporting hydrogen's role as a sustainable energy solution and advancing global efforts to meet ambitious decarbonisation goals.
Mary Gonzalez	Petroleum Engineering	**Unlocking Oil Shale: A Critical Review of the Exploration, Production, and Economic Challenges of Kerogen Oil Shale Resources.** This research project examines the opportunities and challenges associated with oil shale, as an unconventional hydrocarbon resource (kerogen), as a possible source of alternative energy. Oil shale has the potential for use as an alternative energy source, and the global

		reserves of oil shale are much greater than the reserves of conventional crude oil, yet the commercial market for oil shale is limited due to significant technical, environmental, and economic limitations.
Mary Gonzalez	Petroleum Engineering	**Enhancing Underground Carbon Storage in Depleted Reservoirs.** Underground carbon storage in depleted reservoirs is a viable strategy for mitigating greenhouse gas emissions. However, uncertainties in CO_2 migration, storage capacity, and seal integrity hinder its large-scale implementation. This research focuses on computational simulations to model CO_2 behavior in geological formations, assess reservoir capacity, and evaluate sealing efficiency over time. Using advanced numerical modeling and reservoir simulation techniques, this study aims to enhance the understanding of CO_2 interactions within reservoirs, optimise injection strategies, and ensure long-term storage security. The findings will contribute to the development of robust underground carbon storage solutions.
Dr Thomas Scott	Chemical Engineering	his project involves monitoring and analysis of temperature and humidity patterns within a premium barrel hall used for wine maturation. The goal is to better understand the internal climate dynamics of the shed and how they impact product quality and storage risk—particularly in relation to wine loss and mould development.
Dr Thomas Scott	Chemical Engineering	Identification and separation of electrolyte contaminant in copper electrowinning.
Alireza Salmachi	Petroleum and Mining	This project aims to develop a cement incorporating novel additives to enhance its elasticity under cyclical loading conditions. Improved elasticity will strengthen the integrity of the cement–casing system and reduce the risk of leakage in storage wells, including those used for CO_2 and hydrogen. The student will be involved in: Conducting a comprehensive literature review Performing laboratory experiments to evaluate cement performance Analyzing experimental data to assess the effectiveness of the additives
Yan Jiao	Materials Engineering	**Exploring Electrocatalyst Design through Literature Analysing in Electrochemical Energy Research** Explore cutting-edge electrochemical energy research by

		analysing electrocatalyst performance data from scientific literature. Learn how to access, read, and extract key information from publications, gaining skills in literature review, data annotation, and research analysis. Ideal for students interested in sustainable energy, materials science, and scientific data exploration.
Associate Professor Philip van Eyk	Chemical/Process Engineering	**Microbrewery Research Internship** Microbrewery Research Internship involves performing brewing research at small laboratory scale and gives hands-on experience in operating a small-scale microbrewery. This research gives the opportunity to develop beer recipes and test them out on various scales. It involves developing an understanding of the science and engineering of brewing and involves both practical aspects as well as calculations needed to optimise the process.
Dr Diana Tran	Chemical engineering	**The things we know we don't know – How do engineers understand process safety?** The context of health and safety in industrial environments is well-established, but the area of process safety is less understood. This project aims to explore the gaps in understanding process safety and how it overlaps with health and safety practices in various organisational settings. "Contact researcher for further details"
Dr Diana Tran	Chemical engineering	**Evaluating Modelling Tools for Process Safety Assessment** Process safety is critical in chemical and process plant operations. It involves identification, evaluation, and mitigation of risks associated with hazardous materials and energy sources. The aim is to assess how well these tools can predict the likelihood and consequences of failures under abnormal conditions. "Contact researcher for further details"
Mohammad Boshir Ahmed	Sustainability, Hydrogel, Sensor and Agriculture	**Conductive Fibre Gel for Glucose Sensing in Plants** This project aim is to develop a conductive fibre gel using polymeric materials and apply them for glucose sensing using electrochemical technique or colorimetric methods. This will lead to produce a sensible device which will sense glucose molecule in a dynamic environment.

SCHOOL OF COMPUTER & MATHEMATICAL SCIENCES:

Researcher:	Research Area:	Available Project(s):
Dr. Xinyu Wang	Computer Science/Artificial Intelligence	Multi-modal Large Language Models and their applications. Contact researcher for discussion
Melissa Humphries	Statistics, Decision Science, Data Science	Contact researcher for discussion
Dr Henry Li	Computer Science	**Hydrogen Production Materials Discovery Using Deep Neural Networks** This project aims to accelerate the discovery of hydrogen production materials by developing deep learning models, including graph neural networks and causal machine learning techniques. Traditional screening is slow and resource-intensive, but these ML models can efficiently predict key properties such as catalytic activity and stability. Experience with PyTorch and machine learning is required.
Prof. Hung Nguyen	Cybersecurity	**Modelling Security Misconfiguration Debts with Percolation Theory** The accumulation of misconfigurations in complex IT systems, a form of "misconfiguration debt," can be effectively modeled using percolation theory, a concept from statistical physics and mathematics. This approach offers a powerful framework for understanding how seemingly minor configuration errors can cascade through a network, potentially leading to catastrophic security breaches and system failures. In this model, individual misconfigurations can be viewed as these "active" sites. While a single error may pose a limited threat, an accumulation of such debts can create a chain of vulnerabilities. When the density of these misconfigurations reaches a critical point, a metaphorical "percolation" occurs, allowing a malicious actor to navigate through the interconnected weaknesses and compromise the entire system. By representing a system's configuration as a network of interdependent components, we can use percolation theory to analyse their security posture. This involves identifying critical components whose misconfiguration would have the most significant impact on the overall "connectivity" of vulnerabilities. This analytical approach allows for a more strategic and proactive management of misconfiguration debt, enabling security teams to prioritise the remediation of the most critical issues to prevent a cascading failure.
A/Prof Ben Binder	Mathematical Biology and Fluid Mechanics	**Modelling Plant Growth: Estimating the Relative Growth Rate in Duckweed Experiments** This project involves analysing existing experimental data to estimate the

		Relative Growth Rate of duckweed, a fast-growing aquatic plant. Using mathematical models, you will apply data transformations and parameter estimation techniques to compare growth under different environmental conditions. The project is suitable for a mathematics student interested in real-world modelling and data analysis. I also offer other projects in Math Biology and Fluid Mechanics -- please contact me to find out more.
Trent Mattner	Fluid mechanics	**Mathematical modelling of spore dispersal** Knowledge of spore dispersal is important for understanding the spread and origin of disease in crops. In this project we will develop and analyse mathematical models of spore dispersal. Such models are needed to predict disease spread and inform effective control strategies in agricultural systems.
Dr Feras Dayoub	Robotic Vision and Machine Learning	**Dynamic Task Allocation Test-Bed for Human-Robot Search-and-Deliver Teams** This 6-week summer vacation project aims to develop a reusable simulation test-bed for studying dynamic task allocation in human-robot teams. The student will implement a simple "search-and-deliver" scenario with mobile robots and a human operator, design a baseline greedy task allocator, and build a basic human-in-the-loop interface for task oversight and intervention. The system will be instrumented to log key performance metrics, enabling comparison across robot-only, human-only, and mixed-team configurations.
Dr Angus Lewis	Applied probability/data science	Some possible projects include simulating random variables (specifically matrix exponential RVs), convergence of a certain stochastic (point) process, computing the variance of branching processes, statistical signal processing and energy detection, comparing mixture-of-Gaussian and simulation-based object tracking algorithms, ranking and rating sports teams. Contact researcher for discussion.
Joshua Bon	Computational statistics	**Bayesian Additive Regression Trees (BART) in R** BART models are a machine learning technique used to discover complex relationships between variables. In this project you will contribute to the open source R package {tidytreatment} facilitating use of BART in causal inference. Several projects available in visualisation, statistical methodology, and statistical computation. Contact researcher for discussion.
Dr Lyndon Koens	Applied Mathematics (micromachines /microtechnology)	Micromachines can be used to help us manipulate and shape the microscopic world. They are being developed for novel key-hole surgery techniques, targeting drug delivery or exploring inaccessible areas. I have multiple projects on modelling micromachines in complex environments. If interested, please contact me to discuss them.
Professor Minh Hoai Nguyen	Computer Vision and	Project 1: Action Recognition in Volleyball Using Computer Vision and Human Pose Estimation

	Machine Learning	Project 2: Help the Helper: Predicting Patient Bed-Exit for Timely and Intelligent Nurse Intervention Project 3: Learning to Move and Read with Confidence: Scene Text Acquisition for 360° Vision Robots For project summary and criteria, visit: https://minhhoai.net/projs_summer25-26.html
Dr Mengbin (Ben) Ye	Complex networks and dynamics	**Agent-based modelling of cooperation in social dilemmas.** A collective action problem (e.g. a public goods dilemma) requires everyone to cooperate even though it is individually more beneficial to freeride. We will numerically simulate how a network of people can resolve this dilemma as their attitudes towards cooperation evolve over time.
Prof Frank Neumann	Computer Science	**Design and/or analysis of evolutionary algorithms.** Possible areas: Dynamic, stochastic problems. Evolutionary Multi-tasking, Evolutionary Diversity Optimisation. Contact researcher for discussion. Strong programming skills and background on design and/or analysis of algorithms required. Knowledge on evolutionary algorithms desirable.
A/ Prof Ben Binder	Mathematical biology	**Modelling Plant Growth: Estimating Relative Growth Rate in Duckweed** This project involves analysing existing experimental data to estimate the Relative Growth Rate (RGR) of duckweed, a fast-growing aquatic plant. Using mathematical models, you will apply data transformations and parameter estimation techniques to compare growth under different environmental conditions. The project is for a mathematics student interested in real-world modelling and data analysis.
Olaf Maennel	Cyber Security	Contact researcher for discussion
Dr Sasha Gavryushkina	Biological Data Science	**Testing Computational Tools for Studyng Cancer Evolution** Cancer evolves through a series of complex changes at the single-cell level, driven by genetic mutations, copy number alterations, epigenetic shifts, and changes in gene regulation. By reconstructing the evolutionary histories, or phylogenies, of cancer cells, researchers can uncover how tumours develop, progress, and respond to treatment. With the increasing availability of single-cell RNA sequencing (scRNA-seq) data, there is an exciting opportunity to use this rich source of information

		for phylogeny reconstruction. However, this approach faces a number of challenges, including biological variability in gene expression and the technical limitations of current single-cell sequencing technologies, that can introduce biases and reduce accuracy. In this project, you will explore how such limitations influence the reconstruction of cancer cell phylogenies. A key part of the work will using simulation tools to generate realistic scRNA-seq datasets that capture both biological complexity and technical noise. These simulations will allow you to systematically test how different factors, such as data sparsity, affect phylogenetic inference and help guide the development of more robust phylogeny reconstruction methods.
Dr Mike Chen	Applied mathematics	Contact researcher for discussion. Projects in mathematical biology, solid/fluid mechanics and educational technology
Dr Siu Wai Ho	Coding and Information Theory, Navigation and Position Fixing, Machine Learning, Wireless Communications	**Indoor Positioning using Retroreflective Tags** This project aims to develop advanced algorithms for wireless communication and positioning systems. It is a camera-based positioning system that locates the retroreflective tags. A camera takes a photo and from the photo the system locates the tag by finding its position in the photo. 1. Experiment with the positioning system. This is done by using a smartphone camera to record some videos at known locations. 2. Develop software to analyse the videos and estimate the positions and orientations of objects.
Dr Siu Wai Ho	Coding and Information Theory, Navigation and Position Fixing, Machine Learning, Wireless Communications	**Latent Structure Discovery by an Information Theoretic Inequality Prover** The project aims to develop new methods and algorithms for discovering structures in causal models. These models are important in areas such as healthcare, industry, and network security. The new methods can automate reasoning and generate human-verifiable proofs that are too complicated for humans to analyse.
Dr Siu Wai Ho	Coding and Information Theory, Navigation and Position Fixing,	**Data Science for IoT Sensor Networks** Description: This project aims to develop signal processing and data analytics algorithms for IoT sensor networks. Suitable for

	Machine Learning, Wireless Communications	both EME and Data Science students, it involves designing experiments with connected sensors, collecting and managing real-world data, and creating algorithms for processing, visualisation, and performance optimisation in smart devices.
Dr Amali Weerasinghe	Computer Science	**Beyond "What If Score": From Academic Grades to Career Predictions** This project proposes using machine learning to analyse students' grades and map Course Learning Outcomes to key industry skills. By predicting potential career pathways before graduation, students can take a gradual, proactive, systematic approach to shaping their skill development, giving academic tasks greater real-world relevance, and aligning studies with industry demands.
Dr Amali Weerasinghe	Computer Science	**Evolvyn – AI-Powered Career Growth & Portfolio Intelligence** Evolvyn is an AI-driven platform that guides students from day one through a personalised, measurable career growth journey. Combining reverse career mapping, peer intelligence analytics, and reflective soft skill tracking, it bridges education and industry. Universities gain research-grade data on employability progress, while students build dynamic, recruiter-ready portfolios over time.
Dr Amali Weerasinghe	Computer Science	**SkillDNA – Data-Driven Employability Mapping for University Students** SkillDNA is a research-based system that maps a student's technical, soft, and leadership skills into a dynamic "GrowthPrint." It uses AI to recommend projects, track motivation, and benchmark progress against peers and industry demands. Institutions can visualise employability trends, identify skills gaps, and design targeted interventions to improve graduate outcomes.

SCHOOL OF ELECTRICAL AND MECHANICAL ENGINEERING:

Researcher:	Research Area:	Available Project(s):
Dr Ali Pourmousavi Kani	Power Systems, Renewable	**Rebuilding Large-Scale Battery Models Using Real-World Performance Data**

	Energy, Battery Storage	Large-scale battery storage systems are critical for Australia's renewable energy transition. This project leverages newly available AEMO operational data to validate and enhance existing battery models used in power system planning. Students will gain practical experience in electricity markets, battery modelling, data science, machine learning, and Python/MATLAB programming.
Professor Andrei Kotousov	Fracture, Fatigue, Stress Analysis, FEM, Structural Integrity, Guided Waves, DIC	**Research in areas of Fracture, Fatigue, Stress Analysis, FEM, 3D and meta-materials, Structural Integrity, Guided Waves, DIC, etc.** Contact researcher for discussion
Dr Daniel Headland	Electronic engineering	Radar systems employ beam-scanning antennas as the “eyes and ears” to rapidly map the surrounding environment. As frequency is increased, resolution is improved, and so we are currently pushing radar systems beyond 300 GHz, for mm-scale resolution. The student will design specialized beam-scanning antennas to operate at such high frequencies.
Prof. Withawat Withayachumnankul	Terahertz technology	**Designing Terahertz Components via Topology Optimisation** Terahertz technology underpins transformative applications ranging from stand-off sensing to next-generation (6G) wireless communications. Realising these capabilities requires overcoming significant engineering challenges. At the Terahertz Engineering Laboratory, we tackle these challenges through advanced design methodologies. In this project, you will explore topology optimisation, a powerful computational technique for designing high-performance components, and apply it to the development of novel terahertz devices. This hands-on experience will equip you with skills at the intersection of photonics, electromagnetics, and computational design. Prerequisites: Proficiency in Python programming and a foundation in RF engineering.
Mathias Baumert	Biomedical Engineering	Developing algorithms for analysing physiological data for healthcare applications.
Andy Boes	Photonic integrated	Contact researcher for discussion

	circuits, optical frequency combs and their use for LiDAR, positioning and time measurements.	
Said Al-Sarawi	Biomedical engineering	**Automated hip migration measurement using Machine Learning** Description: This is a joint project between researchers and clinicians in the Adelaide Medical School and School of Electrical and Electronic Engineering. The aim of this project is the development of a standalone automated measurement computer aided design tool using plain pelvic radiographs to enable detection of early hip implant migration. This exciting collaborative project has the potential to help patients who have already had a hip replacement along with preventing harm to future patients. The dataset for this project is provided by the Royal Adelaide Hospital in the form of Digital Imaging and Communications in Medicine (DICOM) image format. This format is commonly used for image storage, management, and communications in Medicine. In simple terms, the DICOM file will have meta data with some personal information and X-ray images that have been taken at different times. The tool will be using these images for further processing. As part of this project there is a need to develop algorithms to identify unique landmarks, features, classes between successive X-ray images, and Graphical User Interface. AI and ML algorithms will be used to help automate the identification of these landmarks, features, and classes. This might be proceeded by image pre-processing for noise reduction and improved image processing.
A/Prof Said Al-Sarawi	Biomedical Engineering and Electrical and Electronic Engineering	**Development of an automated bespoke bioreactor device and inoculation mechanisms for tissue engineering** Description: A common practice in burns treatment that require intervention is the use of grafts from other areas of the body, however when the burn area is large, e.g. burns to majority of the body, large skin grafts is not possible. Tissue engineering is a common approach used to culture the needed autologous composite cultured skin from the burnt person cells. Our team has successfully developed an in-house prototype bioreactor that enables the production of large

		pieces of engineered tissue, skin size of 25cm x 25cm. Building on this success, the aim of this project is to further refinement the culturing process to enable a further scale-up and automate the process to enable a reduction in manual-handling and enable the production of a functional skin replacement at mass quantities and at low cost. As part of this project, there is a need to • develop a process model of the developed tissue culture process, • optimise the process model for streamlined and efficient cell culture, • fabricate a disposable perforated air-liquid interface device, • optimise the flow rate and volume output accuracy upon dispensing, • evaluate mechanisms to reduce the residual media retention post waste-tipping, • investigate a mixing mechanism for old/new media, • sterile automation of liquid dispensing, • measure lactate, pH and glucose levels of composite skin, • automated cell inoculation processes, and • automate cassettes manipulation within array.
A/Prof Said Al-Sarawi	Biomedical engineering	**Automated hip migration measurement using Machine Learning** This is a joint project between researchers and clinicians in the Adelaide Medical School and School of Electrical and Electronic Engineering. The aim of this project is the development of a standalone automated measurement computer aided design tool using plain pelvic radiographs to enable detection of early hip implant migration. This exciting collaborative project has the potential to help patients who have already had a hip replacement along with preventing harm to future patients. The dataset for this project is provided by the Royal Adelaide Hospital in the form of Digital Imaging and Communications in Medicine (DICOM) image format. This format is commonly used for image storage, management, and communications in Medicine. In simple terms, the DICOM file will have meta data with some personal information and X-ray images that have been taken at different times. The tool will be using these images for further processing. As part of this project there is a need to develop algorithms to identify unique landmarks, features, classes between successive X-ray images, and Graphical User Interface. AI and ML algorithms will be used to help automate the identification of these landmarks, features, and

		classes. This might be proceeded by image pre-processing for noise reduction and improved image processing.
Prof. Withawat Withayachumnankul	Terahertz technology	**Terahertz Sensing for Defence Applications** Terahertz waves offer unique advantages for defence technologies, including high sensitivity to small objects and the ability to penetrate non-metallic materials. These properties enable applications such as concealed object detection, material inspection, drone radars, and advanced imaging. In this summer project, the selected student will support ongoing laboratory activities aimed at developing terahertz-based sensing systems for defence use cases. This may include assisting with experimental setups, data acquisition, and preliminary analysis. Only Australian citizens are eligible to apply due to the nature of the research. We welcome informal discussions prior to application. Feel free to reach out to our team to learn more.
Dr Harrison Lees (Level-A), Dr Daniel Headland (Level-B), Dr Withawat Withayachumnankul (Level-E)	Radio-Frequency Systems, Terahertz Engineering, Applied Electromagnetics	One of the Terahertz Engineering Laboratory's primary goals is building integrated terahertz systems for radar and communications applications. To this end, we have been developing various tunable terahertz components including filters and phase shifters for the 220—330 GHz range that are tuned via mechanical switching. We have performed early stage experiments to verify their performance but for practical deployment these components would need to be packaged to ensure they are compact, repeatable, and robust. The project scope will be very practical; designing packages, including actuation and control circuitry. The successful applicant will gain experience in device characterization and experience working with world-class RF systems. Additionally there is scope to develop theoretical understanding of these components as well.
Associate Prof Rey Chin	Engineering, Energy	Contact researcher for discussion. My researcher website provides a list of available projects.
Dr Andy Boes	Integrated Photonic Circuits	**Narrow Linewidth Integrated Photonic Lasers** This summer research project will provide you with the opportunity to characterise narrow linewidth lasers that are integrated on photonic chips that have the size of a finger nail. It will give you the opportunity to get familiar with state-of-the-art photonic characterisation equipment and an understanding of the operation principle of such photonic chip light sources.

Dr Ley Chen	Robotics	Testing the dynamic behaviour of an advanced robotic arm - X-ARM 7 in the 3D Manufacturing Lab and adapting the control software to achieve accurate positioning.
Dr. Van Thuy Hoang and Dr. Andy Boes	Optics; Nonlinear Photonics	**Broadening electro-optic frequency combs for precision metrology** This project aims to broaden spectrum of electro-optic frequency combs (EO-combs) through nonlinear phenomena occurring in nonlinear optical fibres. The achieved EO-combs with have spectral bandwidth of tens to hundreds of nanometres will be used for future precision metrology applications such as LIDAR and holography.
Dr Daniel Headland	Electronic Engineering	In The Australian Rover Challenge, teams compete to build a vehicle capable of operation in a simulated lunar environment. The rover is remote-controlled, and so demands a bespoke antenna with highly specific operation requirements. This project will be dedicated to the design, fabrication, and testing of such antennas.
Kim Harvey	Maritime Engineering & Systems Engineering	We require a student interested in AI and robotics to improve an existing fish recognition model. The underwater system (in prototype stage) is called RAMSea and uses YOLO on a Raspberry Pi 5 with AI Hat. There may be opportunities to validate the system in the field using an ROV.
Dr Daniel Headland	Electronic Engineering	Polymer fiber cabling is a highly promising waveguide for terahertz waves, to support high-volume communications and novel sensing applications. However, the technology is currently being held back by a lack of viable connectors to interface with external terahertz systems. This project will develop novel input-coupling mechanisms composed of pure silicon
Prof. Withawat Withayachumnankul	Terahertz technology	**Radiation pattern measurement system for terahertz antennas** Antennas are crucial for wireless applications utilising the terahertz frequency range. Here in our lab, we have developed a number of highly efficient broadband terahertz antennas operating around 300 GHz. One key metric for antenna performance is the radiation pattern. We currently have a 2D radiation pattern measurement system awaiting for further upgrades. As part of this project, you will be responsible for two major improvements: (i) Upgrading the goniometer stage to enhance the system's mechanical stability. (ii) Developing a graphical user interface (GUI) to improve usability and data visualisation. This role requires a background in Python programming and 3D CAD modelling.

Dr Mergen Ghayesh	Biomedical and Mechanical Engineering	**Vibrations of Nanosystems** Project Description: Explore the fascinating world of nanosystems by studying their vibrational properties. This project offers a unique opportunity to delve into nanotechnology, aiming to improve the stability and performance of nanoscale devices. **Vibrations of NEMS (Nano-Electro-Mechanical Systems)** Project Description: Study the vibrational characteristics of Nano-Electro-Mechanical Systems (NEMS) to optimise their design and functionality. This project focuses on the enhancement of the performance of nanoscale devices. **Vibrations of MEMS (Micro-Electro-Mechanical Systems)** Project Description: Examine the vibrational properties of Micro-Electro-Mechanical Systems (MEMS) to improve their performance and reliability. This project aims to contribute to the development of advanced microscale devices. **Heart Attack Prevention Using FSI** Project Description: Contribute to life-saving research by using fluid-structure interaction models to study heart attack prevention. This project offers a unique blend of biomechanics and biomedical engineering, aimed at improving cardiovascular health. **Stroke Prevention Using FSI** Project Description: Join the fight against strokes by using fluid-structure interaction models to study cerebral blood flow. This interdisciplinary project combines biomechanics and biomedical engineering to develop effective stroke prevention methods. **Advanced Hydrogen Storage Systems: Paving the Way for Clean**

		Energy Project Description: Are you passionate about innovative solutions for clean energy? Join our research team to develop advanced hydrogen storage systems, crucial for the efficient and safe storage of hydrogen fuel.
Dr Hong Gunn Chew	Network traffic classification	**Analysing the Predictions of VPN Traffic Classification Models via Explainable AI** Classifying the applications used by devices on a private network is key for situational awareness. Deep learning provides a tool for network analysts to classify traffic. Deep learning provides limited insight into the reasoning of the model, thereby reducing trust in the classification. The goal of this project is to employ explainable AI to uncover the important characteristics of network traffic used by deep learning models to classify applications.
A/Prof. Mathias Baumert	Biomedical Engineering	**Exploring biomedical signals for healthcare applications.** We use signal processing and machine learning algorithms to develop digital biomarkers for various medical conditions. Contact the researcher for a discussion of project details.
Ling Yin	Manufacturing of Advanced Materials	**3D Printing of Metals** This project aims to develop 3D metal printing techniques to meet application demands. It will focus on the establishment of the process-microstructure-property relations to maximize the functions of the materials using advanced materials facilities. The project will train the students to enhance their skills in advanced materials and manufacturing.
Prof Miftar Ganija	EEE	Our mission is to build an Ultrashort and Short Pulsed Laser (USPL) ecosystem for science and industry in Australia through a dual-use approach in collaboration with industry partners. This will create sovereign capability and ensure Australia can meet critical mid- and long-term technology needs. We aim to develop the future skilled workforce required for sovereign USPL manufacturing. Students gain cross-disciplinary research experience through open, hands-on experimental activities, tackling challenges from mechanical design of components to electronic

		control systems, and the complex optical engineering essential for laser development. The DualTech-USPL program drives innovation in USPL source design, development, and construction, integrating mechanical, electronic, and optical expertise. The Summer School provides flexible, collaborative projects that offer students from diverse backgrounds the opportunity to develop practical skills crucial to building advanced laser systems.

SCHOOL OF PHYSICS, CHEMISTRY & EARTH SCIENCES:

Researcher:	Research Area:	Available Project(s):
Dr. Cameron Shearer	Chemistry, sustainability	**Advanced Photocatalytic Materials for Environmental and Renewable Energy Applications** Photocatalysis is a light assisted catalysis where reactive intermediates are formed on the surface upon photoillumination. An excited photocatalyst can drive reduction/oxidation (redox) processes on the particle surface, such as the destruction of pollutants or splitting water into hydrogen and oxygen. A typical Summer Research Project will include the synthesis of photocatalyst nanoparticles and testing their efficiency for the evolution of hydrogen or degradation of persistent organic pollutant. The student will gain experience in inorganic synthesis, electron microscopy, spectroscopic characterisation and analytical chemistry.
Professor Tara Pukala	Biological Chemistry	Contact researcher for discussion
Thomas Fallon	Organic Chemistry	**Sequence-Defined Oligomer Synthesis** Proteins and nucleic acids derive their vast multitude of functions from nature's ability to construct oligomers and polymers with perfect sequence selectivity along the chain. Over the last century, chemists have developed good methods for the laboratory synthesis of peptides and oligonucleotides, but many limitations and opportunities remain. This project will explore the synthesis of peptide mimics via a solution-phase strategy that aims to be easy and scalable. Students will develop many skills in organic synthesis, purification, and characterisation.

Professor Anthony Thomas AC FAA	Theoretical subatomic physics	**Neutron Stars** This will be an opportunity to study what we know about neutron stars and what we may be able to learn from them about the properties of the most dense matter in the Universe. There are other potential projects for which you are encouraged to talk with me.
Kathryn Amos	Earth Science	**Experimental Rivers** Using a new Emriver Em4 stream-table you will explore the conditions that form meandering and braided rivers, river- and wave-dominated deltas. You may investigate biologic and anthropogenic interactions with rivers, and aim to model globally significant landforms. You will record detailed observations and contribute to developing science communication materials.
Dr. Zizhuo Xiang, Prof. Simon Holford	Geomechanics, Carbon storage	**Exploring Non-Destructive Testing for Rock Mechanical Property Assessment** In this project, you will work with the Stress, Structure, and Seismic (S3) research group to develop a rapid, cost-effective, and non-destructive methodology for rock mechanical property assessment. This project will enable you to gain hands-on experience with industry-relevant challenges and build expertise in the emerging geoenergy and geostorage sector.
Dr Finn Stokes	Theoretical Physics	Understanding the strong nuclear force with computer simulations Several projects are available exploring various applications of quantum chromodynamics using computer simulations. They are part of a research program searching for disagreement between theory and experiment, and cover topics like the magnetic moment of the muon, and weak nuclear decays of pions. Contact Finn Stokes for discussion.
A/Prof Tak Kee	Chemistry	**Make hydrogen gas using light and an organic catalyst?** Our research group has demonstrated hydrogen gas generation using water, light and organic light-absorbing catalysts. We have novel materials that show potential for efficient hydrogen generation. Join our research group to learn about these exciting materials and why they are good at generating renewable energy.
Dr. Irene Bolognino	Astroparticle Physics	Contribute to dark matter search: investigate dark matter with SABRE South, Australia's flagship experiment (lab work, simulations, data analysis) or explore next-generation detection with CYGNUS (hands-on prototyping and modelling)

		Join an interdisciplinary project using dark matter technology to study biophotons, with applications in biophysics and medicine.
Dr Tao Li	Chemistry, Materials Science	**Designing Porous Water for Environmental Remediation** Conventional wisdom holds that liquids are non-porous. We challenge this notion by designing porous particles that can remain 'dry' even when dispersed in water. The internal pores can serve as effective sites for concentrating environmental contaminants from water.
Dr. Kwang Jun Lee	Analytical chemistry, inorganic chemistry, materials science, and photonics	**Innovative Solid-Phase Extraction for Ultra-pure Optical Fibre** This project offers a unique opportunity to advance solid-phase extraction methods for enhancing raw material purification. The objective is to achieve ultra-high purity in materials used for optical fibre fabrication, thereby improving fibre performance. A particularly promising strategy involves leveraging functionalized graphene oxide to selectively capture trace metal impurities.
Chris Perrella	Optics, Precision Measurement, Imaging	**Quantum Microscopy** Help us develop quantum microscopy techniques. Some biological samples are delicate, requiring low light levels to prevent photo-damage. To image these samples, we work with quantum light sources to enhance image quality. Help us build these sources, characterise them, and perform biological imaging in a world first project.
Chris Perrella	Optics, Precision Measurement, Imaging Optics, Precision Measurement, Imaging	**Speckle Metrology** Help us advance precision measurement with disordered light beams. Often laser speckle is viewed as problematic, here we utilise it to make extremely precise measurements. Help us make measurements of a laser's frequency with a precision no other research group has achieve, far better than any commercial product.
Chris Perrella	Optics, Precision Measurement, Imaging Optics, Precision Measurement, Imaging	**Optical Tweezers** Help us trap microscopic particles to measure cell health. Optical tweezers manipulate and control micron-sized particles. We utilise this to ability to bring particles close to cells of interest, measure

		their motion, and infer cell health. Help us develop measurements to improve reproductive health and IVF success rates.
Dr Rachelle Kernen	Earth Science	**Reefs of Deep Time: Researching Earth's Earliest Life in the Flinders Ranges** This Summer Research Scholarship focuses on literature-driven research, involving a review of studies on Flinders Ranges stromatolites. The project aims to synthesize sedimentological and paleoecological findings, combining these insights with field mapping of reef localities to produce a critical, publishable synthesis that guides future hypotheses and mentorship in scientific research.

Centre for Automotive safety Research (CASR):

Researcher:	Research Area:	Available Project(s):
Dr Mario Mongiardini	Road safety	**Increase in vehicle size** Modern vehicles have been progressively increasing in size. Vehicle front end designs are becoming taller and more boxed than what they used to be just a few years ago. This trend may have a negative effect in case of a crash with a pedestrian. In this project, you will collect, organise and analyse information about front-end geometry of the most popular passenger and ute vehicles sold in Australia. This dataset will be used for future studies in pedestrian and vehicle safety testing.