COMPUTER SCIENCE

POSTGRADUATE HANDBOOK

2017

THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SCIENCE

Welcome to the Department of Computer Science

I am thrilled that you are contemplating postgraduate study in our department. Computer scientists are shaping the future and you will have the skills to be part of that. We offer a wide range of options for postgraduate study, which will suit whatever pathway you are planning in your career. By joining New Zealand's top ranked and largest Computer Science department, with the most A-ranked researchers and the biggest variety of topics taught, you are going to discover the passion and excitement that drives us to stay at the forefront of research in the discipline. Industry, both internationally and here in New Zealand, values the depth of knowledge and research abilities that you will gain in postgraduate study at the University of Auckland. I look forward to seeing you progress, and watching as you shape our future.

PROFESSOR ROBERT AMOR
Head of Department

18 Best student city in the world

QS Best Student Cities 2016

Our subject is ranked in the top 100 worldwide

QS World University Rankings by subject 2016

TOP **100** in the world

Computer Science

Postgraduate study options in Computer Science

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BSc ──→ BSc (Hons) ┄┄┄→ MSc ──→ PhD
    ──→ PGDipSci ┄┄┄→ MProfStuds
    ──── BSc plus work experience ────→
        PGCert in InfoTech ┄┄┄→ MInfoTech
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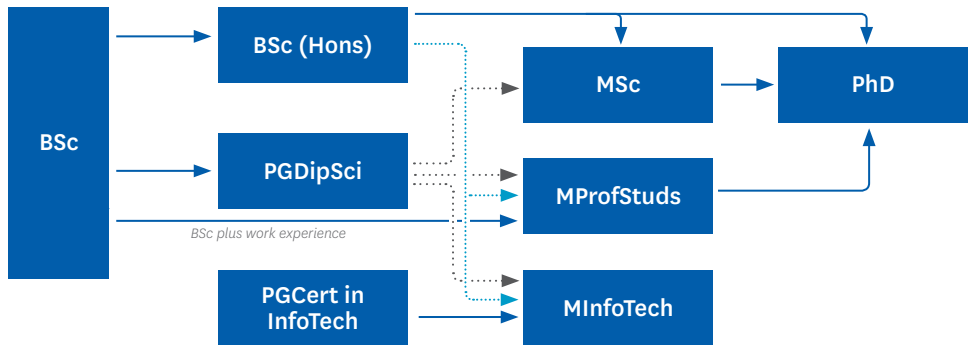
Postgraduate Certificate in Information Technology (PGCertInfoTech)

The Postgraduate Certificate in Information Technology (PGCertInfoTech) has been designed to allow students with undergraduate qualifications in areas other than IT to gain functional IT skills. Graduates of the PGCertInfoTech can gain entry to related masters-level programmes or to entry-level workplace positions. Students will gain fundamental skills in software development, including object-oriented programming and design, web technologies and databases. It can be regarded as the preparatory year for a Master of Information Technology.

Prerequisite

Students must have completed the requirements for a suitable bachelors degree from the University of Auckland or an equivalent degree qualification as approved by Senate or its representative.

Structure

The Postgraduate Certificate in Information Technology is a 60-point taught programme. Students take highly practical, hands-on and lab-based courses that are exclusive to the programme.

Duration: Full-time programme taken over 12 weeks from initial enrolment in early November. Part-time taken over Semester One and Two.

Contact

Dr Ian Warren at ian-w@cs.auckland.ac.nz

Bachelor of Science (Honours) (BSc(Hons))

BSc(Hons) is our premier degree for students who want to understand the frontiers of Computer Science. After graduating with your BSc(Hons), it is possible to progress to a masters degree (MSc); students gaining first or second class division one honours may be eligible for direct entry to a doctorate (PhD).

Prerequisite

A completed BSc in Computer Science with at least a B average and 90 points above Stage III.

Structure

All honours students must complete at least 60 points from COMPSCI 701-217, 720-777 and BIOINF 702, and up to 30 points from 700-level courses in a related subject with approval of the Head of Department. Students must also complete a 30-point COMPSCI 789 dissertation.

Duration

One year full-time or two years part-time from initial enrolment.

Contact

HonoursCoordinator@cs.auckland.ac.nz

1 The average number of years it takes to complete a Bachelor of Science (Hons) degree

Postgraduate Diploma in Science (PGDipSci)

PGDipSci develops cutting-edge skills in Computer Science. It is designed for students who have a BSc with a major in Computer Science. It can be regarded as the preparatory year for a masters degree in Computer Science.

Prerequisite

A completed BSc with a major in Computer Science.

Structure

Students must complete at least 90 points from COMPSCI 601, 602, 691, 701-717, 720-780 and BIOINF 702. Up to 30 points from 700-level courses in a related subject may be chosen, with approval of the Head of Department.

Duration

One year full-time or up to four years part-time from initial enrolment.

Contact

diploma@cs.auckland.ac.nz

1 The average number of years it takes to complete a Postgraduate Diploma in Science

Master of Science (MSc)

MSc is a one-year research programme by thesis only. This is our core programme designed to develop research skills in Computer Science.

Prerequisite

Applicants for the MSc programme must have completed a BSc(Hons) or a PGDipSci in Computer Science from the University of Auckland (or equivalent), with an average grade of at least B- in 90 points.

Structure

Thesis only.

Duration

One year full-time or two years part-time from initial enrolment.

Contact

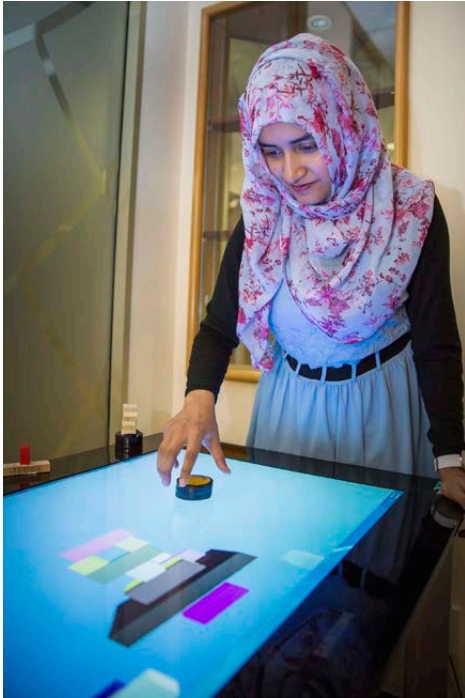MscCoordinator@cs.auckland.ac.nz

1 The average number of years it takes to complete a Master of Science

Master of Professional Studies (MProfStuds)

The department offers two professional masters degrees: Data Science and Digital Security. These taught masters programmes have been designed in response to demand from industry.

Prerequisite

In order to be admitted to either of these programmes, a student needs to have completed:

Either

· The requirements for a four-year bachelors degree

Or

· The requirements for a bachelors (honours) degree

Or

· The requirements for a bachelors degree

And

· Have at least a B- average grade in 90 points (or equivalent) of the most advanced courses of the degree

And

· Either a professional qualification equivalent to one year's advanced study or at least three years of professional experience deemed relevant to this programme by Senate or its representative

And

· Any prerequisites for the course in the subject area in which they wish to enrol

Applicants who do not have the background to take the core 700-level Computer Science courses should first take some relevant Computer Science courses as part of a Certificate of Proficiency programme.

(COMPSCI 220 Algorithms and Data Structures and/ or COMPSCI 225 Discrete Structures in Mathematics and Computer Science, for example.)

Applicants who do not have the background to take the core 700-level Statistics courses should also first take some relevant Statistics courses as part of a Certificate of Proficiency programme.
(STATS 201 Data Analysis or STATS 207 Data-Centered Investigation and Analysis, for example.)

MProfStuds in Data Science

This programme will give graduates a unique combination of skills in data science and data management. These skills will enable them to comprehend, process and manage data efficiently, to extract value from data in order to visualise and communicate it effectively.

Structure

- At least 30 points from COMPSCI 751, 752, 753, 760
- At least 30 points from STATS 762, 769, 782, 784
- Up to 30 points from courses relevant to the area of study from SCIENT 701, 702, COMPSCI 705, 711, 720, 732, 734, INFOSYS 720, 722, 726, 727, 737, 740, OPSMGT 760, 762, 764, STATS 707, 779, 783
- 30 points from COMPSCI 791 Dissertation

Duration

One year full-time or four years part-time from initial enrolment.

Contact

mprofstuds@cs.auckland.ac.nz

MProfStuds in Digital Security

The Digital Security specialisation brings together courses from Computer Science, Information Systems and Operations Management. The programme addresses a need for professionals who are capable of implementing appropriate security strategies, who take into account law and business constraints, who understand and master tools for implementing security policies, and who are able to take containment actions during and after a breach has occurred.

Structure

- 60 points from COMPSCI 725, 726, 727, INFOSYS 727
- 30 points from COMPSCI 702, 705, 720, 732, 742, INFOSYS 720, 726, 730, 737, 750, 751
- 30 points from COMPSCI 791 Dissertation

Duration

One year full-time or four years part-time from initial enrolment.

Contact

mprofstuds@cs.auckland.ac.nz

Master of Information Technology (MInfoTech)

The Master of Information Technology is a taught masters programme, with a 60-point industry internship for students with a strong Computer Science background. It can be taken full-time or part-time.

Prerequisites

180-point option

A relevant bachelors degree (or approved equivalent) with a GPA of ≥ 5 in 75 points at or above Stage III, including at least 45 points in an IT-related field; OR the Postgraduate Certificate in Information Technology (PGCertInfoTech) with a GPA of ≥ 5.

120-point, 'fast track' option

A relevant bachelors (honours) degree (or approved equivalent) with a GPA of ≥ 5 in 75 points above Stage III, including at least 45 points at 700-level in an IT-related field.

Structure

The Master of Information Technology is a taught masters programme, with a 60-point industry internship.

Duration

One year full-time or two years part-time from initial enrolment.

Contact

Dr Ian Warren at ian-w@cs.auckland.ac.nz

Doctor of Philosophy (PhD)

The Computer Science doctoral programme is a research degree which enables exceptional students to become experts in their areas of interest through original and creative research. The degree prepares students for careers at the forefront of academia, government and industry. It is the highest level qualification that can be awarded by the University of Auckland, and as such the application process is rigorous.

Prerequisite

Ideally, candidates will have completed a masters degree to a high standard or a first class honours degree, and demonstrate an ability to produce doctoral-level research. Other high level degrees may also be acceptable.

Structure

Research. You will be directed and supported by an appointed supervisor while engaged in your independent research study. The results of the research you carry out over the period of registration will be submitted as a thesis.

Duration

Three to four years full-time or six to eight years part-time.

Contact

phdcoordinator@cs.auckland.ac.nz

For more information, go to
www.science.auckland.ac.nz/phd

List of courses

COMPSCI 702	Security for Smart-devices
COMPSCI 705	Advanced Topics in Human Computer Interaction
COMPSCI 711	Parallel and Distributed Computing
COMPSCI 715	Advanced Computer Graphics
COMPSCI 720	Advanced Design and Analysis of Algorithms
COMPSCI 725	System Security
COMPSCI 726	Network Defence and Countermeasures
COMPSCI 727	Cryptographic Management
COMPSCI 732	Software Tools and Techniques
COMPSCI 734	Web, Mobile and Enterprise Computing
COMPSCI 742	Advanced Internet: Global Data Communications
COMPSCI 747	Computing Education
COMPSCI 750	Computational Complexity
COMPSCI 751	Advanced Topics in Database Systems
COMPSCI 752	Web Data Management
COMPSCI 753	Uncertainty in Data
COMPSCI 760	Data-mining and Machine Learning
COMPSCI 761	Advanced Topics in Artificial Intelligence
COMPSCI 765	Interactive Cognitive Systems
COMPSCI 767	Intelligent Software Agents
COMPSCI 771	Advanced Topics in Computer Graphics and Image Processing
COMPSCI 773	Intelligent Vision Systems
BIOINF 702	Comparative Bioinformatics
BIOINF 703	Genome Bioinformatics and Systems Biology
BIOINF 704	Statistical Bioinformatics

Careers in Computer Science
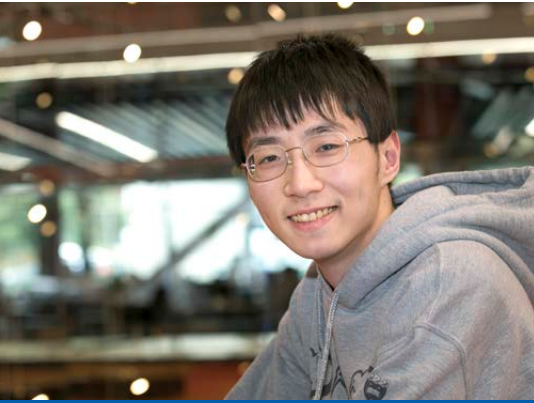
"During my Bachelor of Science, I studied Statistics and Computer Science, as well as some Maths, so a degree in Data Science seemed like the ideal, logical next step to expand my knowledge.

"What is most interesting about Data Science is that it bridges Computer Science and Statistics. Until now, I had to choose which subject to focus on, so it's great to be able to have a degree that combines Computer Science and Statistics courses together.

"Data science is about extracting useful knowledge from data: how to store data, transfer data, extract data, analyse data, and so on. With big data, there is an increasing need for people that have the skills to know how to deal with it.

"For my masters thesis, I'm looking at mining for independence statement in databases. After my masters, I'm hoping to get a job in the field of big data.

"I chose to study at the University of Auckland because it is the best option. I was already living in Auckland, so it was very convenient for me to study here.

"I've really enjoyed my time at the University of Auckland; I've found my lecturers to be friendly and helpful."

Bor-Kuan Song *is studying for a Master of Professional Studies (MProfStuds), specialising in Data Science.*

Recent developments in digital technology have meant that computers are not only a tool for corporate businesses, but are now used extensively across a range of other industries including manufacturing, transport, communication, health care and entertainment. With the internet changing the way we communicate and the way in which we do business, there is also an increasing need for companies to hire professional staff with computer expertise to develop and maintain their systems.

Academia
Business analyst
Computer consultant
Database/systems administrator
E-Commerce solutions architect
Educational software developer
Game developer
Geographic information systems (GIS) analyst
Information and communication technology manager
Information systems manager
Multimedia programmer
Network engineer
Programmer
Project manager
Robotics engineer
Software architect
Software engineer
Systems analyst
Systems developer
Telecommunications engineer
Test analyst
UX developer
Web developer

"I've always been passionate about computing – I've been programming since I was 13! More recently, I've become interested in image processing, artificial intelligence and computer graphics. I chose to specialise in computer vision as I felt it was a good marriage of these disciplines.

"Images are a quick and effective means of capturing information about a scene, and the human visual system is a highly effective mechanism for extracting this information. Computer vision is especially important to many emerging technologies, such as augmented reality and driverless vehicles, where scene understanding is of crucial importance. My research is mainly concerned with describing 3D scene data.

"The University provides a great working environment, access to experts and state-of-the-art equipment that allows me to really explore my field without limitation.

"I work in a very exciting, rapidly changing field. I'm especially encouraged by the fact that some of the advances in my field have tangible positive effects on people's lives, allowing them to do things that they were unable to do before."

Trevor Gee is working towards his PhD in Computer Science, specialising in the field of computer vision. He works in the Intelligent Vision Systems (IVS) laboratory.

Helpful information

Academic dates	www.auckland.ac.nz/dates
Accommodation	www.accommodation.auckland.ac.nz
Apply for postgraduate study	www.auckland.ac.nz/applynow
Career Development and Employment Services	www.cdes.auckland.ac.nz
Childcare	www.auckland.ac.nz/childcare
Degree planning and course advice	www.science.auckland.ac.nz/student-centre
Disability Services	www.disability.auckland.ac.nz
How to enrol	www.auckland.ac.nz/enrolment
Information for postgraduate students	www.postgraduate.ac.nz
International students	www.international.auckland.ac.nz
Libraries and Learning Services	www.library.auckland.ac.nz
Māori and Pacific students	www.science.auckland.ac.nz/tuakana
Need help?	www.askauckland.ac.nz
Postgraduate Students' Association	www.pgsa.org.nz
Rainbow Science Network for LGBTI students	www.science.auckland.ac.nz/rainbowscience
Scholarships, awards and fees	www.scholarships.auckland.ac.nz
	www.auckland.ac.nz/fees
	www.auckland.ac.nz/studentloansandallowances
Support for science students	www.science.auckland.ac.nz/support

Questions? Email pgscience@auckland.ac.nz

THE UNIVERSITY OF
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Te Whare Wānanga o Tāmaki Makaurau
N E W   Z E A L A N D

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