UQ 2021 Winter Research Program Projects

Faculty of Medicine

Read about the program on the Winter Research Program page, and apply online from 22 March – 18 April 2021 via https://employability.uq.edu.au/node/159/2#2. Projects commence on 21 June and to conclude by 23 July 2021.

Please take note of where each project is located. Projects are listed under the unit names on the application page (StudentHub).

Scholars can select from one of the following to see the associated projects:

Child Health Research Centre

Project 01	Dr Dwan Vilcins	Does maternal alcohol intake influence later lung function: a systematic review and pilot analysis
Project 02	Professor Karen Barlow	Investigating needs and costs associated with Traumatic Brain Injury in Children

Centre for Health Services Research

Project 03	A/Professor Jason Ferris	Global Drug Survey: Analysis of the largest global survey of drugs users (2013-2020)
Project 04	A/Professor Clair Sullivan	Digital future: Evaluation of STARS hospital
Project 05	A/Professor Tracy Comans	Trends in antimicrobial resistance prevalence and its health care cost implications among hospital admitted patients in Queensland
Project 06	Dr Anish Menon	Rethinking the model of outpatient diabetes care utilising eHealth in regional, rural and remote populations (Remodel-R3)
Project 07	Dr Lee Woods	Evaluating the impact of digital health maturity in Queensland: The Digimat study
Project 08	Dr Nazanin Ghahreman-Falconer	Evaluation of Antimicrobial Stewardship Programmes in Residential Aged Care
Project 09	Dr. Kim-Huong Nguyen	Evaluating complex healthcare interventions and investments using total economic value
Project 10	Professor Anthony Smith	Telehealth activity and costs for specialist consultations in Australia during COVID-19
Project 11	Professor Jason Pole	Valuing digital health interventions using hospital collected data within ieMR
Project 12	Dr Ronald Dendere	Artificial intelligence in healthcare for older people

School of Biomedical Sciences

Project 13	Dr Sherry Wu	Enhancing anti-tumour immune response in ovarian cancer
Project 14	Dr Taylor Dick	Personalized assistive technology to enhance movement

Project 30	A/Professor Glenda Gobe	Using NMR to identify metabolic changes of progressive chronic kidney disease

School of Public Health

Project 15	Dr Katherine Cullerton	Analysis of letters to the editor regarding nutrition policy in Australia
Project 16	Dr Tracey Di Sipio	Assessment of mind-body practices in cohort studies of cancer survivors: a systematic review

UQ Centre for Clinical Research

Project 17	A/Professor Carlos Salomon	Extracellular vesicles as prediction tools of chemo-response in serous ovarian cancer
Project 18	Dr Brian Forde	Metagenomics in the clinical setting
Project 31	A/Professor Carlos Salomon	Dynamic changes in insulin sensitivity across gestation and its association with extracellular vesicle encapsulated miRNAS in maternal obesity and gestational diabetes mellitus

UQ Diamantina Institute

Project 19	A/Professor Emma Hamilton-Williams	Manipulating the gut microbiota to treat type 1 diabetes
Project 20	Dr Snehlata Kumari	Understanding the communicating network regulating inflammation
Project 21	Dr Fernando Guimaraes	Which tumour immunosuppressive pathways prevent natural killer cell activation?
Project 22	Professor Ian Frazer	Mapping genes to cell types through streamlined automated annotation of scRNA-seq data
Project 23	Professor Ranjeny Thomas	GeT1D: An R and shiny based platform for type-1 diabetes gene expression analysis.
Project 24	Dr Timothy James Wells	Investigation into antibodies that enhance Burkholderia infection
Project 36	Dr Gunn-Helen Moen & Professor David Evans	The causal effect of maternal exposures on later life outcomes

Office of Medical Education

Project 25	A/Prof Helen Wozniak	Evaluating the contribution of workplace-based assessments in medical students' achievement

School of Clinical Medicine

Project 26	Dr Henry Marshall	Development of an Artificial Intelligence (AI) Chatbot for Smoking Cessation
Project 27	A/Professor David Vesey	Measuring the activity of proteases in the urine of patients with kidney disease

Project 28	Professor Dan Siskind	Clozapine levels in CSF and Serum: A Systematic Review
Project 29	Professor Kwun Fung	International Lung Screening Trial (ILST)

Important: These projects are located at multiple sites at St Lucia and Herston campuses and hospitals in Brisbane, Ipswich, and a number of rural and remote area facilities throughout the rest of the state. Find out more about our research sites and research in our clinical schools and hospital sites.

Child Health Research Centre

01 Project title:	**Does maternal alcohol intake influence later lung function: a systematic review and pilot analysis**
Primary Supervisor	Dr Dwan Vilcins d.vilcins@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	Centre for Children's Health Research, South Brisbane
Description:	**Background** Maternal alcohol use in pregnancy is a known risk factor for subsequent harm to the developing foetus. The most recent report of alcohol use in Australia found that around 35% of women consume alcohol during their pregnancy, although the level of intake is typically low. Prenatal alcohol exposure (PAE) has been associated with birth defects, adverse birth outcomes and neurodevelopmental harm. These harms can occur at low levels of alcohol intake, including those who do not drink daily, as well as in cases of heavy drinking in the early stages of pregnancy (i.e. before a woman is aware of her pregnancy). Foetal alcohol syndrome disorders (FASD) describe the wide range of outcomes resulting from maternal alcohol use during pregnancy. Evidence is emerging to show adverse outcomes can extend beyond structural and functional brain development to a wide range of other organs and systems of the body. A series of recent systematic reviews found clinical and pre-clinical evidence that PAE may have negative impacts on the cardiovascular and renal function, body composition, metabolic markers such as insulin, glucose and dyslipidaemia, immune function, and reproductive and hormonal changes. Foetal lung development may also be sensitive to the effects of PAE however existing data has been performed in pre-clinical settings. Pre-clinical evidence has found that PAE inhibits lung development and cellular growth. PAE has been associated with lower levels of surfactant protein expression. Surfactant is important to reduce surface tension in the lung and has an important immune function in the lungs by assisting the innate immune functions. Further, detrimental effects on alveolar macrophages and decreases in T and B cells have been found after PAE. Pre-clinical models have shown an increased risk of pneumonia from animals exposed to alcohol prenatally. This project will comprise of a systematic review and an analysis of data from a cohort study of Australian children to test the association of maternal alcohol use with adverse lung outcomes **Systematic review** A previous narrative review showed pre-clinical evidence for alcohol induced cell damage, cell changes and immune dysfunction in lungs. There is a need for a systematic review to a) update previous narrative review, b) ensure repeatable and complete identification of papers, and c) look for papers reporting on clinical outcomes. **Pilot analysis** Data from the Barwon Infant Study has been acquired to answer the following research questions: 1. Is lung health in children exposed to alcohol in the prenatal period different to the lung health of non-exposed children? 2. Are children with PAE more likely to have increased episodes of lower respiratory tract infections or wheeze compared with non-exposed children?
Expected outcomes and deliverables:	The successful student will be involved in both elements of this project, which will provide useful research outcomes to aid in their future career. The student will be integrated into the CHEP team and gain mentorship and networking opportunities as they complete the project. The student will join the systematic review team and assist in conducting the review and drafting

	of the manuscript. The student will also assist with data preparation and analysis of a longitudinal cohort study and assist in producing a working draft of a research paper from this analysis. Mentoring and teaching will be provided by the team, and basic skills in the statistical software R will be gained. Students will be asked to present a short overview of the project at a team meeting.
Suitable for:	Students interested in epidemiology, public health and/or children's health. Some basic knowledge of statistics, epidemiology or coding is beneficial.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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02 Project title:	**Investigating needs and costs associated with Traumatic Brain Injury in Children**
Primary Supervisor	Professor Karen Barlow k.barlow@uq.edu.au
Secondary contact	Ms Hema Moench h.moench@uq.edu.au
Project duration:	5 weeks Up to 36 hours per week
Location	Centre for Children's Health Research, South Brisbane
Description:	Program background: Concussion is a common diagnosis in childhood and can lead to long-term problems that impede returning to school and sport participation. Over the last decade, researchers and healthcare providers have increasingly realized the significant morbidity associated with concussion. Once thought to be a “trivial” injury, the healthcare needs are increasingly recognized as well as the potential short-falls in healthcare systems. Although some rehabilitation interventions are time- and resource-intensive, there are also cheaper intervention strategies that can help the majority of children. As part of our program to improve the outcome of childhood concussion and traumatic brain injury throughout Queensland, the aim of this winter research project is to investigate its healthcare needs and associated costs in Queensland children. We hypothesize that there will be considerable heterogeneity in the services children receive and that there will be considerable sociodemographic variability with children in poorer and more remote areas being at risk of not receiving both low cost (education) and intervention (high cost) strategies they need. Approach: The successful candidate will be part of a healthcare utilization team (neurologist, physiatrist, economist, and allied health professionals), investigating needs and costs associated with Traumatic Brain Injury in Children. A funded cross-sectional study is already underway and data has been collected from over 100 participants. The student project will be vital to the program and will focus on mild TBI and concussion. During this 5-week project the student will help collect, collate and analyse health service utilization and outcome data on children with TBI focusing on mild injuries, including facilitating the completion of questionnaires by families. This topical project has the potential to inform local and national governing bodies.
Expected outcomes and deliverables:	The successful applicant(s) will gain unique experience in methodologies to assess health service utilization and associated economic costs. We expect the student to be able to analyse data (with supervision and help) and assist in producing a working draft of a research paper focusing on mild TBI and concussion.
Suitable for:	Suitable for applicants with an interest in analytical research and a background in biomedical science or public health.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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Centre for Health Services Research

03 Project title:	**Global Drug Survey: Analysis of the largest global survey of drugs users (2013-2020)**
Primary Supervisor	A/Professor Jason Ferris j.ferris@uq.edu.au
Project duration:	4-5 weeks 20-36 hours per week
Location	Herston/ home (TBC)
Description:	"The Global Drug Survey is the largest survey of drug users around the world. We have annual data spanning 2013-2020 (with over 500,000 records). Each year, respondents from over 30 countries have completed survey on their drug use: ever, last 12 months and recent use. We have data on over 100 different types of drugs: on the less typical drugs (e.g., ketamine, and many Novel Psychoactive Substances) and the more common drugs, for example cocaine, methamphetamines, cannabis and synthetic cannabis, and alcohol. If you are interested in drug and alcohol research, this project is for you. We are looking for a highly motivated scholar to prepare one journal article using GDS data. The topic will be decided based on your interests and current relevant topics. If you want to know more see http://www.globaldrugsurvey.com/"
Expected outcomes and deliverables:	- Conduct a literature search - Create an endnote library - Draft a literature review - May include data cleaning and preparation - May include descriptive data analysis - May include Big Data analytics
Suitable for:	- Excellent writing skills - Strong quantitative analysis skills (3rd /4th year level) - Interest in alcohol and illicit drug policy/interventions
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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04 Project title:	**Digital future: Evaluation of STARS hospital**
Primary Supervisor	A/Professor Clair Sullivan clair.sullivan@health.qld.gov.au
Project duration:	5 weeks 36 hours per week
Location	Oral Health Centre, Herston
Description:	**Program background:** We know that electronic medical record (EMR) implementations rarely unfold as predicted, are expensive and challenging to deliver successfully. Investment in digital hospitals is rapidly increasing but articulating the benefits has been difficult. We need to ensure that this investment delivers the Quadruple Aim of Care - 1. Better care 2. Improved patient and clinician experience 3. Better value 4. Improved population health. STARS Hospital is the newest member of Australia's largest Hospital and Health Service (HHS) - Metro North HHS. STARS has opened in February 2021 as HIMMS Level 6 (full EMR). As it is brand-new, we have a unique

	and rich opportunity to observe the impact of digital transformation over time. **Aims** 1. To assess the impact of digitisation on process and outcomes measures of transferring services to STARS and a cost-benefit analysis. 2. To assess the impact of digitisation on medication safety 3. To assess the perceptions, attitudes and clinical behaviours of multidisciplinary hospital staff related to digitisation using real-time ethnography (observation).
Expected outcomes and deliverables:	Students will be integrated in Queensland's largest digital health research network and work with international leaders in digital health. Practically, students will be immersed in a state-of-the-art digital hospital transformation. Students will be exposed to real-time clinical environments from a research perspective. Skills in quantitative and qualitative data collection and analysis will be taught. Students will have the opportunity to contribute to publications from the research and become an author.
Suitable for:	This project is open to applications from all students. Students interested in digital health and applied; real-world research will thrive!
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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05 Project title:	**Trends in antimicrobial resistance prevalence and its health care cost implications among hospital admitted patients in Queensland**
Primary Supervisor	A/Professor Tracy Comans t.comans@uq.edu.au
Secondary contact	b.wubishet@uq.edu.au +61 7 3346 4647
Project duration:	5 weeks 30 hours per week
Location	Oral Health Centre Building, Herston Campus
Description:	Antimicrobial resistance (AMR) is a phenomenon where microorganisms such as bacteria, fungi, viruses, and parasites alter themselves in ways that make the medications used to treat infections caused by them ineffective. AMR is a staggery growing global public health problem associated with huge health and economic consequences. Managing the increasing AMR in hospitals and communities has become a priority agenda both in Australia and internationally. Australia has taken several measures to contain the growing burden of AM. However, some reports show that up to a quarter of antimicrobial prescriptions in Australian hospitals are not in line with prescribing guidelines; and 21.5% of them prescriptions are inappropriate. The existing limited research on AMR in hospital setting shows that AMR is associated with less than optimal patient outcomes and substantial cost burden. A modelling study on the health and economic burden of AMR infections in Australian public hospitals estimated that the hospitals spend an extra cost of AUD 11 million every year only because of ceftriaxone-resistant Escherichia coli bloodstream infections and methicillin-resistant Staphylococcus aureus. **Aim**: The study aims to assess trends in AMR infections and costs, and associated factors among hospital admitted patients in selected hospitals in Queensland. **Approach:** A matched-case control study will be conducted using Princess Alexandra Hospital and Logan Hospital inpatient and emergency department data and death datasets. The Health Economics Research and

	Modeling Unit has access to these data in relation to a previous ethical approval for a related project. Linkage of Queensland Hospital inpatient to the Queensland Emergency Department data and the Registry of Deaths is performed by the Queensland Health Data Linkage Unit. Amendment to the existing approval will be requested to accommodate the additional objectives of this project and obtain recent data. People older than 18 years and who had one or more hospital admission between January 2010 and December 2020 and who had antimicrobial resistant infections (AMRI) (cases) will be selected from the hospital data. Controls will also be selected from the hospital data using matching conditions including age group, gender, ARIA+ and SEIFA quintile. ICD-10 AM codes for AMRIs will be used to identify cases. Additional costs of AMR infections will be estimated using diagnosis-related group payment system. Trends in the prevalence of AMR infections and associated costs during the study period will be estimated. Potential factors that may be related to prevalence and cost of AMR infections will be assessed. **Impact of the project:** 1) It will give insight into the pattern of AMR in the study hospitals, associated cost burden and related factors; 2) The identification of factors related to AMR and its associated costs will inform specific types of antimicrobial stewardship programs that maybe relevant for consideration; 3) I will also help us to understand the economic burden of AMR produce information for decision makers to prioritise interventions aimed at curbing AMR; 4) Ultimately, the project will contribute to reduction in AMR and its cost burden, improved patient outcomes and trust in health service and therefore increased health seeking behaviour.
Expected outcomes and deliverables:	Students will: 1) Understand the AMR issues and its social and economic impact. Acquire data analysis skill using linkage data set curated in the hospital setting. Opportunity to present the research within the team (HERMU), and the Centre (CHSR); 2) Have the opportunity to improve their data management and analysis skills. 3) Be given access to hospital admission, death data and other dataset and will be assisted to develop confidence and skill in managing, analysing and interpreting these data. 4) Will be guided to write up a manuscript out of their analysis and will also be encouraged to disseminate the outputs as journal publication and presentations. 5) The data analysis and interpretation, academic writing, and disseminations skills that they will learn during the placement and having a journal publication from this project will contribute to their future graduate studies and/or employability.
Suitable for:	A student with quantitative skill, proficiency in Stata and interest in health care administrative data analysis
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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06 Project title:	**Rethinking the model of outpatient diabetes care utilising eHealth in regional, rural and remote populations (Remodel-R3)**
Primary Supervisor	Dr Anish Menon a.menon@uq.edu.au

Project duration:	5 weeks 28 hours per week
Location	Princess Alexandra Hospital Campus
Description:	There is a need to review diabetes models of care in light of the number of people with diabetes not achieving recommended targets (50%), workforce shortages and increasing prevalence of diabetes. To manage this increasing burden, empowering people with diabetes to better self-manage their condition will reduce the risk of complications and future preventable utilisation of healthcare resources. For better educating patients and sustaining their self-management, we have developed, based on digital health principles, an innovative Mobile-based Diabetes Management System (MDMS). The MDMS consists of a clinician portal, as well as a consumer-facing smartphone application. The proof-of-concept, feasibility and pilot trials of the Mobile Diabetes Management System (MDMS) that we have completed have demonstrated a significant improvement in blood glucose levels, a high degree of consumer satisfaction and a good proportion of conventional in-person visits being substituted in a tertiary diabetes service at the Princess Alexandra Hospital, Brisbane. In this project we have added an insulin titration feature to the MDMS, which will be trialled with people living in regional, rural and remote Queensland. Participants will be recruited from the PA's telehealth service. The aim of the project is to trial the updated MDMS for efficacy and safety. We will conduct an economic evaluation alongside the trial to assess the cost-effectiveness of the MDMS. As part of the economic evaluation, we will do a scoping review on the economic evidence for mHealth interventions in type 2 diabetes. There is an opportunity for the scholar to assist with screening and reviewing literature for this scoping review.
Expected outcomes and deliverables:	The scholar will gain skills relating to literature review and drafting academic articles for publication. Depending upon the contribution, the scholar may have the opportunity to be authored on a peer reviewed journal article. The scholar will be able to attend project meetings to experience the real-world implementation of digital health into health systems. As part of this project, the scholar can choose to can gain experience in quantitative research methods. If interested, the scholar might have an opportunity to consider pursuing a higher degree research associated with other possible projects that are either in the planning stage or currently underway such as diabetes stakeholder perspectives to better integrate diabetes care, MDMS implementation trial in specialist care settings and telediabetes care.
Suitable for:	This project is suitable for students with a background in any health-related field of study. A background in chronic disease-related fields, public health, health economics, and/or digital health will be an advantage.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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07 Project title:	**Evaluating the impact of digital health maturity in Queensland: The Digimat study**
Primary Supervisor	Dr Lee Woods lee.woods@uq.edu.au
Project duration:	5 weeks 36 hours
Location	Oral Health Centre, UQ, Herston
Description:	Digital maturity assessments in health allow healthcare organisations to understand their readiness to integrate digital technologies and to develop

	roadmaps to improve patient care that sits within a broader digital strategy. Currently there is limited capability to measure digital health maturity at individual hospitals, state-wide within Queensland or elsewhere in Australia. Whilst there a range of diverse assessment tools and measures, there is no international or Australian based validated digital maturity indicator. This research extends on a world-wide project which is underway with Queensland Health, the Digital Health CRC (DH CRC) and the Healthcare Information Management Systems Society (HIMSS). The existing project aims to: 1. validate the HIMSS methodology in digital health and continuity of care maturity assessment in Australia, and 2. measure Queensland's progress towards a digital health ecosystem. The limitation of the assessment and existing research, however, is a deep understanding of the correlation between digital maturity and health, care and economic outcomes. Therefore, this research describes a plan to address the research gap across correlating digital maturity and outcomes, by measuring the impact of the digitalization of Queensland Health. Our hypothesis is that digital maturity is associated with: 1. improved patient experience, 2. better health outcomes, 3. better clinician experience with increased productivity, and 4. increased cost initially then decreasing cost over time. This is an observational quantitative study using existing, routinely collected data. There is no active intervention associated with this research as it looks at the impact and outcomes of the existing digital transformation journey underway by every HHS in Queensland. There are three study arms for the research: 1. Comparative point prevalence study 2. Longitudinal pre/post impact study 3. Digital hospital economic evaluation
Expected outcomes and deliverables:	Expected outcomes are three-fold as follows: 1. An understanding of the direct correlation between digital maturity and outcomes for a variety of stakeholder groups 2. Understand what impact digitalising health services has on outcomes measured over time 3. An economic analysis framework to which is fit-for-purpose to the Queensland Health context
Suitable for:	1. Information and communication technology students at all levels with an interest in applied information systems, or 2. Healthcare professionals in training at all levels (for example allied health, nursing, pharmacy, dentistry students), or 3. Economics, mathematics, epidemiology, biomedical science students with an interest in health services research. Would suit any student interested in using health data using qualitative/statistical methods either listed or not listed above. Anyone interested in being exposed to a large research/government/NFP collaboration.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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08 Project title:	**Evaluation of Antimicrobial Stewardship Programmes in Residential Aged Care**
Primary Supervisor	Dr Nazanin Ghahreman-Falconer n.ghahremanfalconer@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	Princess Alexandra Hospital
Description:	Current Antimicrobial Stewardship (AMS) practices in RACFs are not well understood and the complexity of RACF environments means that prescription practices and AMS needs are likely to vary widely between facilities. A structured AMS program targeted at optimising antimicrobial use in the RACF setting is urgently needed, especially given that this a requirement for RACF accreditation. In this project an AMS programme will be implemented in 18 RACFs as part of a bigger stepped wedge RCT. This project aims to evaluate the uptake of the intervention and identify needs, barriers and facilitators of AMS in RACFs. A mixed methods approach will be used to evaluate the AMS programme implementation and uptake.
Expected outcomes and deliverables:	The research will involve 1) review of literature & writing of the protocol background / narrative review for publication, 2) some preliminary analysis of data.
Suitable for:	Any student with an interest in Antimicrobial stewardship in aged care who wishes to gain skills in conducting literature reviews, academic writing and data analysis.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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09 Project title:	**Evaluating complex healthcare interventions and investments using total economic value**
Primary Supervisor	Dr Kim-Huong Nguyen kim.h.nguyen@uq.edu.au
Project duration:	5 weeks 30 hours per week
Location	Level 6, Oral Health Centre Building, Herston
Description:	**Background:** Healthcare interventions and medical technologies are becoming more complex and expensive. With the introduction of electronic medical records all around the world and in Australia, there is an increasing integration of digital health into all aspects of care, allowing for improvements in information sharing, precision medicine capacity and potentially other huge medical and healthcare innovations. These will almost certainly come with heavy price tags, at the early stage of R&D (investments) and generate future impacts on the workforce and quality of care that we have not yet anticipated and/or quantified. The question is how we (clinicians, health services researchers and society collectively) decide which innovations constitute “valued care”. Economic evaluation has been extensively used to help decision makers (NICE, PBAC, MSAC) decide on the allocation of healthcare resources to provide the most “valued” interventions. However, traditional methods of evaluation (such as cost utility analyses) lack many “elements of value”, such as reduction in uncertainty, insurance value, equity, scientific spill over and value of hope. Most of these elements fall into the realm of “social values” and while relatively well understood in other fields of economics, have not yet been explored in health and medical research. Further research is needed on how best to measure, quantify and include these values in healthcare and medical decision making. **Aim:**

	Apply the total economic value framework to understand the potential benefits of complex healthcare interventions and medical technologies. **Approaches:** 1. Comprehensive and systematic literature review to understand the application of the total economic value framework in other sectors that are closely related to healthcare and medical technologies. 2. Apply the literature findings into a framework to evaluate digital health investments and operation in Queensland public hospitals. **Impacts:** 1. Provide a systematic understanding of what should be included in identifying and classifying benefits (elements of value) of complex healthcare and medical technologies that rely on digital transformation. 2. Understand the potential trade-off between direct, indirect and un-used values of medical and healthcare interventions, and how this might bias the decision making in resource allocation. 1. 3. Improve the economic analysis and evaluation of complex healthcare and medical interventions, leading to better resource allocation and improvements in patient outcomes and the medical workforce.
Expected outcomes and deliverables:	For participating student, they will learn skills in literature review, data analysis, academic writing and presentations, and will have a journal publication from this project. This will contribute to their future graduate studies and/or employability. More specifically, they will • Understand the spread and depth of economic evaluation in complex healthcare intervention and medical technologies, its theoretical and practical issues and future research needed. • Acquire skill in systematic and scoping review in health and medical research. • Acquire skill in applying theoretical concepts in a practical situation (real case study) • Opportunity to present the research within the team (HERMU), and the Centre (CHSR). • Will be guided to write up a manuscript out of their analysis and will also be encouraged to disseminate the outputs as journal publication and presentations.
Suitable for:	A student with good understanding of both economics and health, having a good quantitative skill and interest in decision making methodologies.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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10 Project title:	**Telehealth activity and costs for specialist consultations in Australia during COVID-19**
Primary Supervisor	Professor Anthony Smith a.smith8@uq.edu.au
Project duration:	4 weeks 24 hours per week
Location	Building 33, Princess Alexandra Hospital, Woolloongabba
Description:	The Centre for Online Health is the premier research unit for telehealth services in Australia. We are seeking one Winter research student to assist with data analysis and literature review. We have administrative data for specialist consultations delivered in Australia through telephone,

	videoconference and in-person modalities. Students will be asked to examine de-identified data and produce descriptive statistics, propose and perform analysis, and perform a narrative analysis on literature in the area.
Expected outcomes and deliverables:	Students will assist with data extraction, data analysis and literature review. It is expected that the results will be used to craft a conference abstract and manuscript for publication.
Suitable for:	Students interested in health service delivery, telehealth or telemedicine, data analysis, and literature review procedures.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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11 Project title:	**Valuing digital health interventions using hospital collected data within ieMR**
Primary Supervisor	Professor Jason Pole j.pole@uq.edu.au
Project duration:	5 weeks 30 hours per week
Location	Level 6, Oral Health Centre Building, Herston
Description:	**Background:** Healthcare interventions and medical technologies are becoming more complex and expensive. With digital technologies and development of genomics, the cycle of innovations becomes shorter, and the volume of new technologies become higher. The question is how we (clinicians, health services researchers and society collectively) decide which innovations constitute “valued care”. Economic evaluation has been extensively used to help decision makers (NICE, PBAC, MSAC) decide on the allocation of healthcare resources to provide the most “valued” interventions. However, traditional methods of evaluation (such as cost utility analyses) lack many “elements of value”, such as reduction in uncertainty, insurance value, equity, scientific spill over and value of hope. Most of these elements fall into the realm of “social values” and while relatively well understood in other fields of economics, have not yet been explored in health and medical research. Further research is needed on how best to measure, quantify and include these values in healthcare and medical decision making. What is considered to contribute to social value in healthcare and medical interventions is inevitably nuanced. It is evidenced by the very fact that decision on who gets what and when does not rely solely on individuals’ willingness and ability to pay within an unregulated market. Additionally, balancing these social values with the opportunity costs of the alternatives, i.e., magnitude of benefits that others healthcare interventions forego when decisions are made to fund new medical and healthcare technologies, has not yet received due research attention. **Aim:** Investigate approaches for valuation and inclusion of additional “elements of value” into economic analysis and decision making in healthcare intervention and medical technologies. **Approaches:** 1. Comprehensive literature review to identify the additional elements of values that are relevant for the evaluation of complex and multi-disciplinary healthcare interventions and medical technologies. 2. Comprehensive review of practical approaches that can be used to measure and include those “elements of values” into economic analysis and evaluation.

	3. Apply the literature findings into a framework to evaluate digital health investments and operation in Queensland public hospitals. **Impacts:** 1. Provide a systematic understanding of how to value benefits (elements of value) of complex healthcare and medical technologies that rely on digital transformation. 2. Identify areas of research and potential methods to be investigated to measure and include those benefits into future healthcare and medical research, especially into trials and cohort studies. 2. 3. Improve the economic analysis and evaluation of complex healthcare and medical interventions, leading to better resource allocation and improvements in patient outcomes and the medical workforce.
Expected outcomes and deliverables:	For participating student, they will learn skills in literature review, data analysis, academic writing and presentations, and will have a journal publication from this project. This will contribute to their future graduate studies and/or employability. More specifically, they will 1. Understand the spread and depth of economic evaluation in complex healthcare intervention and medical technologies, its theoretical and practical issues and future research needed. 2. Acquire skill in systematic and scoping review in health and medical research. 3. Acquire skill in applying theoretical concepts in a practical situation (real case study) 4. Opportunity to present the research within the team (HERMU), and the Centre (CHSR). 5. Will be guided to write up a manuscript out of their analysis and will also be encouraged to disseminate the outputs as journal publication and presentations.
Suitable for:	A student with good understanding of both economics and health, having a good quantitative skill and interest in decision making methodologies.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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12 Project title:	**Artificial intelligence in healthcare for older people**
Primary Supervisor	Dr Ronald Dendere r.dendere@uq.edu.au
Project duration:	5 weeks 20 hours per week
Location	Princess Alexandra Hospital campus
Description:	In recent years, research into the use of artificial intelligence in healthcare has grown. Artificial intelligence applications such as machine learning, and predictive analytics have been investigated in various health care settings including emergency medicine, paediatric medicine, and oncology. The aim of this project is to conduct a literature review to understand how artificial intelligence techniques such machine learning, and predictive analytics can be used in the care of older people in nursing homes, community care or hospitals to identify those at risk of adverse outcomes. Activities during the project include:

	1. Conducting searches for articles relevant to the aims of this project in the mainstream databases that index medical and healthcare research articles (PubMed, Medline, CINAHL, Embase etc). 2. Screening search results according set criteria for inclusion in the review. 3. Reviewing screened articles and data extraction. 4. Summarising and synthesizing extracted data After summarising and synthesising the data, a systematic review manuscript will be written for possible publication in a peer-reviewed journal. The project requires good analytical skills and attention to detail. In addition to enhancing those skills, this project will enable a student to develop excellent communication and scientific writing skills.
Expected outcomes and deliverables:	Students can expect to gain the following skills: 1. Formulating and refining research questions. 2. Effective searching of medical literature. 3. Using Endnote as a collaborative tool for managing research bibliograph. 4. Using Covidence as a collaborative tool for conducting systematic reviews. 5. Develop analytical, communication and scientific writing.
Suitable for:	This project is suitable for any undergraduate or graduate student with a background in healthcare or computer science or data science or engineering and has an interest in health care research.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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School of Biomedical Sciences

13 Project title:	**Enhancing anti-tumour immune response in ovarian cancer**
Primary Supervisor	Dr Sherry Wu sherry.wu@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	St Lucia, MacGregor Building
Description:	We are interested in developing novel nano-therapeutic methods to overcome immune suppression in ovarian cancer. Ovarian cancer is the deadliest type of gynaecologic disease with more than 1500 new cases being diagnosed each year in Australia. The high recurrence rate is a major challenge in the clinical management of high grade serous ovarian cancer. While stimulating our own immune system to recognize and attack tumour cells represents an attractive means to facilitate complete elimination of tumours, emerging data suggest that many of the immunotherapy tools, such as immune checkpoint inhibitors, are minimally active in ovarian cancer. We aim to develop effective strategies to enhance the infiltration and function of cytotoxic T lymphocytes in ovarian tumours and to develop clinically feasible means to monitor T-lymphocytes activity in tumours following therapy. Ultimately, strategies developed in this project could harness the power of the immune system to eliminate tumours and significantly increase the survival of patients with ovarian cancer. We are seeking a motivated undergraduate student who is interested in contributing to a large project involving nanotechnology and cancer biology, and who is eager to learn how to develop effective strategies to enhance anti-tumour immunity. The student will learn critical laboratory skills and

	knowledge needed to develop new strategies to enhance the infiltration and function of cytotoxic T lymphocytes in ovarian tumours. In addition, the student will gain experience in developing novel nanoparticle platforms for tumour-targeted delivery. He/She will gain experience in working in a multidisciplinary environment, obtain hands-on training from the lab head and a postdoctoral fellow, and contribute to an exciting project in the area of cancer nanomedicine and immunology.
Expected outcomes and deliverables:	The student will learn critical laboratory skills and knowledge needed to develop new strategies to enhance the infiltration and function of cytotoxic T lymphocytes in ovarian tumours. In addition, the student will gain experience in developing novel nanoparticle platforms for tumour-targeted delivery. He/She will gain experience in working in a multidisciplinary environment, obtain hands-on training from the lab head and a postdoctoral fellow, and contribute to an exciting project in the area of cancer nanomedicine and immunology.
Suitable for:	This project is open to applications from students with a background in biomedical sciences, pharmacy, or biomedical engineering, who is interested in exploring research as a career path.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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14 Project title:	**Personalized assistive technology to enhance movement**
Primary Supervisor	Dr Taylor Dick t.dick@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	St Lucia, Building 81
Description:	The promise of successfully augmenting human locomotion with wearable assistive technologies is getting closer to reality. Lower-limb exoskeletons represent a class of wearable technology that apply assistance in parallel with muscle-tendon units. These devices aim to optimize physical performance, for example, via reducing the metabolic cost or lowering musculoskeletal loads, but hurdles still remain. To date, the majority of exoskeleton research has focused on using powered devices that deliver energy to lower-limb joints. However, the potential metabolic benefits of these devices are significantly reduced by the added cost of carrying the motors and batteries needed to power them. In addition, powered devices are bulky, expensive and require careful maintenance - all practical issues that continue to limit their routine use. An alternative to powered assistive technology is bio-inspired passive elastic ankle exoskeletons. We are seeking a highly motivated students to work as part of a collaborative research project exploring how the human neuromuscular system adapts the neural control and mechanics of movement to integrate the assistance of wearable robotics (Exoskeletons). Our overarching goal is to take a novel ‘under-the-skin’ approach to determine the neuromuscular mechanisms that underpin human adaptation to exoskeletons designed to assist movement and balance. The research is multi-disciplinary, drawing on principles from neurophysiology, bioengineering, motor control and biomechanics. The planned approach is to explore, in-vivo, how human participants adapt neuromuscular function to accommodate assistance from spring-loaded passive ankle exoskeletons during balance tasks, perturbations, and gait.
Expected outcomes and deliverables:	The student will be exposed to a variety of experimental techniques aimed at understanding mechanisms of musculoskeletal function including: ultrasound imaging, electromyography, motion capture, force sensors. They will be expected to collect experimental data in human subjects and will have the opportunity to contribute to research outputs.
Suitable for:	Any students

Further info:	The supervisor MUST be contacted by students prior to submission of an application

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30 Project title:	**Using NMR to identify metabolic changes of progressive chronic kidney disease**
Primary Supervisor	Assoc Professor Glenda Gobe g.gobe@uq.edu.au
Contact	Mr Ty Humphries; t.humphries@uq.edu.au
Project duration:	5 weeks 28 hours per week
Location	Translational Research Institute and Princess Alexandra Hospital
Description:	Chronic kidney disease (CKD) is a clinical syndrome that is a major health burden, increasing in incidence within Australia and globally. In Australia, 1 in 10 adults is affected by the disease, with the total annual costs attributed solely to CKD estimated to be over $4B. Globally, CKD was the 18th most prevalent cause of death and had an annual incidence rate of 16.3 per 100,000 people from 1990-2012 in the developed world. Understanding the metabolic determinants underlying the pathophysiology of CKD will allow development of much needed early and non-invasive prognostic/diagnostic tests, and the development of novel therapies. Magnetic resonance (MR) is a non-invasive versatile, powerful and increasingly available analysis modality. MR imaging (MRI) locates the region of interest and MR spectroscopy (MRS) measures alterations to tissue chemistry correlated with disease profiling that predicts clinical outcome. CKD is defined as the persistence of kidney damage for more than 3 months and is currently principally stratified by estimated glomerular filtration rate (eGFR) and proteinuria. Irrespective of CKD aetiology, many patients will progress through to kidney failure (KF, preferred terminology from 2020 for end stage kidney disease/ESKD), requiring dialysis or kidney transplantation. Clinicians approach CKD with the therapeutic goal of preventing or slowing progression. However, not all patients will progress at the same rate, if at all. If a subset of CKD patients is unlikely to experience clinically meaningful disease progression, an undifferentiated approach to managing CKD patients is arguably a waste of limited public health resources, and risks potential harm to patients through over-diagnosis. Targeting management to CKD patients likely to progress will improve individual patient as well as public health outcomes. This project uses pre-clinical models of CKD with the aim of identifying metabolic changes in kidneys induced to changes of CKD. We hypothesise that metabolic changes that accompany induced kidney disease, in a cell model of human proximal tubular epithelial cells, are potential markers for kidney disease progression. The prospective scholar will have the opportunity to be exposed to pre-clinical research involving a prominent clinical question.
Expected outcomes and deliverables:	* Develop important experimental skills in cell culture, molecular analysis and nuclear magnetic resonance. * They will have exposure to clinical studies * They may have the opportunity to publish any findings from their research
Suitable for:	BMedSc or equivalent at 3rd year or Hons level Future researchers that want to pursue a career in chronic disease research * Organised * Honest * Fast learner
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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School of Public Health

15 Project title:	**Analysis of letters to the editor regarding nutrition policy in Australia**
Primary Supervisor	Dr Katherine Cullerton k.cullerton@uq.edu.au
Project duration:	5 weeks 30 hours per week
Location	School of Public Health Building, Herston
Description:	This study will examine opinion towards different nutrition policies using letters to the editor from Australian newspapers over a 20-year period. As many types of evidence influences policy makers, this information is likely to help contribute to the development of a rounded picture of responses to different nutrition polices and health behaviours in general. The data for this study has already been extracted and the winter project will focus on the analysis of the data and writing up of the results into a peer-reviewed manuscript
Expected outcomes and deliverables:	The scholar will undertake content analysis of the extracted data and will have the opportunity to write a manuscript.
Suitable for:	Applicants with attention to detail and good writing skills.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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16 Project title:	**Assessment of mind-body practices in cohort studies of cancer survivors: a systematic review**
Primary Supervisor	Dr Tracey Di Sipio t.disipio@uq.edu.au
Secondary contact	Co-supervisor, Professor Marina Reeves marina.reeves@uq.edu.au
Project duration:	5 weeks 20-36 hours per week
Location	Herston, Public Health Building
Description:	Our qualitative work with breast cancer survivors has highlighted their use of mind-body practices as being important to their wellbeing. However, it is unknown if these therapies are being practiced more widely among cohorts of cancer survivors, and what associations are being observed with cancer-related outcomes, such as survival and quality of life. This is distinct from randomised controlled trials assessing the effect individual therapies may have on various outcomes among highly selected cancer groups. Instead, cohort studies will be able to tell us if mind-body practices are being widely measured and utilised, and any associated benefits. Furthermore, if mind-bod practices are being assessed in cohort studies, we want to identify if there are validated measurement tools for this. Therefore, two systematic reviews are being conducted: 1) to identify whether cohort studies of cancer survivors are assessing use of mind-body practices; and 2) to identify what valid measurement tools are available for assessing mind-body practices.
Expected outcomes and deliverables:	Scholars will gain skills in conducting and writing-up a systematic review. Specifically, screening database search for eligible studies; extracting data to collect necessary information from published studies; assessing study quality; and writing methods sections for publication purposes.
Suitable for:	This project is suitable to students enrolled in masters by coursework (MPH or MEpi), or third year Bachelor of Health Sciences students.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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UQ Centre for Clinical Research

17 Project title:	**Extracellular vesicles as prediction tools of chemo-response in serous ovarian cancer**
Primary Supervisor	A/Professor Carlos Salomon c.salomongallo@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	UQ Centre for Clinical Research
Description:	Ovarian cancer is a significant health issue with a lasting impact on the whole community. It is the sixth most commonly reported cancer and the fifth leading cause of cancer-related deaths in women, accounting for 5% of all cancer mortality in developed countries. In Australia, 1510 cases were diagnosed in 2019 and 1046 deaths reported. While some progress has been made, there has been little improvement in survival rates over the last 20 years (around 35% from 2000 to 2020, American Cancer Society). One of the major contributing factors to the high mortality rate is the lack of clinically useful biomarkers for earlier detection of ovarian cancer and for assessing responsiveness to chemotherapy. the aim of this project is to evaluate the use of circulating extracellular vesicles present in women with ovarian cancer as a predicted tool of chemo-response in serous ovarian cancer.
Expected outcomes and deliverables:	the student will gain experience in cell culture, extracellular vesicle isolation, and mass spectrometry analysis. the data will be used for publications and attend national and international conferences.
Suitable for:	Undergraduate (including honours) and masters students in biomedical sciences.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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18 Project title:	**Metagenomics in the clinical setting**
Primary Supervisor	Dr Brian Forde b.forde@uq.edu.au
Project duration:	5 weeks 20 hours per week
Location	Level 8, UQ Centre for Clinical Research, Herston
Description:	**Background:** Metagenomics allows construction of accurate representations of microbial communities directly from mixed samples. Thereby eliminating biases introduced by culture or gene-centric diagnostic techniques. However, metagenomic assembled genomes (MAGs) are fragmented, incomplete and prone to contamination, limiting their use for clinical diagnostics. Long read metagenomics constitutes a potential paradigm shift in how we diagnose and respond to hospital associated infections, offering the potential to recover complete genomes from each organism within a polymicrobial community. We have recently been awarded a small grant to direct a pilot study with the aim of developing methods to use metagenomic data in a clinical/diagnostic capacity. **Aims:** Review the relevant literature to identify the shortcomings' of previous methods, successful methods and applications, as well as highlight the knowledge gaps within the field. **Approach:** The review information will be used to shape and make decisions about the approaches and direction of the pilot study.
Expected outcomes and deliverables:	Review manuscript surrounding the use of metagenomics in the clinical setting.
Suitable for:	Students with a background in public health, genomics, nursing or biomedical science.

Further info:	The supervisor CAN be contacted by students prior to submission of an application

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31 Project title:	**Dynamic changes in insulin sensitivity across gestation and its association with extracellular vesicle encapsulated miRNAS in maternal obesity and gestational diabetes mellitus**
Primary Supervisor	A/Professor Carlos Salomon c.salomongallo@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	UQ Centre for Clinical Research, Herston
Description:	Gestational Diabetes Mellitus (GDM) is a serious public health issue affecting 9-15% of all pregnancies worldwide, and Australia is no exception. A significant predisposing factor to GDM is obesity, which is recognised as an important public health issue in Australia. Recent reports suggest that 35% of women, aged 25-35 years are overweight or obese. In fact, obesity is the most powerful driver (besides pregnancy itself) for the onset and development of insulin resistance and GDM, with short- and long-term consequences for both mother and child. Currently, there are challenges in reducing the long term cardiometabolic consequences of GDM, partly because its pathophysiology is poorly understood, and early detection and treatment are limited. However, it is recognised that cell-cell communication plays a key role in the underlying pathophysiology. In the last 20 years, our understanding of how cells can communicate with each other has had a significant switch, through the recognition of the roles of extracellular vesicles (EV) in cell-to-cell communication. EV are like letters, through which cells can send signals to other cells to modify their biological function, including the cellular response to insulin. Thus, in this project, we will characterise the miRNA content of EVs present in the circulation of obese women throughout gestation who develop GDM and determine their association with changes in insulin-sensitivity during pregnancy. The successful development of this project may provide the foundation for the development of novel therapies for women at risk of/affected by GDM in the future.
Expected outcomes and deliverables:	The student will gain experience in extracellular vesicles isolation, western blot, and miRNA analysis.
Suitable for:	Undergraduate (including honours) and masters in biomedical sciences
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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UQ Diamantina Institute

19 Project title:	**Manipulating the gut microbiota to treat type 1 diabetes**
Primary Supervisor	A/Professor Emma Hamilton-Williams e.hamiltonwilliams@uq.edu.au
Project duration:	5 weeks 35 hours per week
Location	UQDI, Translational Research Institute
Description:	Alterations in the gut microbiota are thought to precede the onset of type 1 diabetes and contribute to the increasing incidence of disease worldwide. Our group is investigating ways to restore a healthy gut microbiota in type 1 diabetes. Using a sterile germ-free mouse model of type 1 diabetes, we are seeking to determine the key elements of the gut microbiota (specific species or metabolites) that can drive disease protection. This project would suit someone with some knowledge of microbiology, immunology or molecular biology.

Expected outcomes and deliverables:	The student will gain experience working in stimulating lab environment, using animal models of disease and analysis of the gut microbiota.
Suitable for:	Students who have studied microbiology, immunology or have some basic computing skills (R).
Further info:	The supervisor MUST be contacted by students prior to submission of an application

20 Project title:	**Understanding the communicating network regulating inflammation**
Primary Supervisor	Dr Snehlata Kumari s.kumari@uq.edu.au
Project duration:	5 weeks 30-36 hours per week
Location	Level 6, Translational Research Institute, The University of Queensland Diamantina Institute (UQDI), Woolloongabba
Description:	The skin provides life-sustaining interface between our body and the outside environment. Skin immunity is crucial to protect against pathogenic microorganisms, but a dysregulated immune response can trigger chronic inflammatory skin diseases. An extensive crosstalk between the epithelial, commensal microbiota and stromal and immune cells regulates skin immune homeostasis, inflammation and cancer. However, the communicative network of the cells and soluble factors orchestrating the skin immunity, inflammation and skin cancer is poorly understood. The project specifically aims to address the following questions a) What are the triggers of inflammatory cascades in skin inflammation b) What are the immune-modulatory roles of inflammatory signalling pathways in skin inflammation and skin cancer
Expected outcomes and deliverables:	Students will gain experience in research laboratory skills and techniques such as RT-PCR, Western Blot, immunohistochemistry and tissue culture. Students will further develop the skills required to excel in science, such as data analysis, protocol writing, report writing, figure preparation and critical thinking.
Suitable for:	This project is open to applications from students with a background in Biomedical Sciences and also to the students who wants to follow the path to HDR.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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21 Project title:	**Which tumour immunosuppressive pathways prevent natural killer cell activation?**
Primary Supervisor	Dr Fernando Guimaraes f.guimaraes@uq.edu.au
Project duration:	5 weeks 36 hours per week
Location	Translational Research Institute (TRI)
Description:	Background: Despite advances in treatment and earlier detection, cancer is still a main cause of cancer death worldwide. Natural killer (NK) cells are circulating innate lymphocytes that naturally protect against tumour spread (metastasis), and recently showed by our group as dysfunctional in the tumour microenvironment (TME) established by cancers at distant organs for future metastatic spread. Yet, despite knowing that NK cells do control cancer metastasis, our knowledge of how cancer cells evade NK cell control is still very poor. This project aims to examine several immune suppressive pathways that cancers likely manipulate to avoid NK cells and spread. These include factors the transforming growth factor (TGF)-Î² superfamily that are elevated in the tumour environment. These molecules have great potential to suppress the normally high killing and anti-metastatic activity

	mediated by NK cells, but to date we still need to elucidate how relatively important each pathway might be. Proposed research program: The intrinsic NK cell function under suppressive factors stimulation will be assessed with NK cells purified from mouse spleen (wild type) by cell sorter, and in vitro challenge with activating cytokines and suppressive factors. Aim-1: Which suppressive factor is a major inhibitor of NK cell killing activity? This aim will be screened by killing activity of NK cells versus target tumour cells in co-culture systems. Aim-2: Which suppressive factor is a major inhibitor of NK cell cytokine secretion? This aim will assess NK cell cytokine production by intracellular cytokine (e.g. IFN-gamma) staining (flow cytometry) and secreted IFN-gamma, among others, from culture supernatants (ELISA); Aim-3: What is the cellular signalling status under suppressive conditions? The identification of altered cellular signalling will be screened by intracellular staining of phosphorylated signalling molecules (phosphor(p)-AKT, p-ERK1/2, p-p38, p-phospholipase C-gamma2, p-phosphotyrosine, p-SMAD2,3, p-STAT4, p-STAT5 and p-ZAP70 (PhosphoFlow).
Expected outcomes and deliverables:	Applicants will gain/learn from participating in the project and are expected to give presentations (e.g. data and journal clubs), and write a report. This will help not only gain skills in data collection, but also have opportunity to generate publications from their research and improve communication skills.
Suitable for:	This project is open to applications from students with a background in chemistry, pre-medical provisional students interested in MD-HDR pathway.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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22 Project title:	**Mapping genes to cell types through streamlined automated annotation of scRNA-seq data**
Primary Supervisor	Professor Ian Frazer i.frazer@uq.edu.au
Secondary Contact	Dr Ahmed Mehdi a.mehdi@imb.uq.edu.au
Project duration:	5 weeks 30 hours per week
Location	Translational Research Institute (TRI)
Description:	**Background** Cells found in different tissues throughout the body have distinct functions and phenotypes despite possessing the same genome. This differential expression of the transcriptome in tissues can be analysed through methods such as RNA-seq. More refined methods such as scRNA-seq improve the resolution down to a single cell, allowing cellular transcriptomic analysis of disease states such as cancer or diabetes, which can help better understand their pathophysiology and lead to potential medication targets. The data that scRNA-seq acquires consists of raw counts of transcripts that have been mapped to genes, from single cells. Mapping a cell to a cell type involves determination of the most differentially transcribed genes, and comparing the results to known datasets. Done manually, this can be difficult, complex, and tedious. As such, a variety of computational automated annotation methods have been developed in order to assist with this task. These computation methods demand an understanding of their documentation and can present frustrating problems in their use to less experienced computer users. This project aims to create a pipeline that can automatically feed an input into and return an output from multiple automated annotation methods including one designed in Frazer lab, thereby assisting researchers through a streamlined workflow. **Methods**

	A literature search has been conducted on current automated annotation software methods in order to identify which are most appropriate for inclusion into this pipeline. After examination of current literature, we have identified three automated annotation methods– SingleR, CHETAH, and scPred. We have also constructed a pipeline in order to feed inputs into the automated annotation methods and receive their outputs. This pipeline was constructed in the R programming language. Additionally, we have designed (and initial scripts are ready) an in-house automated scRNAseq annotation method that would be implemented during this project.
Expected outcomes and deliverables:	Most of the available methods use a variety of gene expression data (microarray, RNAseq) as a reference to annotate single-cells, however this project will develop a technology independent approach by using fixed and/or user-defined gene list to annotate single cells. This method will be available to wider community as an R Package.
Suitable for:	This is a dry lab project. Students with experience in R or programming languages.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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23 Project title:	**GeT1D: An R and shiny based platform for type-1 diabetes gene expression analysis.**
Primary Supervisor	Professor Ranjeny Thomas ranjeny.thomas@uq.edu.au
Secondary Contact	Dr Ahmed Mehdi a.mehdi@imb.uq.edu.au
Project duration:	5 weeks 30 hours per week
Location	UQDI, Translational Research Institute
Description:	Type 1 diabetes (T1D) is a chronic autoimmune disease that leads to the destruction and dysfunction of insulin producing beta cells. The National Diabetes (US) report states that more than 10 million people have been affected in America and increasing numbers of individuals are developing T1D annually in Australia as well. The clinical presentation of T1D is preceded by a prodromal period that can last from months to years post birth and is usually characterized by the production of islet autoantibodies, reflecting damage to beta cells. Infiltration of the pancreas by self-reactive lymphocytes and destruction of beta cells results in metabolic abnormalities, including impaired glucose tolerance, reduced insulin production and eventual hyperglycaemia. Gene expression profiling is widely used to obtain a global picture of cellular events under different physiological conditions. Unfortunately, few experiments have measured temporal changes at the molecular level occurring in situ in individuals at risk of T1D. We have access to BABYDIET, DAISY, DIPP and TEDDY gene expression cohorts and have written scripts in R to analyse such data. We have recently found autoantibodies associated signatures at/near birth of at-risk T1D children (See Mehdi et al. JCI Insight). In another unpublished study, we further found T1D progression is predictable at/near seroconversion. Therefore this project aims to integrate these datasets using R and Rshiny application so that wider scientific community could benefit.
Expected outcomes and deliverables:	The expected outcomes of this project are to enhance understanding of the etiology of T1D through data integration using Rshiny platform and make the prediction models available online as R package to wider scientific community.
Suitable for:	Students with experience and interest in programming language. The project will be based on R.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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24 Project title:	**Investigation into antibodies that enhance Burkholderia infection**
Primary Supervisor	Dr Timothy James Wells timothy.wells@uq.edu.au
Project duration:	4-5 weeks 25-35 hours per week
Location	Translational Research Institute
Description:	The gram-negative Burkholderia cenocepacia is a ubiquitous aerobic bacillus that causes chronic multi-drug resistant infections in patients with cystic fibrosis. Infections caused by B. cenocepacia are typically apparent in the later stages of CF lung disease, and can result in a highly variable and unpredictable clinical course. Infection in a subset of patients (~ 20%) can lead to the onset of “cepacia syndrome”, a necrotising pneumonia that is accompanied by uncontrollable clinical deterioration, and ultimately death. Presently, Burkholderia species represents an relative contradiction to lung transplantation, due to its association with adverse post-operative outcomes and extreme mortality risk. We have recently identified antibodies that paradoxically protect bacteria from killing by the immune system. These ‘cloaking antibodies’ have been identified for patients with Pseudomonas aeruginosa lung infections, where they associate with worse lung function. Removal of cloaking antibodies restores bactericidal killing, and this process has been used to successfully treat patients with multi-drug resistant P. aeruginosa infections. It unknown however if cloaking antibodies also play a role in enhancing Burkholderia infection. This project determine the presence and impact of cloaking antibodies in a cohort of isolates and serum from patients with Burkholderia infection. The project will use molecular microbiology and immunology techniques.
Expected outcomes and deliverables:	Applicants will gain both molecular microbiology and immunology skills. They will be expected to give an oral presentation at the end of their project.
Suitable for:	This project is open to applications from students with a background in microbiology or immunology.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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32 Project title:	**The causal effect of maternal exposures on later life outcomes**
Primary Supervisor	Dr Gunn-Helen Moen & Professor David Evans g.moen@uq.edu.au
Project duration:	4-5 weeks 25-35 hours per week
Location	Translational Research Institute
Description:	Observational studies are prone to confounding and conclusions regarding causality cannot easily be drawn. Mendelian randomization (MR) is a method that uses genetic data to provide information on causality in observational studies. We will use MR to explore if the previously observed relationship between maternal exposures and both birth weight and other later life outcomes is causal. The specifics of exposures and outcomes of interest can be discussed.
Expected outcomes and deliverables:	Scholars will have an opportunity to work in a research group, gain skills in data analysis and generate publications from their research.
Suitable for:	The student should be familiar with the software R. It would also be preferred if the student have some background or interest in bioinformatics, genetics or epidemiology.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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Office of Medical Education

25 Project title:	**Evaluating the contribution of workplace based assessments in medical students' achievement**
Primary Supervisor	Assoc Professor Helen Wozniak h.wozniak@uq.edu.au
Project duration:	5 weeks 24 hours per week
Location	Herston Campus
Description:	The Doctor of Medicine program introduced a new yearlong course in 2019 that utilises best practice medical education principles in the assessment of clinical performance. While completing clinical placements, students engage in a cycle of planning, capture of workplace-based assessment tasks and review of feedback to support their development and preparedness for commencement of internship. This approach incorporates assessment for learning to guide students' future actions and preparedness for assessment of learning which informs assessment decisions and progression in the clinical years. The aim of this project is to analyse the rich data set of over 50,000 workplace-based assessment records and correlate this with other clinical performance-based assessment outcomes (such as the Objective Structured Clinical Examination- OSCE). Prior international research has shown that students who do not engage in workplace-based assessment tasks in a timely manner may be at risk of poorer performance in other higher stakes assessment tasks such as the OSCE. It is also well known that high quality feedback is essential for student learning to maximise their development of evaluative judgement and achievement of clinical capabilities. Therefore, the project will also review the qualitative feedback contained within the data set to identify high quality feedback examples that can be incorporated into automated electronic platforms and consequently streamline the assessment process in the workplace. The research project will adopt a mixed methods approach evaluating de-identified quantitative and qualitative data sets. Statistical methods will be used to test the hypothesis that completion of workplace-based assessment tasks contributes to the level of performance in other higher stakes assessment tasks. The feedback documented in the assessments will be reviewed using thematic analysis to identify examples of high-quality actionable feedback in the clinical setting. This information will inform the development of the electronic learning platform that is planned to be adopted in 2022.
Expected outcomes and deliverables:	The student will learn with support from the research leader and other staff in the Office of Medical Education how to: - Manage large data sets - Perform statistical analysis with SPSS - Work with qualitative data sets - Summarise relevant literature (in collaboration with other staff) - Present results and engage in collaborative discussions with the Office of Medical Education staff via team meetings and research presentations
Suitable for:	This project is best suited to students who are interested in higher education and student learning research. Though not essential students with an interest in the education of health professionals are encouraged to apply.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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School of Clinical Medicine

26 Project title:	**Development of an Artificial Intelligence (AI) Chatbot for Smoking Cessation**
Primary Supervisor	Dr Henry Marshall henry.marshall@health.qld.gov.au
Project duration:	5 weeks 36 hours per week
Location	UQ Thoracic Research Centre Herston, TPCH, CSIRO eHealth; off-site virtual placement
Description:	2.5 million Australians smoke. Smoking is the leading cause of chronic disease and premature death. New technologies need to be explored to see if they can help smokers quit. Smartphones are almost ubiquitous and can host smoking cessation apps, providing “in pocket” evidence-based advice and motivation to smokers. To produce a more tailored and interactive app, the team at UQ, QLD Health and the Australian E-Health Research Centre, CSIRO are developing an AI-based chatbot to help smokers quit. We are looking for an enthusiastic student with good language and communication skills and some basic coding and IT proficiency to assist with development and testing of the chatbot. The student will work under direct supervision of the UQ supervisors and CSIRO eHealth Team at Herston.
Expected outcomes and deliverables:	The successful applicant will get to work on this exciting, NHMRC funded project to help create a unique tool to help smokers quit. This project is a complex task that seeks to translate clinical science into an AI frame. The student will have the opportunity to learn from the best - CSIRO scientists are leaders in the emerging and rapidly developing fields of mHealth apps and medical artificial intelligence. The student will also work within the multidisciplinary project team of academics and clinicians. There may be opportunities to extend work on the project after completion of the scholarship.
Suitable for:	It will be interest to computer science students or pre-med students with appropriate skills. The student must be an all-rounder with excellent hard and soft science skills: *Team-orientated *Self-directed *Willing to learn *Excellent communicator *Good command of colloquial English *Possess at least basic coding and IT skills *Have an interest in public health *Have an interest in harnessing technology for health
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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27 Project title:	**Measuring the activity of proteases in the urine of patients with kidney disease**
Primary Supervisor	Assoc Professor David Vesey david.vesey@health.qld.gov.au
Project duration:	5 weeks 28 hours per week
Location	Kidney Disease Research Group Translational Research Institute
Description:	Chronic Kidney Disease (CKD) is a global health problem affecting up to 10% of the world’s population and is an immense burden on the Australian health care system. Despite its prevalence, it is estimated that a large

	proportion of sufferers are not aware of their condition at earlier stages of the disease due to an asymptomatic presentation and a lack of effective biomarkers. In many cases, CKD will worsen to kidney failure where the patient requires dialysis or a kidney transplant. Current clinical markers for CKD are serum creatinine and proteinuria. The kidneys are the major blood filters in the body with 1.2L of blood passing through the kidneys every minute. The filtration units of the kidney, the nephrons are critical for regulating the body's water and salt balance. The secretions of the tubules are directly deposited into the urine and excreted as waste. Therefore, urine, as a waste product, is readily available in large quantities and collection is minimally invasive to the patient. As such, it offers a promising diagnostic tool for investigating abnormalities in the nephrons of the kidneys. In our investigations, we have found preliminary evidence of changes in a number of proteases and their inhibitors in the urine of patients with CKD compared to healthy cohorts. We aim to further explore these variations in urinary protease and protease inhibitor levels and activity between patients with CKD and healthy donors. We hypothesise that there will be marked differences between certain proteases and protease inhibitors in the urine of patients with CKD compared to people with healthy kidneys. We are actively collecting urine samples from patients with CKD and live kidney donors as healthy controls through partnership with the Department of Nephrology at Princess Alexandra Hospital. The project will involve a number of techniques that measure protein levels and activity including immunoassays and activity assays. We have also recently developed a high-throughput clotting assay that is capable of measuring the activity of different coagulation proteases and inhibitors in urine (Humphries TLR, Johnson LA, Masci PP, Gobe GC, Vesey DA. Progressive Curve Analysis of Microtitre Plate Plasma Clotting Assays Improves Assessment of Tissue Factor Levels. Analytical Biochemistry. 2021, 614, 114060). This assay continues to be developed and is an ongoing project in the lab, that can be integrated into the winter research project. The student will also take part in sample collection from clinical staff, processing and storage in our biobank. This project is ideal for motivated students with a passion for research into chronic disease or nephrology.
Expected outcomes and deliverables:	At the conclusion of the project, scholars will have gained skills in assay development and validation, biospecimen handling and analysis, and critical thinking and problem solving. They will have gained exposure to a multiple clinical studies exploring an important global issue. The student will also be exposed to the world-class research institute that is the Translational Research Institute (TRI), with multiple opportunities for developing research connections and building foundational research skills.
Suitable for:	This project is ideal for motivated students with a passion for research into chronic disease or nephrology.
Further info:	The supervisor CAN be contacted by students prior to submission of an application

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28 Project title:	**Clozapine levels in CSF and Serum: A Systematic Review**
Primary Supervisor	Professor Dan Siskind d.siskind@uq.edu.au
Project duration:	4-5 weeks 20-36 hours per week
Location	Princess Alexandra Hospital
Description:	The student will undertake a Cochrane style systematic review and meta-anlaysis examining the relationship between clozapine levels in the serum and in the CSF.

	The successful student should have an interest in mental health and neuroscience. Skills in literature review are preferred, but this training will be provided by the research team.
Expected outcomes and deliverables:	The student will systematically review publication databases (such as Pubmed) and identify relevant articles, extract data, assist in analysing data, and be involved in the drafting of a manuscript for submission to a peer reviewed journal.
Suitable for:	Pre-medical provisional students interested in MD-HDR pathway Neuroscience students
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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29 Project title:	**International Lung Screening Trial (ILST)**
Primary Supervisor	Professor Kwun Fong kwun.fong@health.qld.gov.au
Project duration:	4 weeks 32 hours per week
Location	UQ Thoracic Research Centre Level 2 Administration Building The Prince Charles Hospital
Description:	UQ Thoracic Research Centre is the lead site in Australia for the International Lung Screen Trial(ILST). The study has been running since 2016 and smaller studies have arisen from the main study (substudies). Therefore, there are a number of research activities that need to be conducted so all data is available for analysis.
Expected outcomes and deliverables:	The successful student will learn the foundations of research and have the opportunity to participate in data collection, extraction of data and basic analysis techniques. At the end of the 5 weeks the student will have developed skills they can use in future projects.
Suitable for:	Any student wanting to learn basic clinical research skills. There is no laboratory work in this project.
Further info:	The supervisor MUST be contacted by students prior to submission of an application

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