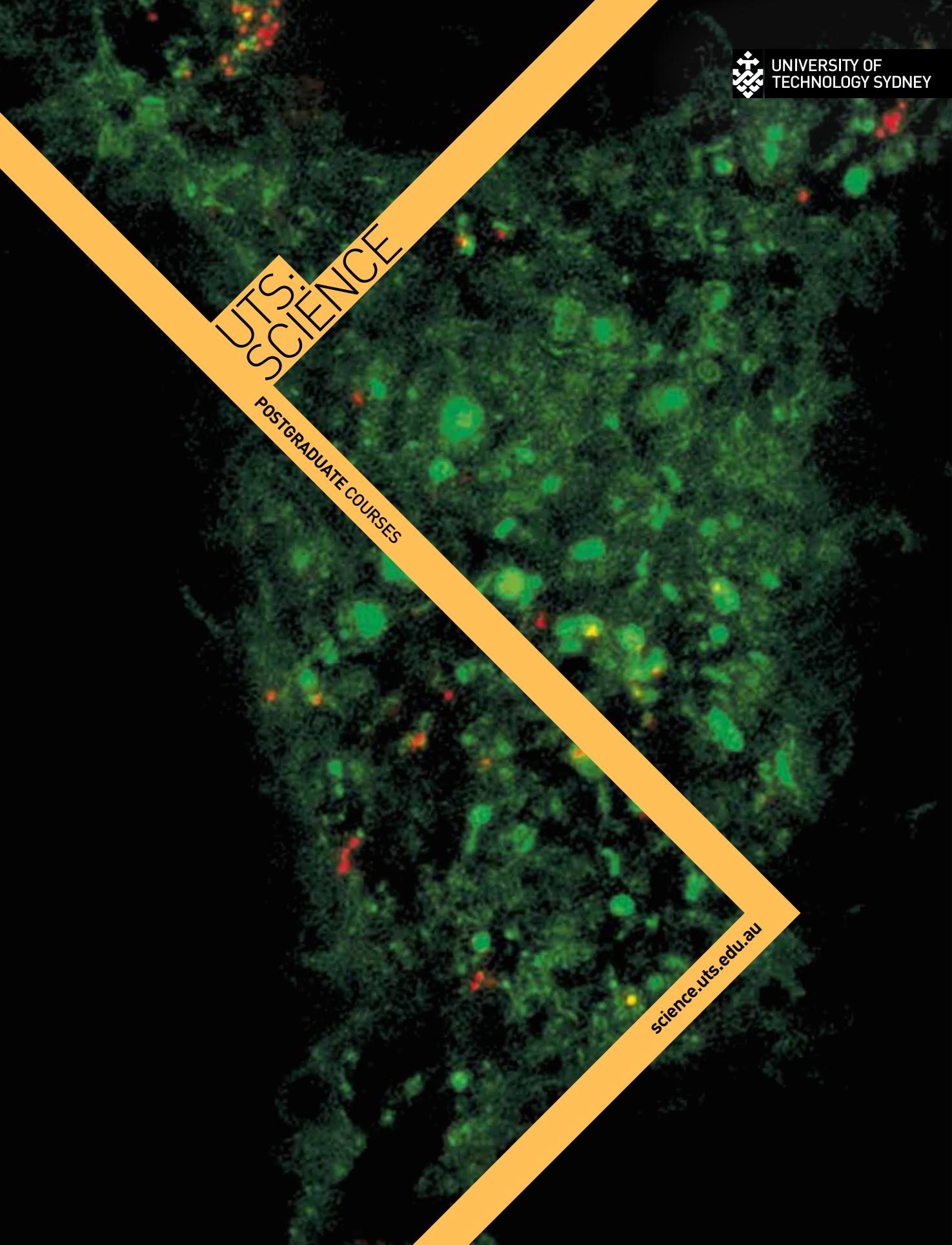


UNIVERSITY OF TECHNOLOGY SYDNEY

UTS: SCIENCE

POSTGRADUATE COURSES

science.uts.edu.au

CONTENTS

FACULTY SNAPSHOT

2651 students
2358 undergraduate students
89 postgraduate coursework students
204 higher degree research students
53% female students
47% male students
276 staff
103 teaching and research staff
27 teaching staff
54 research staff
92 professional staff

UTS AT A GLANCE

35,772 students
7088 international students
23,196 undergraduate students
11,331 postgraduate coursework students
1245 higher degree research students
51% female students
49% male students
41% are 25 years or older
68% are Sydney permanent residents
2797 staff

* Based on headcount and statistics current as at 1 February 2012

MESSAGE FROM THE DEAN

So why join UTS: Science?

UTS: Science is housed in a modern building with state-of-the-art instrumentation available for researchers and students. It is a vibrant faculty, melding technology and creativity to advance our knowledge and capabilities.

It is an exciting environment, where students learn and experience modern applications of science geared towards practice that will create greater opportunities for rewarding employment.

UTS: Science has world-class research activities including climate change, forensic science and biology, nanotechnology, health technology, mathematical modelling of complex systems, infectious and parasitic diseases, imaging and marine biology.

As dean of a lively and stimulating Faculty, I have the good fortune to work with many excellent researchers and teachers, students and support staff. The atmosphere in the faculty is welcoming and motivating. I am looking forward to helping UTS: Science to continue to thrive and grow, and to make significant contributions to Australia and globally through our graduates and our research.

Professor Bruce Milthorpe
Dean of Science

"Science is not just a field of study, it is also a philosophy and a way of viewing the world. Scientists are critical thinkers, using evidence to justify our beliefs in how the universe, the world and life work."

World first microscope technology at UTS

The world's first system for studying the cell biology of living microorganisms at super-resolution has been installed at UTS, promising new insights into the behaviour of infectious diseases.

UTS is the world first commercial site for the next generation DeltaVision OMX Blaze super resolution imaging system – a device capable of capturing real-time multiple colour images of interactions between micro organisms and living cells.

"This new imaging platform is truly amazing. We are at the forefront of being able to actually see infectious disease processes at sub-micron resolution level in living cells," says Director of ithree institute, Professor Ian Charles.

"This will enable research aimed at better understanding how microorganisms such as malaria, bacteria and viruses cause infection and has the potential to help develop treatments for life-threatening diseases."

Deputy Premier and Minister for Trade and Investment, Andrew Stoner, said the commissioning of the OMX Blaze positioned NSW at the very forefront of scientific imaging research.

"Researchers at UTS are the first in the world to access this technology," Mr Stoner said.

"NSW has world-class universities and research institutes, and the fact that UTS secured the opportunity to become the world-first commercial site for this technology speaks volumes about the calibre of research undertaken at the university.

"It will help secure national and international collaborations in science and medical research for NSW and will attract increased investment to the state," he said.

Note: The installation of the OMX Blaze at UTS is a joint investment between NSW Trade and Investment, and UTS with the aim to advance national and international collaborations in science and medical research.

SECURE YOUR FUTURE WITH A UTS: SCIENCE POSTGRADUATE DEGREE

Whether you want to pursue a career in science and technology, research or business, our courses will prepare and dare you to think outside the box – independently, uniquely and critically, to sharpen your skills and give you the edge.

Science on the move

Today's workplace is constantly changing. UTS Science is committed to continuing professional education by teaching and researching good applicable science and maths that is relevant, advances innovation and technology and provides solutions to the most significant issues facing the world right now.

Industry-focused and career-relevant

We're committed to ensuring our graduates have the skills, knowledge and experience that employers value and need. Our lecturers are also active researchers who work closely with industry in Australia and internationally, solving real issues facing our world and everyday life. **Our courses are continually reviewed and updated to reflect current situations and developments in science and technology, research and the marketplace.**

For instance, one of the core subjects in the Master of Science coursework program, which is the Scientific Method, develops your ability to apply experimental methods to a diverse range of scientific applications – an essential capability. It gives you a logical framework for conducting and assessing scientific research, including designing a good experiment, creating hypotheses, designing appropriate data collection, determining sample size and analysing data.

Practice-oriented

Practice-based and group work are high on the agenda in the delivery of our courses. An excellent example: in the Master of Science coursework program, you're required to complete both professional and advanced scientific subjects to better prepare you for the workplace, boosting your knowledge with the latest scientific know-how and methods. **Professional subjects** such as Innovation, Entrepreneurship and Commercialisation, provide you with the opportunity to come up with an idea, develop the product, establish a start up company, manage the IP and pitch it to investors, media and the community, which is what happens in the real world.

World-class facilities

By investing in our facilities, we ensure students and researchers are well supported with the latest technologies and equipment. Our modern facilities are comparable, if not better than those used in advanced commercial laboratories. In fact, we provide solution-based services to industry in niche platform technologies, and they partner with us.

For example, global measurement company, **Agilent Technologies chose UTS as its Asia-Pacific demonstration site, giving our students access to novel and sophisticated instruments worth millions of dollars.**

UTS also leads the way in delivering a world-leading 'green' campus through its billion-dollar City Campus Master Plan. As part of the master plan, a new science facility featuring laboratories, teaching spaces, lecture theatres and social spaces will be built on Thomas Street. Opening in 2014, it will connect to the existing ultra modern science building.

UTS Science postgraduates enjoy outstanding career outcomes with an 82 per cent* employment rate within three months of graduation.

* Australian Graduate Survey results for graduates of the period of October 2010 to April 2011 and applicable to Australian resident graduates only.

SECURE YOUR FUTURE WITH A UTS:SCIENCE POSTGRADUATE DEGREE (CONTINUED)

Innovative and globally applicable courses

Our courses are innovative, giving you both scientific knowledge and professional expertise – and achieving the ideal balance between scientific learning, practical experience and professional expertise.

For example, in the Master of Science coursework program, you're required to complete both professional and advanced scientific subjects to better prepare you for the workplace, boosting the latest scientific know-how and methods, and also acquiring professional skills such as project management, communication, and innovation, entrepreneurship and commercialisation skills.

Dynamic research-integrated learning

Whether you're a research or coursework student with UTS Science, our strong research culture means you'll be taught or supervised by world-recognised experts and exposed to the latest research findings, worldwide networks and connections.

Central location

The UTS City campus is in the heart of Sydney. Just five minutes' walk from Central Station, it's close to the CBD and easily accessible by bus, train and monorail. There are also a number of parking stations close to campus that offer discounted student rates.

Global recognition

UTS was one of only three Australian universities to rate 'well above world standard' in agriculture and veterinary sciences in the Federal Government's recent Excellence in Research Australia (ERA) report, demonstrating the strength and depth of our biological expertise in human and animal infectious diseases, as well as our unique niche in plant functional biology. UTS was awarded FIVE STARS (the highest possible rating) for excellence in higher education in 2011 by QS™.

COURSEWORK PROGRAMS

Graduate Certificate in Science

UAC course code: 942768 (Autumn) 945768 (Spring)

UTS course code: C11216

Duration: 0.5 years full-time or equivalent part-time

Credit points: 24

Overview: Suitable for those seeking an additional scientific qualification to assist them gain entry into the science field, as well as for those who are already employed, but wish to gain new specialised skills to advance their area of expertise. You may also wish to take this course because of your personal interest in science and its applications.

In addition to providing an opportunity to extend or renew your scientific knowledge, this course aims to provide some broad professional skills important to any career, be it in research, business, industry or government organisations.

Course duration and structure: 6 months of full-time study or equivalent in part-time mode. Completion requires 24 credit points of study or 4 subjects, comprising 12 credit points of professional stream subjects and 12 credit points of 'science' subjects.

Course structure

Select two of the following professional stream options:

60901 Advanced Communication Skills in Science (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

Or one of the below:

60902 The Scientific Method (6cp)

35212 Computational Linear Algebra (6cp) (only available to students taking Mathematical subjects)

Select 12 credit points or 2 subjects from the CBK90642 list of science electives, shown in the UTS Online handbook **www.handbook.uts.edu.au/sci/**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Credit recognition: No exemptions are granted for this course.

Further study at UTS: Upon completion of the Graduate Certificate in Science (C11216), you'll gain full credit recognition of prior learning to the Master of Science (C04241) for any subjects relevant to the specific masters specialisation you are enrolled in.

Fees: refer to page 38.

Academic profile

DR LAYNE GROEN

Senior Lecturer,
School of Mathematical Sciences.

It's a long way from Sydney to the cradle of European civilisation, but the work of UTS mathematics students could help save lives along the coast of the Mediterranean.

A group of UTS mathematics students led by Senior Lecturer, Dr Layna Groen have delivered an assessment of the effectiveness of the Mediterranean tsunami warning system, with their findings published in the Journal of Tsunami Society International.

Tsunami activity in the region goes back as far as 1628BC and continued to the present. In 1999 the combined effects of an earthquake in Turkey and tsunami were responsible for about 17,000 deaths and thousands of injuries and a tsunami near the Algerian coast in May 2003 destroyed over 100 boats on Majorca and flooded Palmas.

"I've been doing research for the past few years in assessing the potential performance of tsunami warning systems and this was a chance for the students to see where mathematics can have implications for the lives of many thousands of people."

"We examined the locations of existing tsunameters – specialist buoys and coastal sea-level monitoring stations. A spreadsheet model was used to make the solution transparent and linked this with GIS data from Google Earth and elsewhere."

Based on historical record of tsunamis and assuming international cooperation in tsunami detection, it was demonstrated that the existing network of sea level stations and tsunameters enable around, on average, 90 per cent of the coastal population of the Mediterranean Sea to receive a 15 minute warning.

"We did some work looking for means of improvement and found that this was possible with a relatively small increase in the number of sea-level monitoring stations and buoys."

"This project was integrated with class activities and assessment tasks that involved both hard and soft skills – the hard skills being the technical skills and the soft being research techniques and methodologies, academic writing skills, presentation skills and the like," Dr Groen said.

Graduate Certificate in Mathematics

UAC course code: 942743 (Autumn); 945743 (Spring)

UTS course code: C11210

Duration: 0.5 years full-time or equivalent part-time

Credit points: 24

Overview: The flexibility of this course allows you to design a study package that suits your needs. Depending on your goal, from being a qualified mathematician who needs to advance or refresh your knowledge, to being a graduate of business, engineering or science who needs mathematics in a specific discipline for further studies or advance your career, this course can help you.

It aims to provide graduates with access to training and re-training in mathematics and statistics with a specific focus on the needs and wants of its students in particular mathematical topics, rather than on broader areas of mathematics.

Course duration and structure: 6 months of full time study or equivalent in part-time mode. Completion requires 24 credit points of study or 4 subjects, comprising subjects chosen from the following:

Course structure

Select four of the following:

35100 Introduction to Sample Surveys (6cp)

35101 Introduction to Linear Dynamical Systems (6cp)

35102 Introduction to Analysis and Multivariable Calculus (6cp)

35111 Applications of Discrete Mathematics (6cp)

35140 Introduction to Quantitative Management (6cp)

35151 Introduction to Statistics (6cp)

35212 Computational Linear Algebra (6cp)

35231 Differential Equations (6cp)

35232 Advanced Calculus (6cp)

35241 Optimisation in Quantitative Management (6cp)

35252 Mathematical Statistics (6cp)

35255 Forensic Statistics (6cp)

35322 Advanced Analysis (6cp)

35335 Mathematical Methods (6cp)

35340 Quantitative Management Practice (6cp)

35342 Nonlinear Methods in Quantitative Management (6cp)

35344 Network and Combinatorial Optimisation (6cp)

35353 Regression Analysis (6cp)

35355 Quality Control (6cp)

35356 Design and Analysis of Experiments (6cp)

35361 Stochastic Processes (6cp)

35363 Stochastic Models (6cp)

35383 High Performance Computing (6cp)

35391 Seminar (Mathematics) (6cp)

35393 Seminar (Statistics) (6cp)

35457 Multivariate Statistics (6cp)

35466 Advanced Stochastic Processes (6cp)

35472 Honours Seminar 1 (6cp)

35473 Honours Seminar 2 (6cp)

35474 Honours Seminar 3 (6cp)

35475 Honours Seminar 4 (6cp)

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Recognition of prior learning: No exemptions are granted as recognition of prior learning.

Further study at UTS: Upon completion of the Graduate Certificate in Mathematics (C11210), you can enrol in the Graduate Diploma in Mathematics and Statistics for Business and Finance (C06097) with exemption from up to two core subjects of the graduate diploma program providing a pathway for students without the mathematical knowledge into the graduate diploma.

Upon completion of the Graduate Certificate in Mathematics (C11210), you may also be able to enrol in the Master of Science in Mathematical and Statistical Modelling (C04241).

Fees: refer to page 38

"This project was integrated with class activities and assessment tasks that involved both hard and soft skills."

Dr Layne Groen
Senior Lecturer, School of Mathematical Sciences.

Graduate Diploma in Mathematics and Statistics for Business and Finance

UAC course code: 942741 (Autumn) 945741 (Spring)

UTS course code: C06097

Duration: 1 years full-time or equivalent part-time

Credit points: 48

Overview: This course is designed to meet the needs of bachelor's degree holders who need more mathematics and/or statistics in their everyday work or who wish to broaden their career choices, or to advance a specialist area of expertise for personal interest.

You'll gain a solid mathematical and statistical background through a flexible study program that can be customised to build on your existing mathematical knowledge and skills to suit your objectives, future work plans and career progression.

Graduates with a sound knowledge of mathematical and statistical methods are growing in demand ranging from defence to education, finance and public health, construction and agriculture, manufacturing and transportation. Despite the continuing demand for specialists trained in mathematics and statistics, many graduates do not have the required mathematical knowledge in their bachelor's degrees.

Course duration and structure:
12 months full-time study or equivalent in part-time mode. Completion requires 48 credit points of study, or 8 subjects comprising three core subjects and five electives from the list.

Course structure

Core subjects:

35353 Regression Analysis (6cp)

35363 Stochastic Models (6cp)

35241 Optimisation in Quantitative Management (6cp)

Select five of the following options:

35100 Introduction to Sample Surveys (6cp)

35111 Applications of Discrete Mathematics (6cp)

35140 Introduction to Quantitative Management (6cp)

35212 Computational Linear Algebra (6cp)

35231 Differential Equations (6cp)

35232 Advanced Calculus (6cp)

35252 Mathematical Statistics (6cp)

35255 Forensic Statistics (6cp)

35322 Advanced Analysis (6cp)

35335 Mathematical Methods (6cp)

35340 Quantitative Management Practice (6cp)

35342 Nonlinear Methods in Quantitative Management (6cp)

35344 Network and Combinatorial Optimisation (6cp)

35355 Quality Control (6cp)

35356 Design and Analysis of Experiments (6cp)

35361 Stochastic Processes (6cp)

35383 High Performance Computing (6cp)

35391 Seminar (Mathematics) (6cp)

35393 Seminar (Statistics) (6cp)

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Applicants are expected to have knowledge in mathematics comparable with the following UTS Mathematical Sciences foundation stream subjects, which include:

35101 Introduction to Linear Dynamical Systems

35102 Introduction to Analysis and Multivariable Calculus

35151 Introduction to Statistics.

Applicants who do not satisfy this requirement should instead consider enrolment in the Graduate Certificate in Mathematics (C11210).

Recognition of prior learning: Exemptions will only be granted from core subjects.

Fees: refer to page 38

MASTER OF SCIENCE

UAC course code: Refer to specific specialisations for their UAC course code

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intake.

Different specialisations or majors available in the Master of Science are:

> **Biomedical Engineering (new in 2012)**
> **Marine Science and Management (new in 2012)**
> **Energy Efficient Materials***
> **Environmental Change Management**
> **Forensic Science**
> **Mathematical and Statistical Modelling**
> **Medical Biotechnology**
> **Science Management**
> **No specific major**

Overview

The Master of Science requires 72 credit points of study, comprising 24 credit points of professional stream subjects and 48 credit points of specialisation stream subjects specific to the chosen specialisation.

The professional stream subjects provide broad professional skills relevant to any career.

The specialisation stream subjects give the specialist flavour that you're interested in.

These professional and scientific subjects assist you in developing the skills required to be a scientist or mathematician who can engage at a higher level in an enterprise whether it be in business, industry, research or government organisations. You'll gain analytical tools, disciplinary knowledge, creative and logical approaches to problem-solving and management skills.

Exposure to research skills: All specialisations except the Science Management major provide an opportunity, subject to faculty approval, to develop research skills through taking an elective 12cp or 24cp research project subject. Faculty approval is dependant upon achievement levels in your prior study and the availability of suitable projects. Successful completion of a 24cp research project can provide a pathway to a research degree, if that is your goal.

Credit recognition: Up to 24 credit points of exemption may be awarded on the basis of prior learning if the subjects previously studied are deemed by the faculty to be equivalent to those specified for the course. To be considered for recognition of prior learning, subjects normally must have been completed no more than five years prior to the commencement of this course.

If you have completed the Graduate Certificate in Science (C11216), you'll gain full credit for subjects that are in the masters you plan to enrol in.

Fees: refer to page 38.

* The energy efficient materials major is not available to international students

"I think the flexibility of the supervisors gives you that space to explore your own creativity; they allow you to explore the science behind your ideas."

Dr Joshua Chou

DR JOSHUA CHOU

Chancellor's Post Doctoral Research Fellow, School of Physics and Advanced Materials

"We're an ageing society, so everyone, more or less, is going to have some sort of bone problem, either osteoporosis, loss of bone density or broken bones." he says.

Thankfully, this UTS Chancellor's Post Doctoral Fellow is a specialist in biomaterials, tissue engineering and drug delivery systems. His research is looking at the development of a new graft material that will help the human body rebuild its own bones.

"What we're working on is using corals and coral sand, because they have unique architectural structures. We want to exploit those structures because we're not able to make them synthetically. If people break their bones, for example, normally we use bone grafts or bone implants to help the regeneration process, but that material is metallic so your body doesn't respond to it.

"With the corals, your body actually builds its own new bones. So instead of having a metallic implant for life, your body re-grows itself, which is much better."

Chou started at UTS as an undergraduate student, completing a degree in nanotechnology before entering his honours year. His honours supervisor, Professor Besim Ben-Nissan, encouraged Chou to apply his knowledge to a PhD in biomaterials.

"My supervisor had been working in this field for 30 years and he's really well known, so following in his footsteps was an obvious choice," Chou says.

"The research environment at UTS was another factor in my decision. We have a really good research group here, and I think the flexibility of the supervisors gives you that space to explore your own creativity; they allow you to explore the science behind your ideas and they also guide you through the PhD process."

The decision to switch from nanotechnology to biomaterials gave Chou the opportunity to apply his knowledge in new directions.

"The previous work I'd done in nanotechnology was really useful in terms of my research, as you can apply the principles of nanotechnology to the tissue engineering.

"For example, we're trying to build a drug delivery system basically made from fats where we can incorporate drugs and target them to be delivered to specific sites of the bone. The drugs will help with bone regeneration – so you can see how the application of nanotechnology is relevant in this field." Chou says.

Master of Science in Biomedical Engineering

UAC course code: 942773 (Autumn) 945773 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time – may also be completed in 14 months in accelerated mode from either Autumn or Spring intake.

Overview: Biomedical engineering is the application of science and engineering principles to solving medical and biological problems. This course introduces students to a wide variety of applications around biomechanics, medical devices, tissue engineering, medical imaging, and diagnostic and therapeutic uses of nanotechnology.

It's an innovative course with wide applicability to growing areas in health care. The structure provides wide exposure across the field of biomedical engineering rather than focusing on one specific area.

The course is suitable for science or medical graduates wishing to bridge the gap in their knowledge of medical technologies without wanting to undertake a full engineering degree.

Careers: This course prepares graduates for careers in medical device and biotechnology companies, government policy and regulation, hospitals and research organisations where the ability to combine biology and engineering knowledge and skills is required.

Course structure

Professional stream

60901 Advanced Communication Skills in Science (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

Select one of the following:

60902 The Scientific Method (6cp)

48023 Programming Fundamentals (6cp)

Specialisation

49261 Biomedical Instrumentation (6cp)

Select two subjects from the following options:

Stream A: Physical sciences

91239 Human Pathophysiology (6cp)

Select one of the following:

91400 Human Anatomy and Physiology (6cp)

91429 Physiological Bases of Human Movement (6cp)

OR

Stream B: Biomedical sciences

68316 Applied Electronics and Interfacing (6cp)

91239 Human Pathophysiology (6cp)

Select 30 credit points from the following options:

91239 Human Pathophysiology (6cp)

91703 Physiological Systems (6cp)

91708 Medical and Applied Physiology (6cp)

27174 Analysis of Human Motion (6cp)

91403 Medical Imaging (6cp)

68075 Nanomaterials (6cp)

67509 Molecular Nanotechnology (6cp)

91705 Medical Devices and Diagnostics (6cp)

91140 BioNanotechnology (6cp)

49275 Neural Networks and Fuzzy Logic (6cp)

48023 Programming Fundamentals (6cp)

91171 Biomedical Engineering Project A (12cp)

91172 Biomedical Engineering Project B (12cp)

91173 Biomedical Engineering Project (24cp)

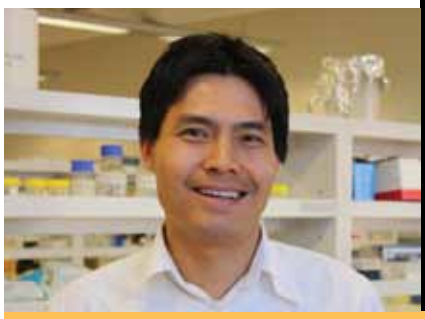
The typical standard program of study (18 months) can be viewed at **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

"Cancer is highly curable if you can find it really early, but the fact is that there aren't any markers in the body that allow us to identify that."

Dr Nham Tran
Chancellor's Post Doctoral Research Fellow



DR NHAM TRAN

Chancellor's Post Doctoral Research Fellow
School of Medical and Molecular Sciences

Dr Nham Tran didn't quite know what he was getting into when he applied to become a Chancellor's Post Doctoral Research Fellow at UTS.

"It's quite a prestigious award – I didn't realise that when I was writing the application," he says, smiling. "Since I've been here they've put quite a lot of emphasis on it. It's a tremendous opportunity."

Tran's research is about biomarkers that signify the presence of a range of cancers in the human body. Specifically, Tran and his team are looking into the role played by non-coding RNA molecules in prostate cancer and the role of microRNAs in head and neck cancers.

"Cancer is highly curable if you can find it really early, but the fact is that there aren't any markers in the body that allow us to identify that. So the idea is to discover really novel biomarkers."

"We're really encouraged to mentor younger students who are coming through, so if we can get PhD students, that's great – we can show them our passion for research and hopefully get them involved in it as well," says Tran.

"The direction of the university is quite good at the moment. There's more funding for research and everybody's quite excited.

"I think UTS is a great environment for students who are really serious about research."

Master of Science in Marine Science and Management

UAC course code: 942770 (Autumn) 945770 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intake.

Overview: This is a cross institutional and multi-disciplinary coursework program that combines professional and marine science subjects to ensure you have the required skills to be a qualified marine scientist who can engage in research, practise commercially or manage an organisation.

It offers you the unique opportunity to enrol at UTS, complete the capstone unit at the Sydney Institute of Marine Science (SIMS) and then take two elective subjects at one of SIMS's partner universities.

Developed in collaboration with SIMS and its four partners, namely UTS, the University of Sydney, Macquarie University and the University of New South Wales, you'll have access to a group of highly regarded marine scientists from these institutions.

You'll undertake core units at UTS, and have the opportunity to take electives at one of the partner universities.

The capstone unit will be taught by scientists from the four partner universities at SIMS. It comprises a lecture series and practical component using real-life data from the Australian Integrated Marine Observatory System.

The distinctive feature of this program at UTS, is that it not only trains you to be a skilled marine scientist but also gives you good managerial skills such as communication skills, project management, commercialisation and entrepreneurship.

Careers: Worldwide in private and public agencies, or as private consultants in fields such as policy and conservation, fisheries, environmental sustainability and management, impact assessment, tourism and education. It'll also enable you to re-skill and change careers completely, or develop a specialist area of expertise and personal interest.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

91146 Topics in Australian Marine Science (6cp)

91165 External Marine Study 1 (6cp)

91166 External Marine Study 2 (6cp)

Select 30 credit points from the following options:

91157 Marine Communities (6cp)

91118 Fisheries Resources (6cp)

66513 Marine Geosciences (6cp)

91126 Coral Reef Ecosystems (6cp)

91156 Marine Primary Producers (6cp)

91540 Climate Change and Ecological Modelling (6cp)

91541 Monitoring Ecological Variability (6cp)

91545 Environment Research Project A (12cp)

91546 Environment Research Project B (12cp)

91547 Environment Research Project (24cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

GOOD NEWS ABOUT OIL RIGS?

In a new paper for the journal Frontiers of Ecology and the Environment, published by the Ecological Society of America, UTS's scientists Professor David Booth, Dr Peter Macreadie and Ashley Fowler propose a large-scale expansion of the so-called 'rigs-to-reefs' concept – leaving decommissioned rigs where they stand or moving them elsewhere to create artificial reefs.

It might seem surprising that marine scientists are proposing a way for the oil and gas industry to save billions of dollars decommissioning old offshore rigs, but it's a plan where the main beneficiary is intended to be the environment.

"The oil and gas industry worldwide is looking at the decommissioning of 6500 offshore rigs by 2025," Professor Booth said. "In Australia more than 60 rigs face decommissioning soon and government policy is still not set. Policy based on science is badly needed in this area.

"A rigs-to-reef project in the Gulf of Mexico dates back to 1979, but most other regions of the US and the world still require complete removal of subsea structures. With mandatory removal targets set to increase, removal and disposal activities will cost the industry billions and would leave a major carbon footprint."

In their article, Macreadie, Fowler and Booth caution that a lot more research is needed, but artificial reefs potentially have important benefits in deep-sea locations.

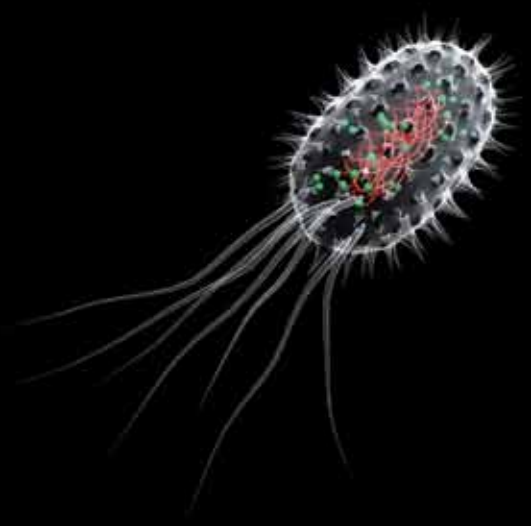
"Rigs themselves have been described as 'de facto marine protected areas' because they exclude trawl fishing and their large internal spaces offer shelter to fish and other organisms," the authors said.

"Deep-sea communities in particular may benefit because the characteristics of their species (longevity, slow growth, late reproduction, low fecundity) make them highly vulnerable to exploitation.

"We suggest that a rigs-to-reef program in the deep sea, in conjunction with the establishment of marine protected areas, may offer a means of conserving deep-sea communities.

"Partnerships between scientists and industry will improve the capacity for further research.

"We recommend that industry savings from a rigs-to-reef program should support independent research and monitoring to evaluate the effectiveness of rigs in fulfilling their intended purpose as artificial reefs in the deep sea." said Professor Booth.



MARK LOCKREY

PhD student

Mark Lockrey says he was attracted to nanoscience because "it's a growth area and it's an area where there are still new things to be discovered – like an unsolved problem."

Conducting research into green lighting solutions, Lockrey is reaping the benefits of UTS's partnership in the Australia-China NanoNetwork, with a scholarship to support his research and the opportunity to study at both UTS and Nanjing University in China.

The NanoNetwork is a collaborative research forum between universities, with expertise in nanoscience and nanoengineering.

Mark's PhD is being co-supervised by staff at UTS and Nanjing. He will split his study between Australia and China and will also be able to access the diverse resources that both institutions have on offer.

At UTS, this means 24/7 access to a suite of enviable top end microscopy tools, material analysis and fabrication equipment and specialists instruments.

"What I like about UTS Science is the really good facilities and the world experts working there," says Mark.

At Nanjing University, he enjoys the chance to access the new materials growing facility for developing gallium nitride – the nanomaterial essential to his work.

"Having access to facilities where we can create the materials is quite exciting."

> "Nanoscience is a growth area and it's an area where there are still new things to be discovered – like an unsolved problem."
>
> **Mark Lockrey**
> **PhD student**

Master of Science in Physics and Advanced Materials

UAC course code: 942753 (Autumn) 945753 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intake.

Note: The physics and advanced materials major is not available to international students.

Overview: The physics and advanced materials major will give you expertise in materials synthesis and characterisation as well as modelling skills required for the development of new or enhanced materials and technologies needed to increase energy efficiency in a sustainable and clean way.

This is a highly creative and innovative course where the focus is on understanding, creating and generating new materials and technologies for cleaner, greener and more sustainable energy usage and generation.

This course is suitable if you wish to obtain a position in an industry involved in development of new sustainable energy technologies or if you wish to gain new specialised skills to advance your area of expertise and career prospects. It'll enable you to re-skill and change careers completely or develop a specialist area of expertise for personal interest.

Careers: Graduates will advance their careers in industries or research developing next generation materials for sustainable use and generation of energy. Examples might include developing alternatives to traditional incandescent or fluorescent lights, or new battery technologies for energy storage.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

68044 Characterisation of Energy Efficient Materials (6cp)

68045 Computation Techniques in the Materials Sciences (6cp)

Select one of the following:

68001 Advanced Physics

68002 Advanced Nanomaterials

Select 30 credit points from the following options:

CBK90640 Elective (6cp)

68001 Advanced Physicsn (6cp)

68002 Advanced Nanomaterials (6cp)

68513 Optics and Nanophotonics (6cp)

68320 Scanning Probe and Electron Microscopy (6cp)

68415 Measurement and Analysis of Physical Processes (6cp)

68416 Computational Physics (6cp)

68606 Solid-state Science and Nanodevices (6cp)

68316 Applied Electronics and Interfacing (6cp)

67509 Molecular Nanotechnology (6cp)

68413 Quantum Physics (6cp)

68315 Imaging Science (6cp)

68046 Physics Research Project A (12cp)

68047 Physics Research Project B (12cp)

68048 Physics Research Project (24cp)

60910 Directed Study A (6cp)

60911 Directed Study B (6cp)

CBK90682 Options (6cp), select one of the following:

60905 Leadership and Teamwork in Science (6cp)

60906 Science in Practice (6cp)

60907 Managing Science-based Enterprises (6cp)

60908 Science and Industrialisation (6cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

Master of Science in Environmental Change Management

UAC course code: 942756 (Autumn) 945756 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intake.

Overview: The environmental change management major will give you a broad appreciation of how the management of people and institutions affects the environment, and also develop an in-depth understanding on how to manage the causes and consequences of environmental change.

This course is suitable for you if you seek an environmental qualification for entry into the field, or wish to gain new specialised skills in a range of theoretical and practical applications to advance your area of expertise and career prospects

Careers: Positions in government or private organisations concerned with biodiversity, environmental sustainability, remediation, climate change adaptation, coastal zone management, national parks and wildlife, land and water resources, planning and natural resources management or environmental research.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

91540 Climate Change and Ecological Modelling (6cp)

91541 Monitoring Ecological Variability (6cp)

Select one of the following:

91145 Environmental Protection and Management (6cp)

91120 GIS and Remote Sensing (6cp)

Select 30 credit points from the following options:

CBK90640 Elective (6cp)

91145 Environmental Protection and Management (6cp)

91120 GIS and Remote Sensing (6cp)

91155 Stream and Lake Assessment (6cp)

91157 Marine Communities (6cp)

91116 Wildlife Ecology (6cp)

91118 Fisheries Resources (6cp)

66513 Marine Geosciences (6cp)

91543 Evaluation of Contaminant Effects (6cp)

91542 Principles of Contaminated Site Assessment (6cp)

91309 Biodiversity Assessment (6cp)

91544 Environment Risk Assessment and Remediation (6cp)

91545 Environment Research Project A (12cp)

91546 Environment Research Project B (12cp)

91547 Environment Research Project (24cp)

60910 Directed Study A (6cp)

60911 Directed Study B (6cp)

91551 Ecohydrology and Climate Change (6cp)

CBK90682 Options (6cp), select one of the following:

60905 Leadership and Teamwork in Science (6cp)

60906 Science in Practice (6cp)

60907 Managing Science-based Enterprises (6cp)

60908 Science and Industrialisation (6cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

"Seagrasses, saltmarshes and mangroves are estimated to capture and store up to 70 per cent of the carbon in the marine realm."

Dr Peter Macreadie
Chancellor's Post Doctoral Reaserch Fellow

DR PETER MACREADIE

Chancellor's Post Doctoral Research Fellow, School of the Environment

"Growing up I wanted to be a professional boxer or a church minister: I was disappointed to learn that the two weren't very compatible," says UTS Chancellor's Postdoctoral Research Fellow Dr Peter Macreadie. "But then I figured that if I could make a living out of my passion for the ocean, I would die a happy man."

Marine biology fit the bill, and now Macreadie's research on seagrass ecosystems has seen the UTS scientist nominated as a finalist for the 2011 Australian Museum Eureka Prizes People's Choice Award. His research, among other things, seeks to gauge the effectiveness of seagrasses as carbon sinks. To do this, Macreadie is working with a team of leading seagrass researchers and getting to know the complete workings of the seagrass carbon cycle.

"This is necessary to ensure these systems keep cranking away and that the carbon they store remains locked away without leaking back out into the atmosphere."

Macreadie says while reducing carbon emissions is vital in reducing global warming, the science now tells us it's not going to be enough.

"If we're going to regain control of our planet's thermostat, we need to capitalise on natural ecosystems that capture and store carbon – known as 'biosequestration.' Along our coastline, at the interface between land and sea, lie the world's most powerful – but largely unrecognised – carbon sinks.

"Seagrasses, together with saltmarshes and mangroves, are estimated to capture and store up to 70 per cent of the carbon in the marine realm," says Macreadie. "That's five times more than tropical rainforests! And while forests typically bind carbon for only a decade or so, the seagrasses have the ability store carbon for thousands of years."

As well as stabilising the world's shorelines and preventing coastal erosion, seagrasses play a crucial role in cycling nutrients (the storage, processing and acquisition of nutrients – a natural capital worth $2 trillion annually), support 50 per cent of the world's fisheries and provide habitat for animals such as turtles, fish and birds.

"Look after the seagrasses, and they'll look after you," says Macreadie.

Master of Science in Forensic Science

UAC course code: 942750 (Autumn) 945750 (Spring)

UTS course code: C04241

Duration: Standard duration is 1.5 years full-time or equivalent part-time, however the actual duration will depend on the subjects chosen.

Overview: The forensic science major will give you the opportunity to broaden your knowledge and skills in forensics investigation and analysis. You'll develop an in-depth understanding of methods and techniques used in forensics investigations.

You can specialise in either forensic biology or forensic chemistry, or a combination of both, depending on your prior qualifications. If you have an appropriate background and wish to choose a mixture of forensic chemistry and forensic biology subjects, you should seek advice from program advisers.

This course is suitable for you if you're seeking a forensic qualification for entry into the field, or wish to gain new specialised skills in a range of theoretical and practical applications to advance your area of expertise and career prospects. Alternatively, you may choose this course for personal interest.

Careers: Positions in government or private organisations including police forensic laboratories, law enforcement agencies, government or private forensic or drug detection labs, customs and border protection agencies and environmental protection agencies.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

65034 Introduction to Forensic Science (6cp)

Select 42 credit points from the following options:

CBK90640 Elective (6cp)

65342 Crime Scene Investigation (6cp)

65544 Chemical Criminalistics (6cp)

65545 Forensic Toxicology (6cp)

35255 Forensic Statistics (6cp)

91137 DNA Profiling (6cp)

91138 Investigation of Human Remains (6cp)

65412 Physical Evidence (6cp)

65643 Chemistry and Pharmacology of Recreational Drugs (6cp)

65644 Fire and Explosion Investigation (6cp)

91402 Anatomical Pathology (6cp)

65863 Expert Evidence Presentation (6cp)

65743 Complex Forensic Cases (Chemistry) (6cp)

91139 Complex Forensic Cases (Biology) (6cp)

79028 Complex Forensic Cases (Law for Biology) (6cp)

65032 Forensic Science Research Project A (12cp)

65033 Forensic Science Research Project (24cp)

91548 Forensic Biology Research Project A (12cp)

91549 Forensic Biology Research Project (24cp)

91132 Molecular Biology 1 (6cp)

65072 Forensic Science Research Project B (12cp)

91550 Forensic Biology Research Project B (12cp)

60910 Directed Study A (6cp)

60911 Directed Study B (6cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

KATE GRIMWOOD

PhD Student

"It's not really the sexy CSI stuff you see on TV. It's dangerous, it's dirty, it's hot and it's hard work," says Grimwood of her time in the field.

"I'm crawling through roof spaces and crawling through stuff that's falling down around me. At first it can be overwhelming, and if it's a room that doesn't have a lot of natural light, it's really oppressive – it's the blackest you can imagine. There's no colour, you can't see anything, everything is just burnt and black."

In the midst of blackened debris, Grimwood's looking for hard data. She has a theory about flashover – one of the most feared phenomena among fire fighters.

Flashover is brutally quick and fatal. It occurs when objects spontaneously ignite because they've reached their auto-ignition temperature – generally around 600 to 900 degrees Celsius. When ordinary household objects are exposed to extreme heat, they give off poisonous gases – including deadly hydrogen cyanide. And when surface temperatures get hot enough, these gases ignite, engulfing the room in fast-moving flame.

"Everything goes, and it's something no one can survive. If you're a firefighter and the room flashes, you've got about 20 seconds to get out."

With an average of 379 residential fires per month in NSW during 2008 and 2009, Grimwood says contemporary houses are flashing faster than the homes of yester-year. As to why, her theory rests on a common household substance: polyurethane.

In manufacturing, polyurethane is the most versatile polymer and it's everywhere. "Your kitchen bench is made out of it, cushion stuffing, the lining in your roof, your clothes, condoms and even car tires," says Grimwood.

"Twenty to 30 years ago houses were constructed with more natural fibres. Natural fibres burn a lot slower, so you could save the house. Today, houses are gone in 10 minutes. Obviously, the more fuel you have in a room, the quicker it's going to flash, but there's no real hard data to support this. With my research I want to show polyurethane is a factor in that."

"Doing a PhD isn't actually about your subject. It's about what you learn along the way and who you meet and doors that open for you as a result of that. I've travelled to Europe, the US and other states in Australia. I've met the most incredible researchers, the most incredible fire investigators. Plus I've got to teach kids and get them excited about this stuff," says Grimwood.

"Doing a PhD is about what you learn, who you meet and doors that open for you."

Kate Grimwood
PhD student

Master of Science in Medical Biotechnology

UAC course code: 942759 (Autumn) 945759 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intakes.

Overview: The medical biotechnology major will broaden your appreciation of the synergies between modern technologies that shape the diverse aspects of medicine (vaccines, therapy, cancer, diabetes), food production and industry. You'll gain insights into the rapidly evolving technologies and methods scientists use to produce this new generation of pharmaceuticals, vaccines, etc.

This program is suitable for you, if you seek an additional qualification for entry into the field, or wish to gain new specialised skills to hone your area of expertise and your prospects for advancement to more senior positions. Alternatively, you may choose this course to re-skill and change careers completely or just for personal interest.

Careers: Positions in pharmaceutical and biotechnology companies, hospital and diagnostic medical labs and research labs.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

91535 Microscopy and Cytometry (6cp)

91536 Proteomics (6cp)

Select 36 credit points from the following options:

CBK90640 Elective (6cp)

91345 Biochemistry, Genes and Disease (6cp)

91352 Parasitology (6cp)

91705 Medical Devices and Diagnostics (6cp)

91368 Bioreactors and Bioprocessing (6cp)

91707 Pharmacology 1 (6cp)

91335 Molecular Biology 2 (6cp)

91359 Advanced Immunology (6cp)

91344 Medical and Diagnostic Biochemistry (6cp)

91369 Biobusiness and Environmental Biotechnology (6cp)

91537 Biotechnology Research Project A (12cp)

91538 Biotechnology Research Project B (12cp)

91539 Biotechnology Research Project (24cp)

60910 Directed Study A (6cp)

60911 Directed Study B (6cp)

91709 Pharmacology 2 (6cp)

CBK90682 Options (6cp), select one of the following:

60905 Leadership and Teamwork in Science (6cp)

60906 Science in Practice (6cp)

60907 Managing Science-based Enterprises (6cp)

60908 Science and Industrialisation (6cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

DR ALISON HEATHER

Senior Lecturer, School of Medical and Molecular Sciences

"Dr Alison Heather is more than just a prolific researcher. She's also a community health promoter who raises funds for the Heart Foundation and gets the healthy eating message out to Sydney schools. Her dedication to a healthy lifestyle for herself, her kids and her community is in part a response to her research, where she spends her daily life working on atherosclerosis, or the build-up of fatty plaques in the coronary arteries.

Atherosclerosis can lead to heart attacks and death if left untreated; most Australian adults have some level of the disease but don't know they're at risk.

"Atherosclerosis affects everyone, absolutely everyone. If you did an ultrasound on the coronary arteries of every adult in this department, they would have some form of atherosclerosis," Alison says.

"Our western diet promotes the fatty plaques."

Heart disease remains the biggest killer of Australians and rates are on the rise – there are more annual fatalities from heart disease than there are deaths from all types of cancer combined. It can be particularly deadly for men in their 40s and 50s as male sex hormones or androgens seem to accelerate the plaque calcification process.

"The question is, why, for some people, does atherosclerosis develop and become a very severe disease, while other people die with these plaques and don't even know they had them?" Alison says.

It's one of many questions she and her research team are trying to answer. One of their major projects is looking at a particular gene that may have the capacity to protect against these coronary plaques. Proving the existence of the gene would be a world-first, and would also give the team a novel target for the development of new therapies.

"We could make a 'copycat of the protein' and use it to try and stop the plaque from forming in the initial stages."

"We're facing the fact that the average lifespan in our children's generation will be shorter than our own, and it's because of the lifestyle that they lead."

Dr Alison Heather
Senior lecturer

Master of Science in Mathematical and Statistical Modelling

UAC course code: 942765 (Autumn) 945765 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intakes.

Overview: This course highlights logistic, statistical, modelling skills, analytic tools, disciplinary knowledge, creative and logical approaches to problem-solving, and management skills to administer an organisation.

It is suitable for you if you seek a mathematics qualification for entry into the field, or wish to gain new specialised skills in a range of theoretical and practical applications to advance your area of expertise and career, or to re-skill and change careers.

Careers: Mathematicians find careers in a diverse range of organisations and industries such as banking, finance, health, market research and information technology. Graduates from other disciplines such as business may advance their career prospects by increasing their specialised mathematical expertise.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

35212 Computational Linear Algebra (6cp)

Select 48 credit points from the following options:

CBK90640 Elective (6cp)

35231 Differential Equations (6cp)

35252 Mathematical Statistics (6cp)

35322 Advanced Analysis (6cp)

35340 Quantitative Management Practice (6cp)

35342 Nonlinear Methods in Quantitative Management (6cp)

35344 Network and Combinatorial Optimisation (6cp)

35353 Regression Analysis (6cp)

35355 Quality Control (6cp)

35356 Design and Analysis of Experiments (6cp)

35361 Stochastic Processes (6cp)

35366 Numerical Methods of Finance (6cp)

35457 Multivariate Statistics (6cp)

35502 Seminar A (6cp)

35503 Seminar B (6cp)

35504 Seminar C (6cp)

35505 Seminar D (6cp)

35112 Mathematical Research Project A (12cp)

35113 Mathematical Research Project B (12cp)

35114 Mathematical Research Project (24cp)

35364 Statistics for Quantitative Finance (6cp)

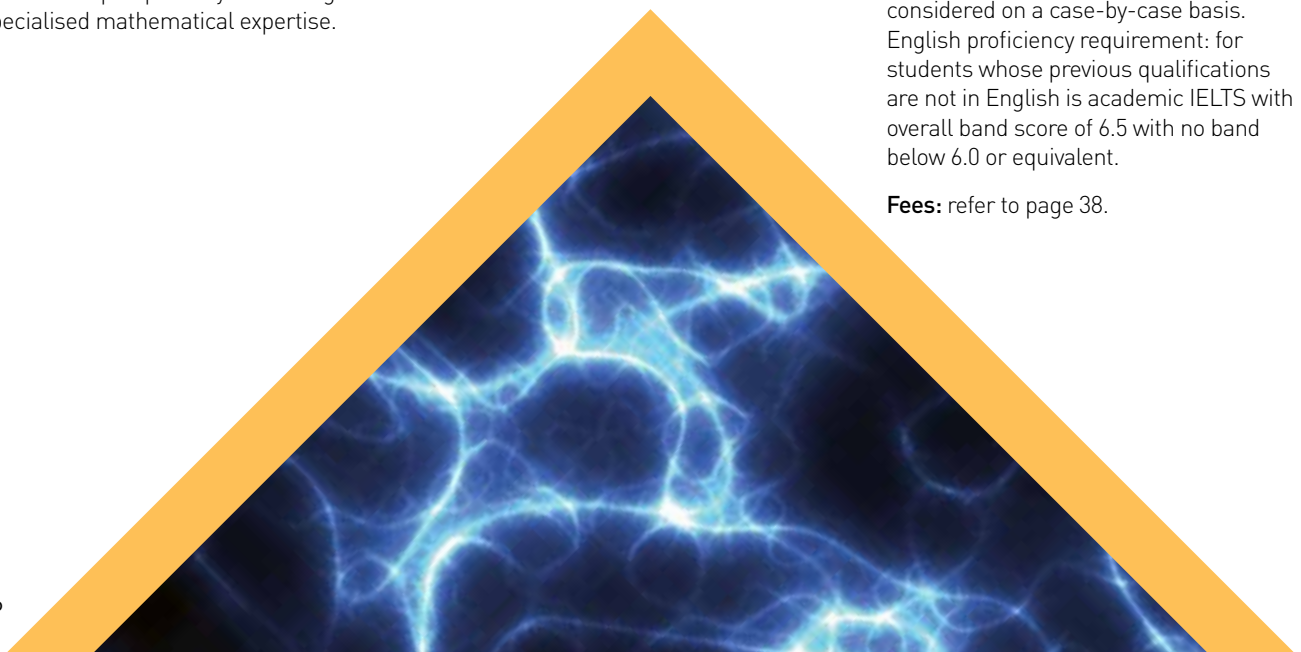
35365 Stochastic Calculus in Finance (6cp)

35393 Seminar (Statistics) (6cp)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.



Master of Science in Science Management

UAC course code: 942762 (Autumn) 945762 (Spring)

UTS course code: C04241

Duration: 1.5 years full-time or equivalent part-time. May also be completed in 14 months in accelerated mode from either Autumn or Spring intakes.

Overview: The science management major will give you a sound understanding of how scientists work, how scientific organisations and industries are run, critical issues and how to respond to them in the professional framework.

This course is suitable for you, if you're seeking a scientific management qualification to aid your entry into the field, or wish to gain new specialised management skills to assist you in making a confident transition into a management role.

Careers: You'll have advanced career and employment opportunities in relevant science industries, organisations and science based government agencies.

Course structure

> **60901** Advanced Communication Skills in Science (6cp)
> **60902** The Scientific Method (6cp)
> **60903** Project Management in Science (6cp)
> **60904** Innovation, Entrepreneurship and Commercialisation (6cp)
> **60905** Leadership and Teamwork in Science (6cp)
> **60906** Science in Practice (6cp)
> **60907** Managing Science-based Enterprises (6cp)
> **60908** Science and Industrialisation (6cp)

Select 12 credit points from **CBK90678** Electives

Select 12 credit points from the following options:

> **CBK90388** Electives (12cp) (Health Services Management)
> **CBK90643** Elective (12cp) (Business Management)
> **CBK90650** Electives (12cp) (Science specialist subjects)

To view the typical standard program of study, visit **www.handbook.uts.edu.au/courses/c04241.html**

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

Master of Science (no specific major)

UAC course code: 942747 (Autumn) 945747 (Spring)

UTS course code: C04241

Duration: Standard duration is 1.5 years full-time or equivalent part-time, however actual duration will depend on the subjects chosen

Overview: By choosing 'no specific major', you can mix specialist subjects from the various master's majors, namely biomedical engineering medical biotechnology, environmental change management, marine science management, energy efficient materials, forensic science, science management and, mathematical and statistical modelling.

This course is suitable for you, if you're seeking a scientific qualification for entry into the field, or wish to gain new specialised skills in a range of theoretical and practical applications to advance your area of expertise.

Careers: Positions suitable for you will depend on the major focus of your study program and your prior background, with a particular emphasis on positions in industries and organisations that require a mix of science skills from different fields. The broader knowledge and skills you gain in this course are valuable to many science based careers.

Course structure

60901 Advanced Communication Skills in Science (6cp)

60902 The Scientific Method (6cp)

60903 Project Management in Science (6cp)

60904 Innovation, Entrepreneurship and Commercialisation (6cp)

Select 48 credit points from CBK90649

CBK90649 contains all subjects available in each of the specialised masters courses allowing you to mix and match according to your background and desired cross-disciplinary needs.

Typical programs of study cannot be identified for the no specified major option as they will depend on the subjects chosen.

Admission requirements: Bachelor's degree or an equivalent or higher qualification in a related field of study. Students without a bachelor's qualification but with significant relevant employment supported by other educational qualifications will be considered on a case-by-case basis. English proficiency requirement: for students whose previous qualifications are not in English is academic IELTS with overall band score of 6.5 with no band below 6.0 or equivalent.

Fees: refer to page 38.

WHY RESEARCH AT UTS:SCIENCE?

UTS is one of only three Australian Universities to receive a 'well above world standard' rating*, which shows the depth of our biological expertise in both human and animal infectious diseases as well as our unique niche in plant functional biology.

"For the past three years UTS was the only university to be consistently ranked within the top three in the Australian Government's Learning and Teaching Performance Fund. The ERA result demonstrates UTS's world class research, which is a complement and support for our teaching program prowess, ensuring we are on track to become a world leading university of technology," said Professor Attila Brungs, UTS Deputy Vice-Chancellor, Research.

"This is a significant result for a university that is only just over 20 years old, and is equally impressive given that these ERA results are reflective of research statistics that are now three to six years old – it shows the dedication and energy of our staff," Professor Brungs said.

UTS Science has a strong research culture and excellent record in research development, which is essential to facilitate quality higher degree research programs.

It contributes approximately 40 per cent of UTS total research activities and outputs. Its' research focuses on increasing impacts and to meet the needs of the community and society, with outcomes that change lives. Examples of such research include the invention of a more accessible diagnostic kit for cystic fibrosis, and the development of eco-friendly pesticide using venoms and many more.

LEARNING AND WORKING WITH THE BEST

Our researchers engage in a wide spectrum of research with remarkable outcomes that are valuable to the quality of our life, both socially and economically.

Examples include treating type 2 diabetes through gene therapy by using the liver instead of the pancreas as a surrogate system to produce insulin. Currently this research is progressing to testing on human cells after successful testing in animal models.

We've also developed and improved the mechanical properties of a carbon-based material, called 'graphene' which can be made as thin as paper, but possesses ten times the strength of steel. The potential is enormous as it can revolutionise numerous industries, including the automotive, aviation, electrical and optical industries.

WORLD-CLASS FACILITIES

We ensure our students and researchers are supported with the latest technologies and equipment, by investing in cutting edge technology, making our science facility one of the best in Australia with impressive suites of specialised advanced technologies ranging from PC2 laboratories, to electron microscopes , and the first ever elemental bio-imaging labs. Most of these technologies are one of a kind, and are only available commercially in large organisations such as CSIRO or ANSTO.

In 2014, UTS Science will have a purpose-built building to add to its existing facilities, which is to cater for its expansion and growth.

QUALITY SUPPORT AND LEARNING RESOURCES

We offer comprehensive support systems to research students which include regular workshops, online resources, English language and literacy teaching, academic development programs, intercultural education, and competitive funds for travel and student conferences.

* The Excellence in Research for Australia (ERA) report released by the Federal Government, February 2011.

RESEARCH THEMES

WHAT AREAS OF RESEARCH CAN I CONDUCT RESEARCH AND PURSUE MY STUDIES IN AT UTS SCIENCE?

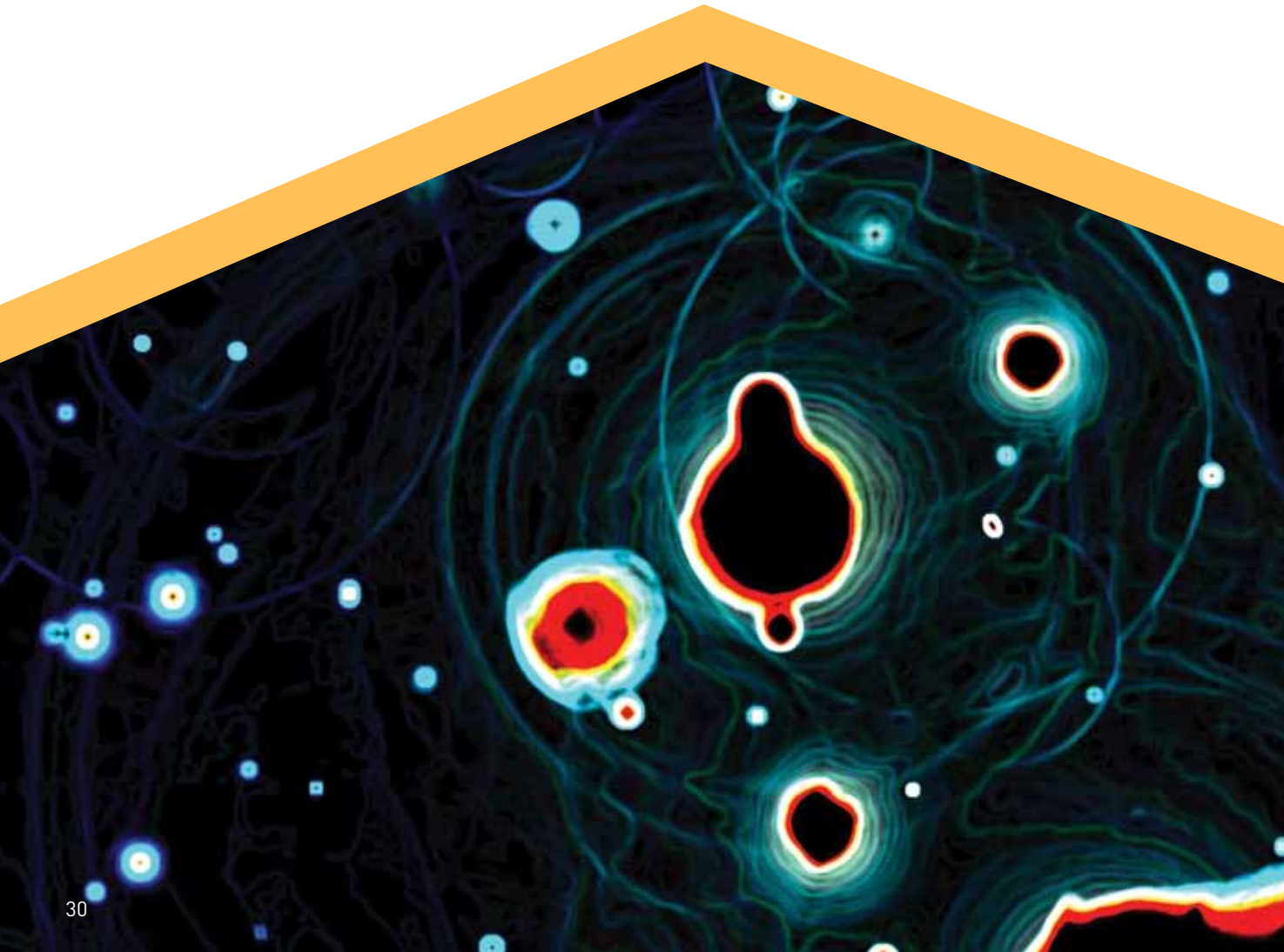
UTS Science has a dynamic research culture, where its activities are conducted through research strengths, centres and units. We encourage you to explore each research area on the appropriate website to better understand their focus and projects.

Plant Functional Biology and Climate Change Cluster (C3)

C3's diverse group of researchers include plant physiologists, ecologists, biological and physical modellers, remote sensing specialists, mathematicians and many more. It brings together a group of like-minded researchers with the aim of developing an understanding of the processes regulating surface-atmosphere and gas exchange to improve and enhance predictions about climate change. Visit **www.c3.uts.edu.au**

The ithree institute (i3)

i3 researchers practise innovative science by using a systems biology approach to develop greater insight into basic biology and its application to the diagnosis, treatment and prevention of infectious diseases. Its researchers are focused on understanding and controlling infectious diseases in humans and animals. Visit **www.ithreeinstitute.uts.edu.au**



Centre for Forensic Science (CFS)

CFS researchers are high-calibre forensic scientists with international reputations for their training and practical solutions in crime and terrorism prevention and solution. Its researchers have a wide spectrum of expertise ranging from fingerprint detection to fire investigation, to drug and toxicology investigations. Visit **www.forensics.uts.edu.au**

Centre for Environmental Sustainability (CEnS)

CEnS examines the impact of natural and human-induced stresses on our environment, and generate methods and information to develop sustainable resource management – which is a top national research priority in Australia. Visit **www.science.uts.edu.au/research/**

Institute for Nanoscale Technology (INT)

INT brings together cross-disciplinary researchers from mathematicians to biologists in its research activities. The group aims to enhance the possibilities of light and its interaction with matter, and to understand, analyse, develop, characterise and exploit nanoscale, mesoscale and microscale materials and structures to develop useful optical and chemical functions. Visit **www.nano.uts.edu.au**

Centre for Clean Energy Technology (CCET)

CCET focuses on the development of efficient devices for energy harvesting, storage, and conversion. Taking a rational approach, CCET combines principles of calculation, modelling, novel materials architecture and design, synthesis and system integration in its research practices. Its focus is to achieve a low carbon energy context globally through innovations and breakthroughs with zero-emission energies. Visit **www.science.uts.edu.au/research/energy**

The Health Psychology Unit (HPU)

HPU is an independent research unit within UTS Science. It conducts research on various areas related to psychological aspects of health, and provides a range of free services such as psycho-educational programs for teenagers, public seminars and distribution of psycho-educational materials. Visit **www.science.uts.edu.au/centres/psych**

Centre for Health Technologies (CHT)

CHT brings together interdisciplinary research and development skills in the creation of medical devices and systems that are unique in Australia. CHT has two research streams: biomedical devices and biotechnology science. It focuses on health and disease processes, the development of new devices, and advanced methods for the early detection, diagnosis and rehabilitation of cardiovascular disease, diabetes, neurological disorders and cancer. Its research has already produced several new device technologies which are at the cutting edge of biomedical engineering and science. Visit **www.research.uts.edu.au/strengths/ht/index.html**

Quantitative Finance Research Group (QFRG)

QFRG brings together the largest group of quantitative finance researchers in Australia, and is recognised as one of the leading centres for this discipline in the Asia-Pacific region. The group focuses on financial risk management and the associated quantitative methods, such as simulation techniques in finance, financial optimisation, credit risk, financial econometrics and market design issues. Visit **www.qfrc.uts.edu.au**

Centre for Study of Choice (CenSoC)

CenSoC's vision is to be the innovator in understanding choice behavior, pushing the boundaries via research-inspired insights into real-world problems. It is a multi-disciplinary team of choice modelling experts, economic experts in valuation of non-market goods, business professionals, and experts in consumer behaviour. With decades of experience in understanding and modelling the processes that underlie individuals' decision-making, CenSoC has a mandate to undertake research that benefits society as a whole. Visit **www.censoc.uts.edu.au**

PICK YOUR DISCIPLINE, DO YOUR RESEARCH

Beyond these research areas, you can choose from a wide range of research areas to pursue at UTS Science.

Some examples of these research projects include applied chemistry, toxicology, applied physics including image processing and analysis, aquatic ecology, biotechnology, climate change, computational number theory, ecology, ecotoxicology, environmental science, experimental design, data analysis, forensic science, gene therapy; health technologies, immunology, marine studies, mathematics, statistics; medical and biomedical science, microbiology; nanotechnology, nano science, neurotoxins, numerical integration; photonic crystals, plant tissue culture, quantitative finance, scheduling theory, traditional Chinese medicine, water and environmental resource management.

RESEARCH WITH REAL OUTCOMES

Some examples of research projects conducted by our researchers and students that will change our world:

> Use of gene therapy to treat diabetes, using the liver as a surrogate system to 'teach' livers of diabetics to produce insulin instead of relying on the pancreas where it is normally produced.
> Development of innovative treatments to fight prostate cancer without harming healthy cells.
> Development of a 'diagnostic kit' for cystic fibrosis sufferers which is accessible, inexpensive and less time consuming. This has led to commercialisation.
> Development of a new method to create high-quality crystallised materials which can be used to produce more efficient light emissions product.
> Development of innovative new cooling products from paints to radiative cooling, and using natural lights more efficiently as effective and sustainable energy sources.
> Development of an innovative method accurately mapping deposits of trace metals in cells in the brain which can unlock the causes of degenerative brain diseases like Alzheimer's and Parkinson's, and opens up massive potential to trace other diseases.
> Forensic DNA profiling in the criminal justice system including DNA statistics.
> Illicit drug profiling for intelligence and evidence purposes.
> Using novel methods to detect biochemical changes following exposure to toxic and carcinogenic substances.
> Mechanisms of settlement success in coral reef fish.
> Understanding invasive species and how naturalised plants can become successful invaders.
> Seagrass tolerance of oil spills and scaling of pollution impacts.
> Coal-ash as a resource for sustainable soil-management in plant production systems.
> Relationships among water-use efficiency, climate and hydraulic architecture of Australian trees.
> Choice experiments to improve predictive power for policy makers.
> Investigating linkages among individual decision-rules, properties of experimental designs and choice models in environmental economics applications.
> Modelling the choices of individuals.

RESEARCH PROGRAMS

MASTER OF SCIENCE (RESEARCH)

UTS code: C03029

Duration: 2 years full-time or 4 years part-time

Overview

You will acquire research skills and deepen your knowledge in your chosen area of science. This course aims to advance professional development by providing experience in problem definition, hypothesis formulation and testing, data acquisition, analysis and interpretation, and project presentation.

Mode of delivery

You will work under the guidance of a supervisor who is a full-time academic staff member of the Faculty. You will be examined through presentation of a thesis, and may be required to take a prescribed subject in research methodology or any other subject deemed necessary by your principal supervisor. In addition to work on your research project, you will be expected to undertake extra activities in consultation with your supervisor to enhance and develop your skills as a researcher. These activities will be documented each year in the form of a study plan.

Career options

There is a wide variety of career options depending on your chosen area of science. This includes environmental consultant, medical scientist, researcher, resource manager, scientist or technologist.

Application requirements

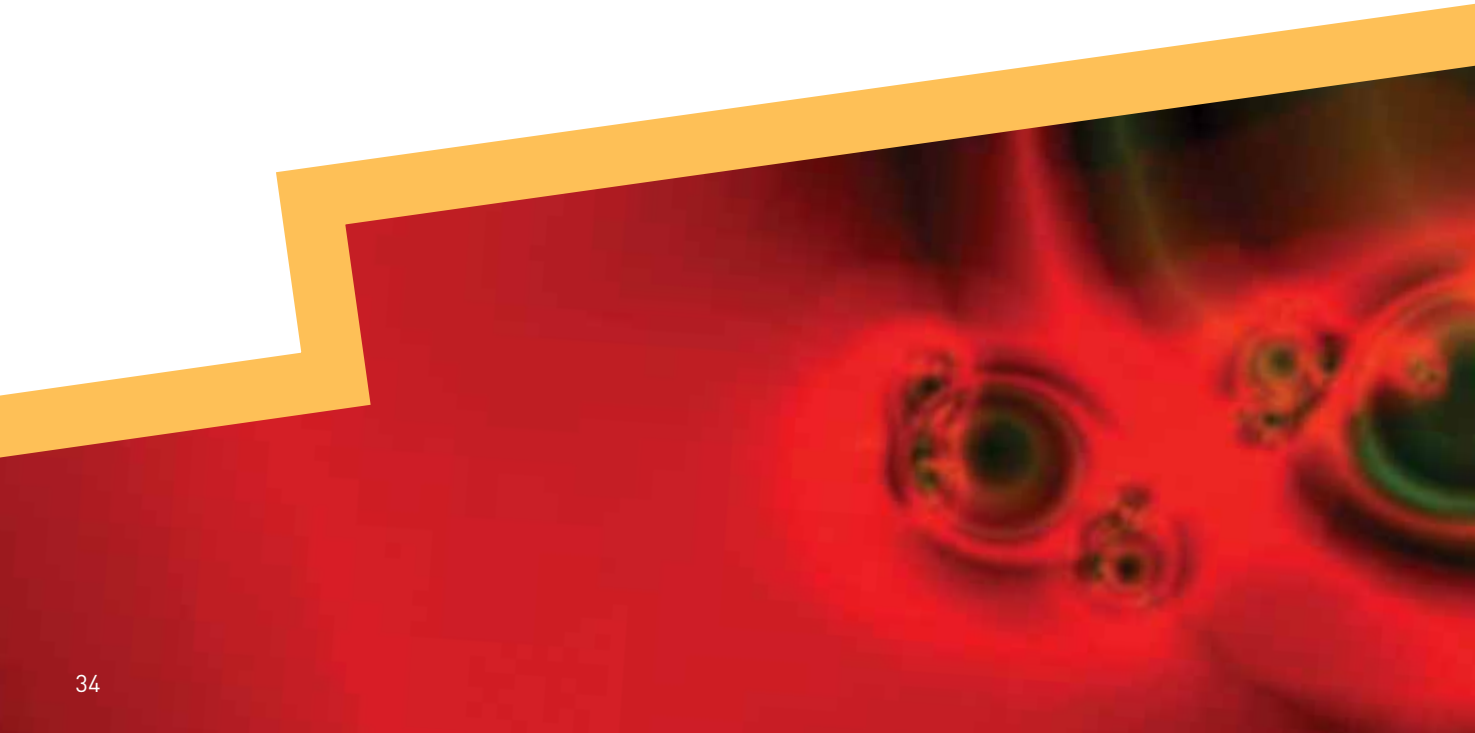
> A recognised bachelor's degree in the relevant field of research, or an equivalent or higher qualification.
> A nominated supervisor
> A research project proposal written in consultation with your nominated supervisor
> English proficiency requirement for international students or local applicants with international qualifications is IELTS: 6.5 overall with a writing score of 6.0; TOEFL: paper based: 575 overall with TWE of 4.5, internet based: 90 overall with a writing score of 21; DEEP: C

How to apply

Apply through the University Graduate School, visit **www.gradschool.uts.edu.au**

For a step by step guide in applying for a research degree at UTS Science, visit **www.science.uts.edu.au/for/future/applying.html.**

It is highly recommended that you contact the Faculty's Research Office to discuss your research ideas, find potential supervisors, scholarships, fees and student support. Refer to page 38.



MASTER OF SCIENCE IN MATHEMATICAL SCIENCES (RESEARCH)

UTS code: C03026

Duration: 2 years full-time or 4 years part-time

Overview

You will acquire research skills and deepen your knowledge in your chosen area of mathematics. This course aims to advance professional development by providing experience in problem definition, hypothesis formulation and testing, data acquisition, analysis and interpretation, and project presentation.

Mode of delivery

You will work under the guidance of a supervisor who is a full-time academic staff member of the Faculty. You will be examined through presentation of a thesis, and may be required to take a prescribed subject in research methodology or any other subject deemed necessary by your principal supervisor. In addition to work on your research project, you will be expected to undertake extra activities in consultation with your supervisor to enhance and develop your skills as a researcher. These activities will be documented each year in the form of a study plan.

Career options

Skills in research and the ability to think mathematically are growing in demand – at various sectors such as banking and finance, government agencies, environmental companies and businesses in general. As a consequence, you will significantly broaden your career choices and pathways. For example, in senior levels of market research, quantitative management and quantitative finance.

Applications requirements

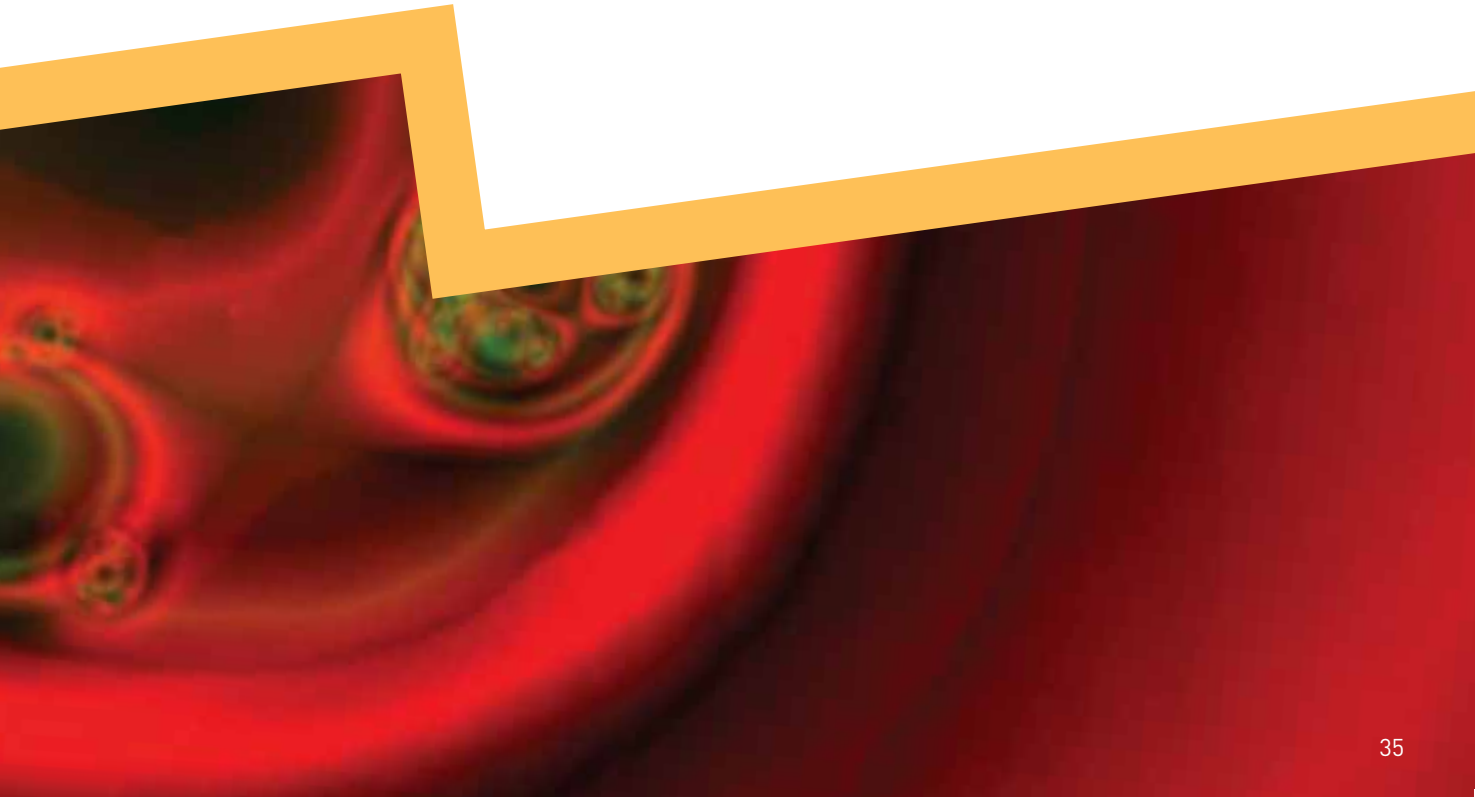
> A recognised bachelor's degree, or an equivalent or higher qualification.
> A nominated supervisor
> A research project proposal written in consultation with your nominated supervisor
> English proficiency requirement for international students or local applicants with international qualifications is: IELTS: 6.5 overall with a writing score of 6.0; TOEFL: paper based: 575 overall with TWE of 4.5, internet based: 90 overall with a writing score of 21; DEEP: C

How to apply

Apply through the University Graduate School, visit **www.gradschool.uts.edu.au**

For a step by step guide in applying for a research degree at UTS Science, visit **www.science.uts.edu.au/for/future/applying.html.**

It is highly suggested that you contact the Faculty's Research Office to discuss your research ideas, find potential supervisors, scholarships, fees and student support. Refer to page 38.



DOCTOR OF PHILOSOPHY

UTS code: C02031

Duration: 4 years full-time or 8 years part-time

Overview

You will acquire research skills and deepen your knowledge in your chosen area of science. The PhD is a University-wide degree that involves an intense period of supervised study and research culminating in the submission of a thesis. The degree is awarded to candidates who, through original investigation, make a distinct and significant contribution to knowledge in their field of specialisation.

Mode of delivery

You will work under the guidance of a supervisor who is a full-time academic staff member of the Faculty. You may be required to take a prescribed subject in research methodology or any other subject deemed necessary by your principal supervisor. In addition to work on your research project, you will be expected to undertake extra activities in consultation with your supervisor to enhance and develop your skills as a researcher. These activities will be documented each year in the form of a doctoral study plan.

You are also required to submit, in consultation with your supervisor(s), a progress report at the end of each semester, and to complete an assessment task at the end of each year of candidature.

Applications requirements

> An Honours degree class 1 or 2(1); or a recognised Research Masters degree
> Selection criteria for admission also include the quality of the research project proposal, the Faculty's ability to offer appropriate supervision in the applicant's chosen field, and where necessary, demonstration of necessary technical skills.
> English proficiency requirement for international students or local applicants with international qualifications is: IELTS: 6.5 overall with a writing score of 6.0; TOEFL: paper based: 575 overall with TWE of 4.5, internet based: 90 overall with a writing score of 21; DEEP: C

How to apply

Apply through the University Graduate School, visit **www.gradschool.uts.edu.au**

For a step by step guide in applying for a research degree at UTS Science, visit **www.science.uts.edu.au/for/future/applying.html.**

It is highly suggested that you contact the Faculty's Research Office to discuss your research ideas, find potential supervisors, scholarships, fees and student support. Refer to page 38.

DOCTOR OF PHILOSOPHY (MATHEMATICS)

UTS code: C02030

Duration: 4 years full-time or 8 years part-time

Overview

You will acquire research skills and deepen your knowledge in your chosen area of mathematics. PhD is a University-wide degree that involves an intense period of supervised study and research culminating in the submission of a thesis. The degree is awarded to candidates who, through original investigation, make a distinct and significant contribution to knowledge in their field of specialisation.

Mode of delivery

You will work under the guidance of a supervisor who is a full-time academic staff of the Faculty. You may be required to take a prescribed subject in research methodology or any other subject deemed necessary by your principal supervisor.

In addition to work on your research project, you will be expected to undertake extra activities in consultation with your supervisor to enhance and develop your skills as a researcher. These activities will be documented each year in the form of a doctoral study plan.

You are also required to submit, in consultation with your supervisor(s), a progress report at the end of each semester, and to complete an assessment task at the end of each year of candidature.

Applications requirements

> A Honours degree Class 1 or 2(1); or a recognised Research Masters degree
> Selection criteria for admission also include the quality of the research project proposal, the Faculty's ability to offer appropriate supervision in the applicant's chosen field, and where necessary, demonstration of necessary technical skills.
> English proficiency requirement for international students or local applicants with international qualifications is: IELTS: 6.5 overall with a writing score of 6.0; TOEFL: paper based: 575 overall with TWE of 4.5, internet based: 90 overall with a writing score of 21; DEEP: C

How to apply

Apply through the University Graduate School, visit **www.gradschool.uts.edu.au**

For a step by step guide in applying for a research degree at UTS Science, visit **www.science.uts.edu.au/for/future/applying.html.**

It is highly suggested that you contact the Faculty's Research Office to discuss your research ideas, find potential supervisors, scholarships, fees and student support. Refer to page 38.

HOW TO APPLY

Do your research and visit our website

For detailed information about courses, visit **www.science.uts.edu.au/postgraduate**

Attend a postgraduate info session

For details of the next postgraduate info session, visit **www.science.uts.edu.au**

Local applicants

How to apply

Processes are slightly different when applying for a research degree and a postgraduate coursework degree. Read on to find out.

POSTGRADUATE RESEARCH DEGREE:

> Visit **www.science.uts.edu.au/for/future/applying** for a step-by-step guide to applying for a research degree at UTS Science.
> Contact the faculty's Research and Development Office to discuss your research ideas, potential supervisors, scholarships, fees and student support.
> Download a copy of the application form at **www.gradschool.uts.edu.au/forms**, or contact the University Graduate School **ugs@uts.edu.au**
> Submit the completed form with all relevant documentation to the University Graduate School.

Closing dates

Applications for postgraduate research degrees close on 31 October and 31 May (subject to availability of places).

Scholarships

Postgraduate Research Scholarships are available at UTS for master's and PhD students. For more information, visit **www.science.uts.edu.au/for/future/research.html**

Contact us

Enquiries only for UTS Science postgraduate research programs

Research and Development Office, UTS Science.
Email: **science.research@uts.edu.au**

POSTGRADUATE COURSEWORK DEGREES

> For more detailed information about courses, check out the UTS Online handbook, visit **www.handbook.uts.edu.au**
> Register and attend a UTS Science Postgraduate Info Session where you can discuss your situation with the Course Director.
> Apply in-person at one of our Postgraduate Info Session. Visit **www.science.uts.edu.au** for session times and dates, application fee will be waived at most of these sessions.
> Apply online through the Universities Admissions Centre (UAC), please visit **www.uac.edu.au**

Closing dates

Applications for postgraduate coursework degrees close on 31 January and 31 October. However applications may be taken up to two weeks prior to the start of the semester and subject to availability.

Fees

Visit: **www.sau.uts.edu.au/fees**

FEE-HELP

FEE-HELP is the government loan scheme that assists eligible local students to pay their tuition fees. Visit **www.goingtouni.gov.au** or call 1800 020 108 for details.

Contact us

For more details on UTS Science postgraduate coursework programs please contact the UTS Student Centre

Phone 1300 ASK UTS (1300 275 887)

Online enquiry:
http://servicedesk.uts.edu.au

www.science.uts.edu.au

International applicants

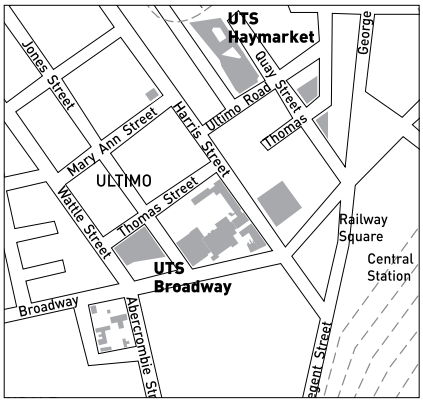
How to apply

Applicants who are not citizens or permanent residents of Australia or citizens of New Zealand must apply as international students directly through UTS International. This applies for both postgraduate coursework programs and research programs.

For details of international application closing dates, visit: **www.uts.edu.au/international**

For details of international student fees, visit: **www.uts.edu.au/international/prospective/studying/fees**

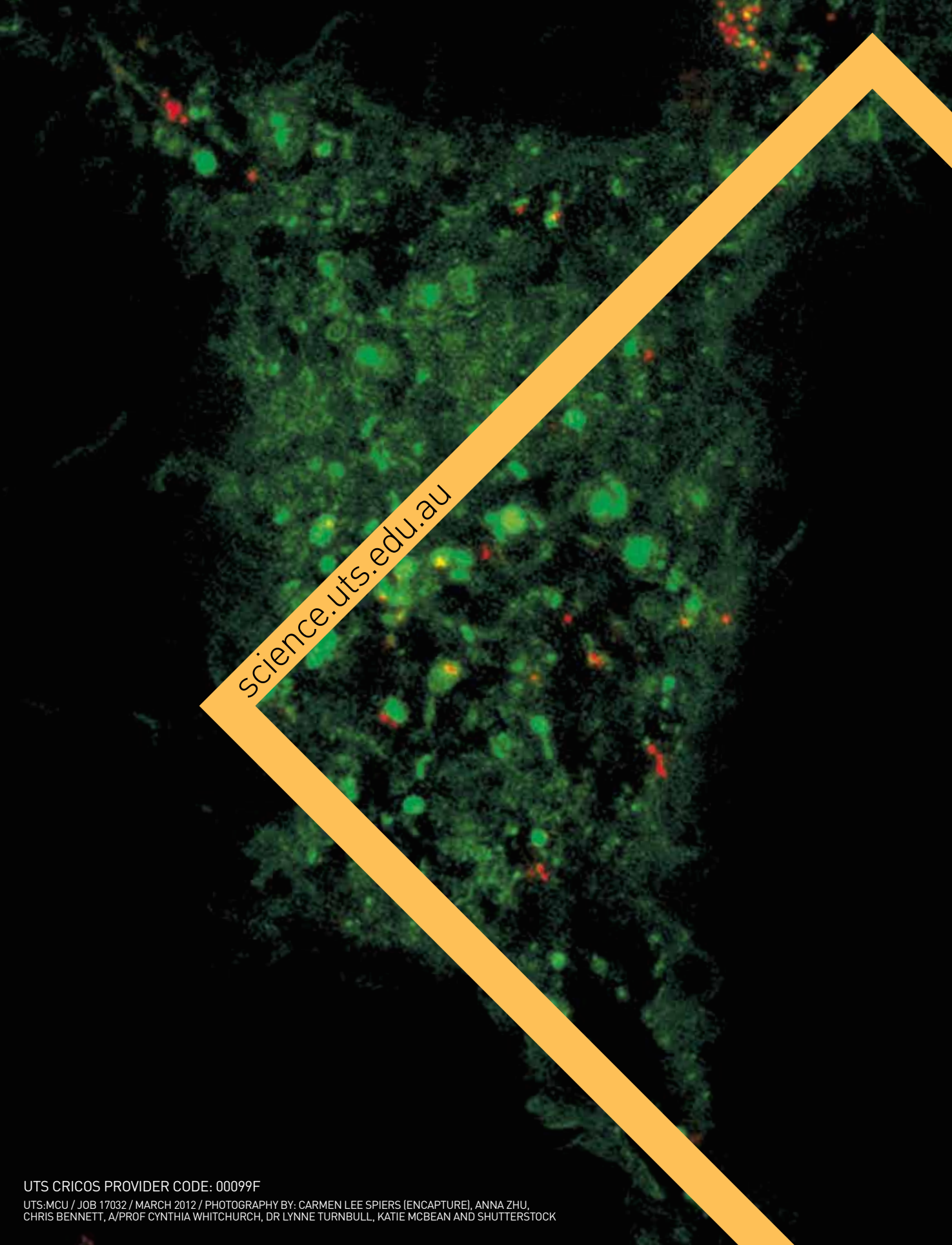
Phone outside Australia +61 3 9627 4816
Freecall within Australia 1800 774 816
Email: **international@uts.edu.au**
Website: **www.uts.edu.au/international**



City campus

Disclaimer: Courses and electives are offered subject to numbers. Information in this brochure is provided for Australian and New Zealand Citizens and Australian Permanent Residents. If you are an international student, please consult the International Prospectus available from UTS International. Information is correct at time of printing (February 2012) and is subject to change without notice. Changes in circumstances after this date may alter the accuracy or currency of the information. UTS reserves the right to alter any matter described in this brochure without notice. Readers are responsible for verifying information that pertains to them by contacting the university.

Cover: A macrophage cell captured by the DeltaVision OMX Blaze super resolution imaging system. Macrophages are cells in our body that recognise micro-organisms such as bacteria and viruses.



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