



Faculty of Science

ithree institute

ithreeinstitute.uts.edu.au

Infection Immunity Innovation



Researchers at the ithree institute use pioneering science to discover how microbes adapt and survive in their hosts and the environment. Our goal is to decrease the spread of antimicrobial resistance and reduce the morbidity, and mortality caused by infectious diseases

Antimicrobial resistance represents one of the biggest single threats to humanity.

Fortunately, the ithree institute at UTS is at the frontline in the battle against pathogenic microbes. Led by Professor Liz Harry, the ithree institute's team of researchers focus on delivering innovative solutions to real world problems. There is an urgent need to tackle the spread of antimicrobial resistance that threatens health and food security on a global scale.

The ithree institute is part of UTS' Faculty of Science. The Faculty is research intensive, contributing around 30 per cent of UTS's total research outputs. UTS is the first Australian university to obtain a top twenty global ranking of universities under 50 years old as assessed by the Times Higher Education World University Rankings.

THE POWER OF ONE

A key ithree research theme is One Health, which recognises that the health of people is intimately connected to the health of animals and the environment. Infectious diseases (and the pathogens that cause them) do not respect state or national borders, and so national and international approaches are needed for their effective management. Our researchers tackle these issues from many different angles.



Specific research areas include:

- **Computational biology** to track, measure and predict transfer of virulence genes and mobile antibiotic resistance elements in the environment including clinics and hospitals
- **Adaptation mechanisms and stress responses of bacteria** in different and extreme environments and situations, and how these changes are regulated

- **Understanding genetic diversity** in pathogens that will adversely affect food safety and biosecurity
- Developing **infection models** to assess host cell genetic changes in real time
- **Medical device redesign** to reduce infection based on knowledge of how bacteria live and coordinate behaviours in a communal setting
- Drug development including **new antibiotics**
- **Alternatives to antibiotics** such as anti-biofilm products, pro- and prebiotics, vaccines, phage therapy and medicinal honey



OUR SPIN-OFF COMPANIES

Three spin-off companies have been initiated via support from Australia's Medical Research Commercialisation Fund including:



Longas is developing advanced DNA sequencing technologies that offer substantially improved accuracy and read length at a reduced cost.



Auspherix Ltd, now based in the UK, is engaged in the discovery and development of a new class of antibiotics with a distinct antibacterial profile for serious and difficult to treat or potentially life-threatening infections.

KEY PARTNERSHIP



The Ausgem partnership between the NSW Department of Primary Industries' Elizabeth Macarthur Agricultural Institute and the itthree institute at UTS safeguards the state's agricultural industries. Ausgem strives to develop a range of innovative ways to control and mitigate the risks from infectious and parasitic diseases in livestock, plants and humans.

CASE STUDY: OZ HONEY PROJECT

Certain types of Australian honey are medicinal, with some even capable of killing 'superbugs' resistant to current antibiotics. As the demand for medicinal honey grows, so must the supply. Our researchers are working with local beekeepers to find more sources of medicinal honey and to understand its activity. They are looking closely at many of the 80+ species of native *Leptospermum* plants that are sources of Australian manuka honey.

CASE STUDY: BEYOND THE GENE

We are studying the role of host-pathogen interactions using proteomics, and we have identified and characterised numerous surface proteins to target for vaccine development. As proteins are processed by the bacterial cell's manufacturing machinery, modifications are made, making the bacteria more adept at escaping the host immune system. Some of our team are investigating these events to better understand pathogens, and they are working towards developing more effective vaccines against *Mycoplasma hyopneumoniae* – a pathogen that causes respiratory disease in pigs.

CASE STUDY: GENOME ANALYSIS TOOLS

Peering into the hidden world of microbes isn't easy. Thousands of species often co-exist in ecosystems such as the gut or soil, creating a huge analytical challenge. We need to maximise the value of the extracted genomic information to be able to better understand microbes in their environments. One of our teams is addressing this challenge by bringing statistical and machine learning methods to bear on the metagenome analysis problem, and they are unravelling the complexities of genome evolution to help fight today's infectious diseases.



WORKING WITH US

Our industry partners and supporters include Cochlear, Comvita, GE Healthcare and NSW Department of Primary Industries. We welcome enquiries from industry for both long term and short term projects

Employment opportunities

itthree institute attracts world class researchers, available positions will be advertised on itthreeinstitute.uts.edu.au

More information
uts.edu.au/research-and-teaching

Postgraduate Research

At UTS Science research is part of our culture. As a research student you'll be an integral part of a team working at the frontiers of human knowledge. Close collaboration with industry and government research organisations means our postgraduate students are in high demand from employers.

How to apply

To find out more about the application process visit uts.ac/apply-for-research or email: grs@uts.edu.au

International students should also head to uts.edu.au/international for further details relevant to you.

Scholarships

UTS offers a range of competitive research scholarships and funding schemes for both domestic and international applicants.

More information
www.uts.edu.au/research-and-teaching/research-degrees

Bachelor of Advanced Science

Our unique Bachelor of Advanced Science degree in **Infection and Immunity** requires a very special kind of person. You're going to have to be just as tenacious, resilient and adaptable as the microbes you'll be studying, and have a commitment to reducing the negative impact of infectious diseases.

This unique degree program offers you the chance to work alongside, and be mentored by, some of the best research scientists in the field of infection and immunity.

You'll be well supported and exposed to the latest technologies. This course is a gateway to multiple career options in biotechnology, medicine, pharmaceuticals, vaccine development, patent law and public health.

uts.edu.au/bachelor-advanced-science

UTS Science Research Strengths and Centres

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The Climate Change Cluster
c3.uts.edu.au

Institute for Biomedical Materials and Devices
ibmd.uts.edu.au

Centre for Forensic Science
forensics.uts.edu.au

Centre for Clean Energy Technology
www.cleanenergy.uts.edu.au

Centre for Neuroscience and Regenerative Medicine
science.uts.edu.au

Centre for Health Technologies
uts.edu.au/research-and-teaching/our-research/health-technologies

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