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Victoria University of Wellington
WELCOME TO ENGINEERING AND COMPUTER SCIENCE

Welcome to the School of Engineering and Computer Science, a leading research department in New Zealand that stands proudly on the world stage with its distinguished faculty and research output. We back up our research with access to sophisticated, cutting-edge equipment. Our researchers have access to the high-speed network connectivity of other research institutions and resource providers in New Zealand, including access to HPC resources hosted at New Zealand eScience Infrastructure (NeSI) https://www.nesi.org.nz/. We also have research networks across the world, provided via our National Research and Education Network (NREN) operator, Research and Education Advanced Networking New Zealand (REANNZ) https://reannz.co.nz/.

We encourage anyone interested in graduate study to contact a relevant staff member directly by email (Firstname.Lastname@ecs.vuw.ac.nz). We are open to receiving your proposals for PhD and Master’s projects and provided that we have the appropriate resources and supervisory experience available, we will consider these most positively.

We look forward to hearing from you.

Stuart Marshall
Head of School

IMPORTANT DATES 2017

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>University re-opens for Trimester 3 and Summer School</td>
<td>9 January</td>
</tr>
<tr>
<td>Wellington Anniversary (observed)</td>
<td>23 January</td>
</tr>
<tr>
<td>Trimester 3 and Summer School exams</td>
<td>20–25 February</td>
</tr>
<tr>
<td>Enrolment closes for 2017</td>
<td>18 February</td>
</tr>
<tr>
<td>Trimester 1 begins</td>
<td>6 March</td>
</tr>
<tr>
<td>Easter/Mid-trimester break</td>
<td>14–30 April</td>
</tr>
<tr>
<td>Anzac Day</td>
<td>25 April</td>
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<tr>
<td>Graduation</td>
<td>16–18 May</td>
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<tr>
<td>Queen’s Birthday</td>
<td>5 June</td>
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<tr>
<td>Examinations</td>
<td>16 June–5 July</td>
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<tr>
<td>Mid-year break</td>
<td>6 July–16 July</td>
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<tr>
<td>Trimester 2 begins</td>
<td>17 July</td>
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<tr>
<td>Mid-trimester break</td>
<td>28 August–10 September</td>
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<tr>
<td>Labour Day</td>
<td>23 October</td>
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<tr>
<td>Examinations</td>
<td>27 October–18 November</td>
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<tr>
<td>Trimester 3 begins</td>
<td>20 November</td>
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<tr>
<td>Graduation</td>
<td>13–14 December</td>
</tr>
<tr>
<td>Christmas break</td>
<td>22 December–7 January 2018</td>
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</tbody>
</table>

TIMETABLE

The timetable is online at www.victoria.ac.nz/timetables
School of Engineering and Computer Science  
Te Kura Mātaia Pūkaha, Pūrorohiko

Location: Room 358, Cotton Building, Kelburn Campus  
Office Hours: Monday–Friday, 8.30am–5.00pm  
Telephone: (04) 463-5341 from NZ +64-4-463-5341 from overseas
Email: office@ecs.vuw.ac.nz  
Website: http://ecs.victoria.ac.nz

STAFF CONTACTS

DEANS AND HEAD OF SCHOOL
Prof Dale Carnegie  Dean  AM224  463 7485  
Dr Stuart Marshall  Head of School  CO342  463 6730  
A/Prof Peter Andreae  Associate Dean (Students)  CO336  463 5834  
Prof Mengjie Zhang  Associate Dean (Research)  CO355  463 5654

GRADUATE STUDIES COORDINATORS
Prof Winston Seah  Postgraduate Coordinator (Admission)  AM403  463 5233  
    x8493  
Dr Alex Potanin  Postgraduate Coordinator (Current PhD)  CO262  463 5302  
A/Prof Thomas Kühne  Postgraduate Coordinator  CO259  463 5657  
    (Current Master)  
Dr Sharon Gao  International Student Adviser for Postgraduate Coursework  (CGRA/COMP/NWEN/SWEN)  CO259  463 5657  
A/Prof Paul Teal  International Student Advisor for Postgraduate Coursework  (ECEN/ELCO)  AM420  463 5966  
A/Prof Kris Bubendorfer  International Student Admissions  (MEP/MSwDev)  EA110  463 6484

PROGRAMME DIRECTORS
Prof Neil Dodgson  Computer Graphics  CO329  463 6922  
A/ Prof Marcus Frean  Computer Science  CO337  463 5672  
Dr Pawel Dmochowski  Electronic and Computer Systems Engineering  AM419  463 5948  
Dr Aaron Chen  Network Engineering  AM405  463 5114  
Dr David Pearce  Software Engineering  CO231  463 5833  
A/Prof Kris Bubendorfer  Master of Software Development and Master of Engineering Practice  EA110  463 6484
## ACADEMIC STAFF

<table>
<thead>
<tr>
<th>Staff</th>
<th>Research Interests</th>
<th>Room</th>
<th>Contact</th>
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</thead>
<tbody>
<tr>
<td>A/Prof Peter Andreae</td>
<td>Artificial Intelligence</td>
<td>CO336</td>
<td>463 5834</td>
</tr>
<tr>
<td>Dr Dionysis Athanasopoulos</td>
<td>Software &amp; Data Engineering, Service-Oriented Architecture, and Cloud Computing</td>
<td>EA111</td>
<td>463 5233 x8024</td>
</tr>
<tr>
<td>A/Prof Will Browne</td>
<td>Robotics, Cognitive systems engineering</td>
<td>AM418</td>
<td>463 5233 x8489</td>
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<tr>
<td>A/Prof Kris Bubendorfer</td>
<td>Clouds, Services, eScience, Security and Distributed Computing</td>
<td>EA110</td>
<td>463 6484</td>
</tr>
<tr>
<td>Prof Dale Carnegie</td>
<td>Mechatronics, Digital Electronics, Embedded Controllers, Musical Mechatronics, Engineering Education</td>
<td>AM224</td>
<td>463 7485</td>
</tr>
<tr>
<td>Dr Aaron Chen</td>
<td>Distributed Computing, Evolutionary Computation, Machine Learning</td>
<td>AM405</td>
<td>463 5114</td>
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<tr>
<td>Dr Pawel Dmochowski</td>
<td>Wireless Communications, Signal Processing</td>
<td>AM419</td>
<td>463 5948</td>
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<tr>
<td>Prof Neil Dodgson</td>
<td>Computer Graphics, Imaging</td>
<td>CO329</td>
<td>463 6922</td>
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<tr>
<td>Dr Robin Dykstra</td>
<td>Development of Scientific, Industrial and Educational Instruments</td>
<td>AM415</td>
<td>463 5177</td>
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<tr>
<td>Dr Elf Eldridge</td>
<td>Nanofluidics and Data Analytics</td>
<td>AM228</td>
<td>463 5233 x7077</td>
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<tr>
<td>A/Prof Marcus Frean</td>
<td>Machine Learning, Theoretical Biology</td>
<td>CO337</td>
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<tr>
<td>Dr Qiang Fu</td>
<td>Internet Protocols, Wireless and Mobile Systems, Network Measurement and Security</td>
<td>AM414</td>
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<tr>
<td>Dr Sharon Gao</td>
<td>Artificial Intelligence</td>
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<td>463 5978</td>
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<tr>
<td>Dr Gideon Gouws</td>
<td>Sensor Devices and Instrumentation</td>
<td>AM225</td>
<td>463 5952</td>
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<tr>
<td>A/Prof Lindsay Groves</td>
<td>Formal Software Development</td>
<td>CO257</td>
<td>463 5656</td>
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<tr>
<td>Dr Christopher Hollitt</td>
<td>Vision and Control for Robotics</td>
<td>AM223</td>
<td>463 6965</td>
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<tr>
<td>Dr Michael Homer</td>
<td>Programming Languages</td>
<td>EA115</td>
<td>463 5233 x4034</td>
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<tr>
<td>Prof Bastiaan Kleijn</td>
<td>Signal Processing</td>
<td>AM417</td>
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<td>A/Prof Thomas Kühne</td>
<td>Software Engineering</td>
<td>CO233</td>
<td>463 5443</td>
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<tr>
<td>Dr Zohar Levi</td>
<td>Geometry processing</td>
<td>CO338</td>
<td>463 5233 x7045</td>
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<tr>
<td>A/Prof John Lewis</td>
<td>Computer Graphics</td>
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<tr>
<td>Dr Karsten Lundqvist</td>
<td>eLearning</td>
<td>EA116</td>
<td>463 5233 x8016</td>
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<tr>
<td>Dr Hui Ma</td>
<td>Databases</td>
<td>CO259</td>
<td>463 5657</td>
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<tr>
<td>Dr Stuart Marshall</td>
<td>Mobile Devices, Software Visualisation</td>
<td>CO342</td>
<td>463 6730</td>
</tr>
<tr>
<td>Dr Yi Mei</td>
<td>Evolutionary Computation, Machine Learning, Scheduling and Operations Research</td>
<td>CO353</td>
<td>463 5233 x8016</td>
</tr>
<tr>
<td>Name</td>
<td>Course</td>
<td>Teaching Period</td>
<td>Contact Details</td>
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</tr>
<tr>
<td>Dr Mark Moir</td>
<td>Practical and Theoretical Aspects of Concurrent, Distributed and Real-time Systems</td>
<td>Adjunct Professor</td>
<td></td>
</tr>
<tr>
<td>Dr Ciaran Moore</td>
<td>Nanophotonics</td>
<td>AM227</td>
<td>463 5233 x8931</td>
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<tr>
<td>Dr Bryan Ng</td>
<td>Network Engineering, Stochastics</td>
<td>AM404</td>
<td>463 9998</td>
</tr>
<tr>
<td>Prof James Noble</td>
<td>Object-Oriented Software Design</td>
<td>CO234</td>
<td>463 6736</td>
</tr>
<tr>
<td>Dr David Pearce</td>
<td>Compilers, Program Analysis</td>
<td>CO231</td>
<td>463 5833</td>
</tr>
<tr>
<td>Dr Alex Potanin</td>
<td>Ownership and Immutability, OO Programming Languages, Type Systems, Software Engineering</td>
<td>CO262</td>
<td>463 5302</td>
</tr>
<tr>
<td>Dr James Quilty</td>
<td>Optical Engineering, Computational Science and Engineering</td>
<td>AM226</td>
<td>463 5233 x4090</td>
</tr>
<tr>
<td>Dr Ramesh Rayudu</td>
<td>Power System Engineering, Power Electronics, Renewable Energy Systems.</td>
<td>AM421</td>
<td>463 5223 x8068</td>
</tr>
<tr>
<td>Dr Taehyun Rhee</td>
<td>Computer Graphics</td>
<td>CO330</td>
<td>463 5233 x7088</td>
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<tr>
<td>Prof Winston Seah</td>
<td>Network Engineering, Wireless Systems</td>
<td>AM416</td>
<td>463 5233 x8493</td>
</tr>
<tr>
<td>Dr Marco Servetto</td>
<td>Formal programming language design, Languages, Type Systems, Software Engineering</td>
<td>CO258</td>
<td>463 5820</td>
</tr>
<tr>
<td>Dr Mansoor Shafi</td>
<td>Wireless Communications Systems</td>
<td></td>
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<tr>
<td>Dr David Streader</td>
<td>Use of Formal Mathematical Techniques in Software Engineering</td>
<td>CO260</td>
<td>463 5655</td>
</tr>
<tr>
<td>A/Prof Paul Teal</td>
<td>Signal Processing and Communications</td>
<td>AM420</td>
<td>463 5966</td>
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<tr>
<td>Dr Ian Welch</td>
<td>Security and Distributed Systems</td>
<td>AM403</td>
<td>463 5664</td>
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<tr>
<td>Dr Bing Xue</td>
<td>Evolutionary Computation, Feature Reduction, Classification</td>
<td>CO352</td>
<td>463 5542</td>
</tr>
<tr>
<td>Prof Mengjie Zhang</td>
<td>Data Mining and Machine Learning, Genetic Programming, Evolutionary Computer Vision</td>
<td>CO355</td>
<td>463 5654</td>
</tr>
</tbody>
</table>
GRADUATE ADMISSION AND ENROLMENT PROCEDURES

- International students must apply through Victoria International (Victoria’s International Student Office): [www.victoria.ac.nz/international](http://www.victoria.ac.nz/international)
  See more information in the International Students section below.
- New Zealand residents can apply online; information about the process is available at: [www.victoria.ac.nz/study/apply-enrol/postgraduate-admissions](http://www.victoria.ac.nz/study/apply-enrol/postgraduate-admissions)

THESIS STUDENTS: CONTACT US BEFOREHAND

For both international students and New Zealand residents, applicants for PhD thesis and Master thesis programmes are advised to discuss their proposed enrolment with a member of the Engineering and Computer Science staff, either in person or by email. Prof Winston Seah (winston.seah@ecs.vuw.ac.nz) is in charge of admissions for thesis students, and can provide advice if you do not know which staff member to approach.

Applicants with qualifications from universities other than Victoria University should bring/include a copy of their transcript and details of courses they have taken. International students for whom English is not their first language should also bring/send a copy of their IELTS or TOEFL scores.

TIME OF APPLICATION

PhD

There are three deadlines per year for all PhD applications to be considered. The dates are 1 March, 1 July, and 1 November. Students may complete an application form and speak with prospective supervisors prior to the deadline, but their application must be submitted through the Faculty of Graduate Research (FGR) and decision on acceptance into the programme will be made after the deadline. This admission/scholarship application process applies to both domestic and international prospective PhD students. More information can be found on the FGR website: [www.victoria.ac.nz/fgr](http://www.victoria.ac.nz/fgr)

**Note:** Every effort will be made to ensure that enrolment in the PhD degree is flexible where there is a demonstrated need such as for those candidates who have funding or a scholarship from outside Victoria which must be taken up within a particular timeframe. Please contact the postgraduate thesis coordinator Professor Winston Seah at any time to discuss these issues and we will endeavour to manage your enrolment as quickly as we can.

Masters by Thesis Only

Applications for Master’s by thesis only (ME or part 2 of MSc) can be made at any time.

Postgraduate Programmes with Coursework

Applications for postgraduate programmes with coursework (BSc(Hons), MSc with part 1, MCompSci, postgraduate diplomas) can be made prior to each trimester using the same application process as for undergraduate programmes.
Victoria International is the University’s office for international students, and applications for all graduate programmes must be made through Victoria International. The International Office has a website at www.victoria.ac.nz/international that provides much information on application and immigration formalities, scholarships, New Zealand living costs, fees, academic programmes and the like. You can contact Victoria International online or email victoria-international@vuw.ac.nz

In addition to the academic prerequisites for graduate programmes, International applicants must also meet the University’s postgraduate English language requirements:

- IELTS overall band of 6.5 with no sub-score below 6.0; or
- TOEFL 90 IBT with a minimum of 20 in writing; or
- Pearson Test of English score of 65 with a Communicative score of not less than 58; or
- Two ratings of 5 and two ratings of 4 in Victoria University of Wellington’s English Proficiency Programme.

TUITION FEES

International students accepted for the PhD degree currently pay the same fees as domestic students. For other degrees and qualifications, International students from Australia also pay the same tuition fee as New Zealand students. International students from other countries pay the full international student fees for degrees and qualifications other than the PhD. Some thesis students may have their fees paid from a scholarship or from the research grants of their supervisors.
QUALIFICATIONS AVAILABLE

The School of Engineering and Computer Science offers a variety of graduate programmes. Except for the MSwDev, these programmes require an undergraduate qualification in a relevant Engineering discipline, Computer Science, Electronic and Computer Systems or an equivalent. They are suitable for new graduates seeking an advanced degree before entering the work force, professionals with an Engineering or Computer Science background seeking a more advanced professional qualification (possibly on a part-time basis), and graduates seeking research based qualifications in order to enter research or academia.

For students whose undergraduate degree is not in Engineering or Computer Science, the MSwDev and the GradDipSc are graduate programmes that may be taken as preparation for postgraduate study in Engineering or Computer Science or as a qualification in their own right.

The School of Engineering and Computer Science offers the following postgraduate programmes:

- **BSc(Hons)** (Bachelor of Science with Honours) in Computer Science, Computer Graphics, or Electronic and Computer Systems. This degree is the traditional first graduate degree, and involves one year of full time (or two years part-time) study combining course and project work.

- **PGDipSc** (Postgraduate Diploma in Science) in Computer Science, Computer Graphics or Electronic and Computer Systems. The diploma is a postgraduate qualification. As a research project is not compulsory, the PGDipSc will appeal to students wanting a postgraduate course-work qualification. The PGDipSc also provides an opportunity for those students who are not able to meet the entry requirements for the BSc(Hons) or MSc Part 1. The PGDipSc requires 120 points of postgraduate study and can be completed full-time in two trimesters or part-time up to 4 years.

- **PGCertSc** (Postgraduate Certificate in Science) in Computer Science, Computer Graphics or Electronic and Computer Systems. This certificate is a short postgraduate qualification that consists of 60 points of 400-level courses. The PGCertSc may include a project with permission.

- **ME** (Master of Engineering) This Master’s degree involves a thesis in engineering and may be endorsed with a specific area (Electronic and Computer System Engineering, Network Engineering, or Software Engineering). It consists of a 120 point Master’s thesis, or a 90 point thesis plus 30 points of 400 or 500-level courses from the ME or BE(Hons) schedule.

- **MEP** (Master of Engineering Practice) This is a one-year, 180-point Master’s programme which aims to help students advance their skills and improve their job prospects.

- **MCompSc** (Master of Computer Science) This Master’s degree consists of course work and a 30 point project completed over two years (or a longer period on a part-time basis).

- **MSc** (Master of Science) in Computer Science, Computer Graphics or Electronic and Computer Systems. This Master’s degree has two parts. Part 1 is one year of full-time study consisting of course work. Part 2 is a thesis which typically requires 12 months of study. Students with an honours degree (including a BE with honours) or a PGDipSc take Part 2 only. Students with only a BSc or GDipSc need to take both parts 1 and 2.

- **PhD** (Doctor of Philosophy). The PhD is a research degree, involving a substantial thesis, and is open to students with a good four-year qualification or a master’s degree in Engineering, Computer Science, or Computer Graphics.
• **MSwDev (Master of Software Development)** This is a one-year, 180-point Master’s degree delivered through a combination of course-work and an in-work (industry placement) research and development project. It is a “conversion masters” designed for students with a good undergraduate qualification in a subject other than computer science or software engineering.

*Figure 1* indicates how the various degree programmes relate to the undergraduate BSc and BE(Hons), and to each other. Candidates normally progress along the paths indicated by the solid arrows and can by permission progress along the paths indicated by dashed arrows. Previous professional experience can be taken into account.

![Diagram](Diagram.png)

**FIGURE 1: RELATIONSHIP BETWEEN DEGREE PROGRAMMES**

The BSc(Hons), MCompSc, MSc Part 1 and PGDipSc consist of courses on advanced topics in engineering, computer science, and computer graphics. Students are able to study technology that is just finding its way into commercial implementations and concepts that will form the foundations for future technology and solutions. This combination of material prepares our students for a successful career in areas such as software design and development, network or systems planning and management, electronics and computer systems, or for study towards a further degree. An overview of individual graduate courses can be found starting on page 24. Entry to all these programmes assumes a BSc in Computer Science, Computer Graphics, Electronic and Computer Systems or equivalent. Page 22 describes programmes to enable graduates in other disciplines to obtain an equivalent background.

The MSc Part 2, ME and PhD are all research degrees featuring a substantial research project leading to a thesis. Thesis projects are supervised by academic staff and are normally related to staff research.

Each of these programmes is described briefly below, including an indication of whom the programme is designed for, the programme goals, the prerequisites for entry, and the requirements for completion of the programme. For the complete regulations regarding these programmes, we refer you to the appropriate pages of the Victoria University Calendar, available online at:
BSc(Hons)

The BSc Honours degree is the traditional first step beyond a three-year undergraduate degree and is typically taken immediately following completion of a BSc. It comprises one academic year of full-time study. With permission, it can be undertaken part-time over two years.

BSc(Hons) IN COMPUTER SCIENCE

The BSc(Hons) in Computer Science is designed both for students wishing to strengthen their studies in Computer Science before entering the workforce or as a first step for students intending to pursue a research degree (MSc or PhD).

ENTRY REQUIREMENTS

Entry to the degree requires a first degree and at least 60 points in 300-level courses in Computer Science. Applicants should have attained a good standard of performance in their final year of study (normally an average grade of B+ or higher in relevant 300-level courses), and should have completed any specific prerequisites for their proposed courses of study.

SUBJECT REQUIREMENTS

Candidates are required to complete 120 400-level points, which must include COMP 489 (a 30-point research project), and a further 90 points from Computer Science (including COMP, NWEN, and SWEN) 400-level courses. Up to 60 points may be replaced by graduate courses from other disciplines. Whilst we encourage Honours students to enrich their education with advanced courses in other subjects, substitution of courses will only be permitted if the complete set of courses constitutes a coherent programme of study. Recent graduate students have taken courses in mathematics, philosophy (logic), linguistics, information systems, and physics (electronics).
BS(Hons) IN COMPUTER GRAPHICS

The BSc (Hons) in Computer Graphics is designed as a first step for students intending to pursue a research degree (MSc or PhD in Computer Graphics) and also for students wishing to work in industry in related areas.

ENTRY REQUIREMENTS

Entry to this program requires students to have the equivalent of an undergraduate degree with a major in computer science including relevant computer graphics courses. For VUW graduates, the requirements include the completion of COMP 308, and a further three 300 level courses (45 points) from COMP, MDDN, NWEN or SWEN. It is normally expected that students have achieved a B+ or better average in their 300 level courses with an A- or better in computer graphics (COMP308).

SUBJECT REQUIREMENTS

Candidates are required to complete 120 points. These must include CGRA 489 (a 30-point project); CGRA 408, 409; and a further 30 400-level points in an approved combination from CGRA, COMP, MDDN and SWEN (excluding project courses).

BS(Hons) IN ELECTRONIC AND COMPUTER SYSTEMS

This programme is ideal for graduates with a BSc with a major in Electronic and Computer Systems, or in a related discipline that included significant electronics or signal processing studies.

ENTRY REQUIREMENTS

Entry to the degree requires a first degree and at least 60 points in approved 300-level or higher courses from BE (Hons) schedule or 300-level courses in COMP or PHYS. Applicants should have attained a good standard of performance in their final year of study (normally an average grade of B+ or higher in relevant 300-level courses), and should have completed any specific prerequisites for their proposed courses of study.

SUBJECT REQUIREMENTS

Candidates are required to complete 120 points. These must include ELCO 489 (a 30-point research project); 60 points from ECEN 401-440; and a further 30 points in an approved combination from 400-level courses in ECEN, COMP, NWEN and SWEN.
MCompSc (MASTER OF COMPUTER SCIENCE)

The Master of Computer Science degree is a graduate qualification designed for professionals seeking to advance their knowledge of Computer Science and to obtain a formal qualification that recognises their achievement. The degree will also be attractive to new graduates who wish to advance their knowledge of Computer Science before seeking employment. The degree emphasises course work as opposed to a significant research thesis.

ENTRY REQUIREMENTS

Entry to the MCompSc requires a degree with the equivalent of 60 points of 300-level courses in Computer Science, with an average grade of at least B+. International applicants are expected to have an average grade equivalent to at least a B+ at Victoria University. The Graduate Diploma in Science (Computer Science) is one way of satisfying this prerequisite for candidates who have a degree in a subject other than Computer Science. In exceptional cases, substantial professional experience combined with a degree containing less Computer Science may be acceptable. Applicants should have demonstrated the ability to study at an advanced level, through either their previous study or work experience.

Applicants who did not complete their previous study at Victoria should pay particular attention to the prerequisite requirements of individual courses.

DEGREE REQUIREMENTS

The degree consists of two parts, each equivalent to one year of full-time study. Part 1 consists of 120 points in an approved combination from COMP, NWEN, SWEN 401-479 (excluding the project courses). Part 2 consists of COMP 588 (30 point project), one further 500-level course from COMP (15 points), and a further 75 points from COMP, NWEN, SWEN 401-479 (excluding project courses).

Normally, candidates can proceed to Part 2 only on satisfactory completion of Part 1. However, a candidate who has completed a four-year degree or has appropriate professional experience may be exempted the requirements of part or all of Part 1, with the approval of Head of School. Note that normally only candidates who have completed a qualification equivalent to a BSc (Hons) or PGDipSci in Computer Science will be exempted the whole of Part 1.

This programme can be taken full-time or part-time. Full-time students can complete this qualification within two years. Those exempted part 1 can complete this qualification within one year. For part-time students, the period for the two parts may be up to six years.
ME (MASTER OF ENGINEERING)

The ME degree provides a clear route for continued study for graduates with a BE degree. The ME programme provides students with both a very attractive professional qualification in the engineering fields as well as opportunities to carry out a significant piece of research in engineering.

ENTRY REQUIREMENTS

Entry to this programme normally requires a BE degree with first or second class Honours from Victoria or equivalent. Those with a BSc (Hons) or a PGDipSc in Computer Science or Electronic and Computer Systems with good grades may also be accepted into the programme.

DEGREE REQUIREMENTS

The ME programme has two options:

- A 120 point Master’s thesis (ENGR 591); or
- A 90 point Master’s thesis (ENGR 592), and 30 points of approved 400-level or 500-level courses from the schedules to the BE or ME.

The degree may be awarded with Distinction or Merit, but a candidate must complete the work required for the degree within 12 months to be considered for such an award. For part-time students, the period may be extended pro-rata to a maximum of two years.
MSc (MASTER OF SCIENCE)

MSc IN COMPUTER SCIENCE

The MSc is a postgraduate degree with a thesis as a major component. The degree is designed to provide an advanced level of professional competence with some research experience. Individuals seeking advanced expertise in one or more areas of Computer Science and research experience in a specialised area of Computer Science will find the MSc programme attractive.

ENTRY REQUIREMENTS

This programme has two parts (see details below). Applicants seeking entry to Part 1 need to meet the entry requirements of the BSc (Honours) degree and satisfy the Graduate Coordinator of Computer Science that they have the prospect of successfully completing the MSc thesis. Applicants who have already completed an Honours degree in Computer Science, or the equivalent, and have the prospect of successfully completing the MSc thesis, may gain direct entry to Part 2.

SUBJECT REQUIREMENTS

The MSc degree is divided into two parts:
- Part 1 is similar to the PGDipSc and the BSc Honours year (without requiring a project).
- Part 2 consists of a thesis (COMP 591), equivalent to one year’s full-time study.

Candidates for Part 1 are required to complete 120 points. These points need to come from 400-level Computer Science, Network Engineering, and Software Engineering courses. Candidates may be given approval to substitute some courses from other disciplines provided the complete set of courses constitute a coherent programme of study. Full-time candidates taking both Part 1 and Part 2 must complete the degree within two and a half years, extended pro-rata up to five years for part-time candidates. Full-time candidates for Part 2 only must complete the degree within 12 months, extended pro rata up to two years for part-time candidates.
MSc IN COMPUTER GRAPHICS

The MSc in Computer Graphics is a postgraduate degree with a research thesis as a major component. Graduates of the MSc in Computer Graphics will have a solid understanding of the mathematical and computer science principles that underlie computer graphics. They will be familiar with common languages and advanced libraries used in computer graphics, and will be able to use these to independently develop novel solutions to computer graphics problems. Graduates will also have experience working in teams to develop graphics software involving a variety of components.

ENTRY REQUIREMENTS

This programme has two parts (see details below). Applicants seeking entry to Part 1 need to meet the entry requirements of the BSc (Hons) in Computer Graphics, which requires students to have the equivalent of an undergraduate degree with a major in computer science including relevant computer graphics courses. For VUW graduates, the requirements include the completion of COMP 308 and a further three approved 300 level courses (45 points) from COMP, MDDN, NWEN, or SWEN. It is normally expected that students have achieved a minimum of B+ average in their 300 level courses with an A- or better in computer graphics (COMP308).

SUBJECT REQUIREMENTS

The Programme is divided into two parts:

**Part 1:** Candidates are required to complete 120 points. These must include CGRA 408, 409; and a further 90 points 400-level points in an approved combination from CGRA, COMP, MDDN, and SWEN (excluding project courses).

**Part 2:** Candidates are required to complete a 120 point Computer Graphics Thesis (CGRA591).
MSc IN ELECTRONIC AND COMPUTER SYSTEMS

The MSc in Electronic and Computer Systems deals with topics at the intersection of computer science and electronics. With embedded controllers existing in almost all of modern-day electronics, the distinction between software and hardware is becoming blurred. Victoria University has expertise in communications, electronic design, network and software design, artificial intelligence, mechatronics and robotics, and signal processing. This two-year programme offers students the opportunity to explore all of these topics in a manner which best suits their interests.

ENTRY REQUIREMENTS

Entry requirements are the same as BSc (Hons) in ELCO, which requires 60 points in approved 300-level or higher courses from the BE (Hons) schedule or 300-level courses in COMP or PHYS with at least a B+ average grade and satisfies the Graduate Coordinator that they have the prospect of successfully completing the MSc thesis.

SUBJECT REQUIREMENTS

The programme is divided into two parts. Part 1 consists of 120 points including ELCO 580; 60 point from ECEN 401-440; and further 30 points in an approved combination of 400-level courses from ECEN, COMP, NWEN, and SWEN.

Part 2 is a 120 point research thesis (ELCO 591). Students who have entered the degree with a satisfactory academic background (typically a BSc (Hons) or equivalent degree) may enrol directly in Part 2. Full-time candidates for Part 2 only must complete the degree within 12 months, extended pro rata up to two years for part-time candidates.
MASTER OF ENGINEERING PRACTICE

The Master of Engineering Practice (MEP) is a unique and innovative programme for graduates seeking a professional postgraduate engineering qualification in the IT field.

ENTRY REQUIREMENTS

Applicants for the MEP will have:

- completed a Bachelor’s degree in a relevant subject with good grades; and
- been accepted by the Head of School of Engineering and Computer Science as capable of proceeding with the proposed course of study.

International applicants must also meet the University’s postgraduate English language requirements – see page 6.

SUBJECT REQUIREMENTS

Taught 180 points Master’s degree - 1.5 years of academic study. It is taught in three parts and it should be possible for students may complete the degree in 12 months.

Part 1 (one trimester of study) – 60 points

- ENGR 501—Research and Communication Skills (15 points)
- ENGR 502—Engineering Practice (15 points)
- Two 400-level courses from Electronics, Networking, Software or Computer Science (30 points)

Part 2 (one trimester of study) – 60 points

- ENGR 589—Engineering project (30 Points)
- 2 courses from Electronics, Networking, Software or Computer Science (30 points)

Part 3 (one trimester of study) – 60 points

- ENGR 589—Industry Research and Development Project (60 points)

Students may be placed in industries locally (including within Victoria University of Wellington), or nationally – past industry placements include companies such as Google, Xero, Datacom, Weta Digital, Park Road Post, Solnet, Microsoft, IBM, Trade Me, Fujitsu, Magritek, Tekron, BRANZ, Callaghan Innovation, BECA, GNS, Fisher & Paykel, EDMI, Chorus, Transfield Services, 2degrees and others.

Students may be paid by companies in which they are placed.

* Entry to Part 3 requires good grades in Part 1 and Part 2 or special permission from the Head of School.
MASTER OF SOFTWARE DEVELOPMENT

Master of Software Development (MSwDev) is a graduate programme designed to equip students from a range of backgrounds with an industry focused qualification that prepares them to develop real-world software-based systems. It is an opportunity for those from non ICT fields to convert into the software engineering field. In prior years students have included: designers, micro-biologists, librarians, teachers, Media and Film, etc.

ENTRY REQUIREMENTS

Applicants for the MSwDev will have:

- A university New Zealand bachelor’s degree in any discipline (except computer science, software engineering, or the equivalent), or equivalent qualification with at least a B average (or good grades as previous page).
- A basic level of competence in programming – this can be demonstrated by:
  - Achieving a good grade in the 4 week MSwDev boot-camp: SWEN 131—Programming for Software Development (optional: enrolment as a certificate of proficiency (COP)). This is held prior to the start of the MSwDev each year.
  - Attaining excellent grades in either COMP102 or a first year computing course in your prior degree. This is assessed on a case by case basis.
- Satisfied an entry interview (held between the boot-camp and the start of the MSwDev).

International applicants must also meet the University’s postgraduate English language requirements – see page 6.

SUBJECT REQUIREMENTS

The programme is a one-year 180 point Master’s degree delivered through a combination of course-work and an in-work (industry placement) research and development project. It is taught as a full-time intensive course and the individual courses do not follow the normal trimester calendar. The programme is normally completed in 12 months.

Part 1 (Two Trimesters of Study)

- SWEN 501—Professional Programming Skills
- SWEN 502—Software Development Studio I
- SWEN 503—Software Development Studio II
- SWEN 505—Professional Seminar

Part 2

- SWEN 585—Research and development project (60 points)

Entry into the research and development component requires good grades in the Part 1 courses or approval by the Head of School.
MASTER OF INNOVATION AND COMMERCIALISATION

The Master of Innovation and Commercialisation (MlnnComl) is for those who want to help bring innovations to life. These innovations may have a scientific, engineering, design or technology component and could arise from research or from identifying an industry problem that needs solving.

Students of the practice-based MlnnComl will both lead the development of an innovation project that interests them and work within a multidisciplinary team, consisting of fellow students. This will all be done with active support from a range of industry, government and research organisations that are associated with innovation and commercialisation.

The MlnnComl programme is multidisciplinary and has been developed in association with the faculties of Architecture and Design, Engineering, Law, Science and Victoria Business School.

Your innovation project could be developed in conjunction with a commercial organisation or the University, or you could work on your own project.

On this programme, you will gain a breadth of skills and industry contacts, together with the type of practical experience that is sought by employers. Potential opportunities for graduates include product design and development, management, analysis and consultation, technology transfer and commercialisation, or as future leaders of innovative companies.

COURSE REQUIREMENTS

Part 1 consists of:
- ATEN 504

Part 2:
- ATEN 502, 503, 591

ENROLMENT

Programme start date is 16 November 2015. Apply online at www.victoria.ac.nz/enrol

APPLICATION/ENQUIRY CONTACT DETAILS

Jenny Douché, Programme Director jenny.douche@vuw.ac.nz 04 463 5479
Shona de Sain, Associate Dean (Students) shona.desain@vuw.ac.nz 04-463 5092

www.victoria.ac.nz/innovation-commercialisation
POSTGRADUATE DIPLOMA IN SCIENCE

The PGDipSc is a postgraduate science qualification offered in all subjects offered for the MSc. It will appeal to students wanting a postgraduate course-work only qualification since a research project is not compulsory. The PGDipSc may also provide an opportunity for postgraduate study for some students who are not able to meet the entry requirements for the BSc(Hons) or MSc Part 1. The PGDipSc requires 120 points of postgraduate study and can be completed full-time in 2 trimesters or part-time over 4 years. Students who have successfully completed a PGDipSc may be accepted directly into a thesis program (MSc Part 2, ME or PhD).

ENTRY REQUIREMENTS

Entry to this qualification usually requires a degree in a relevant subject that satisfies the prerequisites for the required courses. In special cases, candidates without a relevant degree but have extensive practical, professional or scholarly experience may also be considered.

SUBJECT REQUIREMENTS

PGDipSc in Computer Science requires 120pts in approved courses from COMP, NWEN and SWEN 401-489.

PGDipSc in Computer Graphics requires CGRA 408, 409; a further 60 approved points from CGRA 401-489, COMP 401-479, MDDN 401-479, SWEN 401-479, including at least 30 CGRA, COMP or SWEN points.

PGDipSc in Electronic and Computer Systems requires 90 points from an approved combination of ECEN 401-440, ELCO 489, 580; and 30 further approved 400 level points from the BE Schedule.

POSTGRADUATE CERTIFICATE IN SCIENCE

This PGCertSc provides an alternative path of postgraduate study in Science for students wanting a short course-work postgraduate qualification of fewer than 120 points. PGDipSc students who wish to exit the qualification early may be able to transfer to the certificate. A candidate in PGCertSc will normally be enrolled for at least one trimester and must complete the requirements within two years. This program is also suitable for those who want to complete postgraduate study in a focused area within a short timeframe while in full-time work or managing other commitments. Entry to the PGCertSc is the same as for the PGDipSc.

SUBJECT REQUIREMENTS

PGCertSc in Computer Science requires 60pts in approved courses from COMP, NWEN and SWEN 401-489.

PGCertSc in Computer Graphics requires CGRA 408, 409, and 30 approved points from CGRA 401-289, COMP 401-479, and MDDN 401-479.

PGCertSc in Electronic and Computer Systems requires 45 points from approved combination of ECEN 401-440, ELCO 489, 580; and 15 further approved 400 level points from the BE (Hons) Schedule.
The PhD degree is an internationally recognised research qualification that usually involves three to four years of original research work. A PhD is generally required by people seeking careers in a university or research laboratory such as one of the Crown Research Institutes. A number of private companies and government departments also carry out research and seek new employees with a PhD.

The PhD degree is designed to encourage original thought and teach disciplined research techniques. PhD candidates are frequently employed in the School as teaching assistants and gain valuable experience in teaching and communicating their knowledge. Thus the skills acquired in pursuit of a PhD are often applicable in careers other than research.

Students interested in pursuing a PhD are encouraged to discuss their plans with the Thesis Coordinator, and with staff who may supervise their research.

ENTRY REQUIREMENTS

Applicants should normally have either an Honours or Master’s degree in Engineering or Computer Science, or a closely related discipline, with at least second class (first division) honours. Applicants will also need to propose, in general terms, a research project (topic/area) that can be supervised by a member of Victoria University staff. Several months of preliminary work including background reading, discussions with prospective supervisors, and preparation of a research proposal might be required before a candidate is accepted.

SUBJECTS

The School currently provides PhD programmes in the following subjects:

- Computer Science: covering many areas in computer science including artificial intelligence, computer graphics, databases, data mining and knowledge discovery, distributed systems, formal methods, human-computer interaction, information retrieval, and programming languages.
- Computer Graphics.
- Electronic and Computer Systems: covering all the science aspects of electronic and computer system engineering subjects.
- Engineering: covering all areas of engineering at the University, particularly Electronic and Computer System Engineering, Network Engineering, Software Engineering, Intelligent System Engineering, and related interdisciplinary engineering programs.

A PhD is expected to take three years of full-time study. The initial enrolment for a PhD is provisional and is normally converted to full registration within one year, after the successful presentation of a full research proposal.

All PhD students are expected to meet regularly with their supervisors to report and discuss their progress. Together with their supervisors, they must also submit six-monthly reports on their progress in May and November each year.

PhD students are also expected to participate in the research activities of the school, in particular attending research seminars in their discipline.

There are other requirements for PhD students, for example, to do with initial enrolment, re-enrolment, and thesis submission and examination. It is particularly important for new PhD
students to submit the Confirmation of PhD Provisional Registration form within the first month of enrolment/provisional registration to the School, and arrange a meeting with Dr Alex Potanin to complete the registration process. Students should read the School thesis information website http://ecs.victoria.ac.nz/Main/ThesisInformation, where there are a lot of policies and guidelines as well as important links to the Faculty of Graduate Research. Current postgraduate students who have questions about the PhD programme should talk to their current supervisor or the thesis coordinator.

CERTIFICATE OF PROFICIENCY

Students who do not want to complete a degree or diploma may take courses individually for a Certificate of Proficiency, as long as they have satisfied the prerequisites for the course(s) they wish to take. Such courses may (with certain restrictions) be credited later to a graduate qualification.
PREPARATORY PROGRAMME FOR GRADUATES OF OTHER DISCIPLINES

Graduates of disciplines other than Engineering and Computer Science wanting to take any of the above postgraduate programmes (except the MSwDev) will need the equivalent 60 points of COMP, ELCO, ECEN, NWEN and/or SWEN courses at the level of the final year (300-level) of undergraduate study. For some students without this background, the appropriate way of achieving this will be the Graduate Diploma in Science (GDipSc) containing appropriate COMP, ELCO, ECEN, NWEN and/or SWEN courses.

The GDipSc requires 120 points of 200- and 300-level science courses with at least 75 points at 300-level. Most students require a minimum of two years of part-time study because of the prerequisites of the 300-level courses.

Students with no relevant background will need an additional year to take the appropriate 100-level courses before starting the BSc. For such students, the combination of transfer credit from their previous qualification and the additional courses taken to meet prerequisites may mean that they could complete a BSc with only a few more courses than are required for their GDipSc.

With an appropriate selection of courses, the GDipSc may be obtained with a specialisation. The School provides three specialisations to the GDipSc: Computer Graphics, Computer Science, Electronic, and Computer Systems. To obtain a specialisation, the candidate’s courses must meet the 300-level requirements of the relevant BSc major.

GRADUATE PROGRAMMES IN INFORMATION SYSTEMS

The School of Information Management (SIM) offers several qualifications that may appeal to students who are more interested in information systems rather than in computer science. Their graduate programmes are designed for people who wish to develop expertise in managing information and information technologies in a corporate environment.

The Master of Information Management (MIM) is a post-experience qualification and students need at least three years of appropriate work experience. In contrast to the Computer Science graduate programmes described above, the MIM has a strong management orientation and is aimed at people who want to become effective managers or executives. SIM also offers a BCom(Hons) and an MCA in Information Systems.

For students without a degree in Information Systems, the transitional Graduate Diploma in Commerce in Information Systems may be of interest.

Contact the School of Information Management for more information about these programmes: www.victoria.ac.nz/sim/postgraduate
PLANNING YOUR COURSES

The School offers a number of graduate level courses for the BSc(Hons), MSc, MCompSc, and other postgraduate qualifications. Many of these courses reflect the research interests of the staff and build on top of the third year undergraduate courses. Candidates for these courses are assumed to have a general background in undergraduate computer science, computer graphics, electronic and computer system engineering, network engineering, or software engineering in addition to any specific prerequisites indicated, and admission to the courses is not automatic, even if the specified prerequisites are met.

The offering of graduate courses is subject to availability of staff, and not all courses will be offered in any given year. The following list shows the courses that we are currently expecting to be able to offer in 2017. However, there may be late changes to this list; please check with the school.

Note that in special cases, students may be permitted to take one (or two in exceptional cases) “reading” course(s) from the courses that are not being offered in a given year, but we make no guarantee that such courses will be available. Students should consult http://ecs.vuw.ac.nz for details, including prerequisites and the timetable.

Admission to any graduate course requires the approval of the School. Students wishing to undertake graduate study should consult the School office prior to enrolment regarding the availability of the courses they wish to take and their eligibility to enrol in those courses.
CGRA 401  Special Topic: Algorithms and Mathematics for Games and Graphics  15 PTS
Prerequisites: Permission of Head of School
Restrictions: COMP 471 in 2014-15

This course will introduce applications of mathematics to game and graphics programming. The concepts will be taught through computational and programming exercises with visual results. Topics may include mathematics for shading, geometric computations and numerical considerations for graphics, graphics applications of linear systems with constraints, SVD, and eigenvectors.

This course is not offered in 2017.

CGRA 402  CRN 28326 Special Topic: Project in Computer Graphics Programming  15 PTS  Tri 1
Prerequisites: Permission of Head of School
Restrictions: COMP 472 in 2014-15
Coordinator: Dr Taehyun Rhee

This course will develop programming and collaboration skills in the context of computer graphics. Students will program each stage of a computer graphics pipeline and integrate the results into a complete graphics application.

CGRA 408  CRN 28327 Computer Graphics Rendering  15 PTS  Tri 2
Prerequisites: COMP 308 or at least B- in CGRA 401 and 402 (or COMP 471 and 472 in 2014-15)
Restrictions: COMP408
Coordinator: Dr Taehyun Rhee

This course will introduce a physically based photo-realistic rendering pipeline including radiometry, reflectance models, lighting, scene acceleration structures, ray tracing, path tracing and other global illumination algorithms.

CGRA 409  CRN 28328 3D Modelling for Computer Graphics  15 PTS  Tri 2
Prerequisites: COMP 308 or at least B- in CGRA 401 and 402 (or COMP 471 and 472 in 2014-15)
Restrictions: COMP409
Coordinator: Dr Zohar Levi

This course introduces the algorithmic and mathematical foundations of three-dimensional modelling. Topics include representations such as polygons, splines, implicit surfaces, point models, particle systems and volumetric models; concepts such as parameterisation, curvature, and discrete differential geometry; algorithmic approaches such as gradient domain processing, spectral processing and example-based deformation. It does not address content creation.
CGRA 489 CRN 28333 **Computer Graphics Project** 30 PTS Full Year

Prerequisite: Approval of Head of School
Coordinator: Prof Neil Dodgson

All candidates for BSc(Hons) in Computer Graphics are required to take CGRA 489, which is a research project conducted under the supervision of a staff member. The purpose of the BSc(Hons) research project is to provide students with an opportunity to study a particular problem within this area. It is also intended to provide training and experience in individual study and research, and communicating the results thereof. CGRA 489 is a two-trimester course. It can be done over any two consecutive trimesters.

COMP 421 CRN 986 **Machine Learning** 15 PTS Tri 1

Prerequisites: COMP 307, one further 300-level COMP, ECEN, NWEN or SWEN course
Coordinator: Dr Marcus Frean

This course covers a range of topics in machine learning, with a focus on inference and uncertainty. Topics include deep learning, learning from rewards, unsupervised learning, and belief nets.

COMP 422 CRN 2324 **Data Mining, Neural Networks and Genetic Programming** 15 PTS Tri 2

Prerequisites: COMP 307, one further 300-level COMP, ECEN, NWEN or SWEN course
Coordinator: Prof Mengjie Zhang

This course is concerned with data mining concepts and techniques, especially neural networks and genetic programming. It mainly focuses on the following topics: data mining and knowledge discovery in databases; data mining techniques such as nearest neighbour, naive Bayes, support vector machines, neural networks, genetic algorithms and genetic (automatic) programming; image analysis operations such as feature extraction and image recognition; and performance evaluation of data mining / machine learning / Image recognition systems. The course considers applications ranging from general classification, clustering and optimisation tasks to engineering applications.

COMP 423 CRN 4962 **Intelligent Agents** 15 PTS Tri 1

Prerequisites: COMP 307, one further 300-level COMP, ECEN, NWEN or SWEN course

This course examines construction of intelligent agents - software programs that can act for themselves in some part of the human world. This course focuses on agents for improving web search and includes topics such as agents for information extraction from the web, web page clustering and classification, automatic query expansion and web page ranking.

**This course is not offered in 2017.**
COMP 425  
**Computational Logic**  
15 PTS

Prerequisites:  
COMP 304; one further 300-level COMP, NWEN or SWEN course (MATH 309 or PHIL 211 / 334 / 335 recommended)

This course is concerned with the application of formal logic to problems in Computer Science, and with techniques for mechanising logical reasoning. Topics may include: systems of reasoning; logic programming; the application of temporal and modal logics; and the relationship between proofs, programs, specifications and types.  
**This course is not offered in 2017.**

COMP 440  
CRN 15202  
**Directed Individual Study**  
15 PTS  
Tri 1  
Tri 2

Prerequisite:  
Approval of Head of School

Coordinator:  
A/Prof Marcus Frean

This course enables a student to study a topic that is not covered by other 400-level courses. It is conducted under the supervision of a staff member, and may involve attending a 300-level course, but undertaking additional 400-level assessment.

COMP 441  
CRN 15203  
**Directed Individual Study**  
15 PTS  
Tri 1  
Tri 2

Prerequisite:  
Approval of Head of School

Coordinator:  
A/Prof Marcus Frean

This course enables a student to study a topic that is not covered by other 400-level courses. It is conducted under the supervision of a staff member, and may involve attending a 300-level course, but undertaking additional 400-level assessment.

COMP 471  
**Special Topic**  
15 PTS

**This course is not offered in 2017.**

COMP 473  
CRN 28126  
**Special Topic: Introduction to Big Data Analysis**  
15 PTS  
Tri 1

Prerequisite:  
ENGR123 or STAT193 equivalent preparation in statistics; 30 approved 200/300 level points

Coordinator:  
Prof Mengjie Zhang

Big Data refers to the large and often complex datasets generated in the modern world: data sources such as commercial customer records, internet transactions, environmental monitoring. This course provides an introduction to the theory and practice of working with Big Data. Students enrolling in this course should be familiar with the basics of statistical modelling and with programming.

Note: Course is being jointly offered at several NZ universities and will use video conferencing for the lecture delivery. The VUW lecturers will be delivering one segment of the course.
COMP 489  CRN 1027  Research Project  30 PTS  Full Year

Prerequisite: A research project on a topic approved by the Head of School
Coordinator: TBA

All candidates for BSc(Hons) in Computer Science are required to take COMP 489, which is a research project conducted under the supervision of a staff member. The purpose of the BSc(Hons) research project is to provide students with an opportunity to study a particular problem within this area. It is also intended to provide training and experience in individual study and research, and communicating the results thereof. COMP 489 is a two-trimester course. It can be done over any two consecutive trimesters, but the school does not guarantee availability of the course over T3.

NWEN 401  Distributed Systems Design  15 PTS

Prerequisites: Two courses from (NWEN 301, 302, 303)
Restrictions: COMP 413, ECSE 431

Distributed system concepts and techniques underlie much of modern computer technology; client-server systems based on high-bandwidth networks support applications ranging from business data processing to multimedia information systems. This course teaches the concepts and principles employed in the design and implementation of distributed systems, with practical examples, providing a suitable knowledge base for those aiming for careers in advanced system and application development, or in research. This course is not offered in 2017.

NWEN 402  Internet Engineering  15 PTS

Prerequisites: NWEN 302, 304, 15 further 300-level COMP, ECEN, NWEN or SWEN pts
Restriction: COMP 417

This course addresses the use of important hardware and software technologies in the design and engineering of modern Internet applications and infrastructure. The course coverage includes perspectives on the impact of economic, political and technical issues on Internet engineering that are explored through case studies and recent professional and research literature. These aspects are explored through practical group work that can incorporate distributed systems, network and Internet technology, lectures, and seminars. This course is not offered in 2017.

NWEN 403  Advanced Network Engineering  15 PTS

Prerequisites: NWEN 302, 30 further 300-level pts from (COMP, ECEN, NWEN, SWEN)
Restrictions: COMP 414, ECSE 432

This course extends the data communications and telecommunication taught in Computer Network Design, concentrating on new developments and network case studies. The course is designed for those aiming for careers that involve networking or network research and enhances the understanding of distributed systems through the applications of distributed systems in network management and Internet infrastructure. This course is not offered in 2017.
NWEN 404 CRN 18605 Mobile Computing 15 PTS Tri 1
Prerequisites: NWEN 302, 30 further 300-level pts from (COMP, ECEN, NWEN, SWEN)
Restriction: COMP 415 or ECSE 433 (before 2008)
Coordinator: Prof Winston Seah

The course introduces the fundamental topics of Mobile Computing. In particular, the course will emphasise the network and transport layers of wireless communication protocols and network infrastructure suitable for mobile personal systems (e.g., GSM, 3G, Mobile IP, etc.). Key issues of mobility and disconnected operation with respect to mobile computing systems, and quality of service issues in mobile personal systems will be covered and how applications handle node mobility and wireless communications will be explored.

NWEN 405 CRN 18606 Security Engineering 15 PTS Tri 2
Prerequisites: NWEN 304, 30 further 300-level pts from (COMP, ECEN, NWEN, SWEN)
Restriction: COMP 418
Coordinator: Dr Ian Welch

The Internet's role as a large, public, distributed system has raised security to an issue of critical importance. This course examines security mechanisms, security policies, security evaluation and risk management, security issues in networks and operating systems, and case studies that show how these security techniques can be used to solve real-world problems such as conducting trustworthy auctions and secret ballots.

NWEN 406 CRN 18592 Distributed Computing in Grids and Clouds 15 PTS Tri 2
Prerequisites: NWEN 301; NWEN 302 or 303
Restriction: COMP 415 in 2009, ECSE 433 in 2009
Coordinator: Dr Ian Welch

This course focuses on the design and use of distributed systems for high-end computing. In particular, we look at the aggregation of geographically distributed computing resources to form massive distributed computing platforms. These platforms can then be applied to solve large problems in science and industry – protein docking, seismology, medicine, astronomy, particle physics, climate prediction etc. Topics in this course typically include: e-Science, clusters, grids and clouds, service oriented architectures, workflow management, utility computing and grid economies.

NWEN 438 Special Topic 15 PTS
Prerequisite: Permission of Head of School
This course is not offered in 2017.

NWEN 439 Special Topic 15 PTS
Prerequisite: Permission of Head of School
This course is not offered in 2017.
**SWEN 421** CRN 18661  **Formal Software Engineering**  15 PTS  **Tri 1**

Prerequisites: SWEN 224, 30 300-level pts from (COMP, SWEN)
Restriction: COMP 426
Coordinator: Dr David Streader

This course addresses the use of mathematical logic in the specification and construction of software systems. It presents an introduction to the area of formal methods; the formal specification of software systems; the refinement of specifications to code; and their semantic foundations.

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**SWEN 422** CRN 18662  **Human Computer Interaction**  15 PTS  **Tri 2**

Prerequisite: SWEN 303
Restrictions: COMP 453, ECSE 434

This course covers principles of human-computer interaction that underlie good design of software user interfaces. Advanced topics are introduced with a focus on current research areas.

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**SWEN 423** CRN 18663  **Object Oriented Paradigms**  15 PTS  **Tri 1**

Prerequisites: COMP 304 or SWEN 301; 15 further 300-level pts from COMP, NWEN or SWEN pts
Restriction: COMP 462
Coordinator: Prof James Noble

Object-orientation is the basis for many approaches to programming, systems, languages and applications. This course discusses the design principles of object-orientation and studies advanced topics in system design, programming language, and development process.

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**SWEN 424** CRN 18664  **Model-Driven Development**  15 PTS  **Tri 2**

Prerequisite: 30 300-level pts from (COMP, NWEN, SWEN)
Restriction: COMP 471 in 2007-2009
Coordinator: A/Prof Thomas Kühne

An introduction to model-driven development - the modern approach to large-scale software system development. Along with an introduction to the core concepts of model-driven development, the course will address the foundations and principles for infrastructures supporting model-driven development. This includes an in-depth discussion of ‘meta-modelling’ and a critique of existing modelling techniques. Students will get hands-on experience with using a meta-case tool.

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**SWEN 425**  **Design Patterns**  15 PTS

Prerequisites: SWEN 301, 15 further 300-level COMP, NWEN or SWEN pts
Restriction: COMP 463 in 2008-2009

The course addresses a variety of advanced issues in Software Engineering, including the use for Software Patterns for software design. 
**This course is not offered in 2017.**
### SWEN 426  
**Advanced Software Engineering: Implementation**  
15 PTS

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>SWEN 301, 15 further 300-level COMP, NWEN or SWEN pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction:</td>
<td>COMP 467</td>
</tr>
</tbody>
</table>

This course begins by covering issues relating to the successful implementation of a software design, including: individual software processes, metrics, the choice of a programming language, the choice of implementation tools, coding styles, code reviews, and testing. The course also looks closely at the maintenance stage of software development, and the issue of quality throughout the entire development process. Issues such as software quality assurance, configuration management and software process improvement are raised.  
**This course is not offered in 2017.**

### SWEN 427  
**Distributed Computing in Grids Requirements and Design**  
15 PTS

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>SWEN 301, 15 further 300-level COMP, NWEN or SWEN pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction:</td>
<td>COMP 466</td>
</tr>
</tbody>
</table>

The course covers basic concepts and principles of software requirements engineering, its tools, and techniques, including a survey of methods for modelling software requirements. The course also covers methods and techniques used in the design of software systems, including both architectural and detailed design. In the requirements and design areas, issues such as documentation, reviews, and inspections are covered.  
**This course is not offered in 2017.**

### SWEN 430  
**Compiler Engineering**  
15 PTS

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>SWEN 224 or COMP 261; 30 further 300-level pts from (COMP, SWEN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction:</td>
<td>COMP 431</td>
</tr>
</tbody>
</table>

The course looks at a range of issues relating to the design and implementation of modern compilers. In particular, the course will focus on techniques and algorithms for code generation, code optimisation, and type checking. During the course projects, students will be working on a fully-fledged Java compiler to extend it in various ways. Students should expect to learn a great deal about how compilers work and, in particular, about the Java compiler and Java Bytecode instruction set.  
**This course is not offered in 2017.**

### SWEN 431  
**Advanced Programming Languages**  
15 PTS

<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>COMP 304, 15 further 300-level COMP or SWEN pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction:</td>
<td>COMP 432</td>
</tr>
</tbody>
</table>

This course develops and extends understanding of the functional programming paradigm, by studying both its theoretical foundations and the practical aspects of programming in a functional language.  
**This course is not offered in 2017.**
### SWEN 432 CRN 18670  **Advanced Database Design and Implementation**  15 PTS  **Tri 1**

| Prerequisites: | SWEN 304, 15 further 300-level COMP, NWEN or SWEN pts |
| Restriction:   | COMP 442                                               |
| Coordinator:   | Pavle Mogin                                           |

This course explores a selection of the following topics: Data Warehouse, Internet and XML Databases, Object-Relational Databases, and Distributed Databases. It examines features of these advanced database systems and analyses the new applications they facilitate.

### SWEN 433 CRN 18671  **Web Information Systems Engineering**  15 PTS  **Tri 2**

| Prerequisites: | SWEN 304, 15 further 300-level COMP, NWEN or SWEN pts |
| Restriction:   | COMP 443                                               |
| Coordinator:   | Dr Hui Ma                                              |

This course gives a technology-centred introduction to web information systems and services. On successful completion of the course, students are able to explain basic concepts used in building and managing web information systems. They know central technological standards underlying web information systems and web services, understand architectural principles, and are able to evaluate and critically discuss such systems.

### SWEN 434  **Data Warehousing**  15 PTS

| Prerequisites: | SWEN 304; 15 further 300-level COMP, NWEN or SWEN pts |
| Restriction:   | COMP 444                                               |

This course considers theory, design and implementation of Data Warehouses.

*This course is not offered in 2017.*

### SWEN 438  **Special Topic**  15 PTS

| Prerequisite: | Permission of Head of School                           |

*This course is not offered in 2017.*
ECEN 400-LEVEL COURSES

BE ECEN 400-level courses can be taken by ME and BSc (Hons), MSc, PGDipSc, PGCertSc, students. Details of 100 to 300-level ECEN courses are in the SECS undergraduate prospectus.

ECEN 403  CRN 18520  Advanced Electronics  15 PTS  Tri 2
Prerequisites:  ECEN 303 (or PHYS 340); ECEN 220, MATH 243 or 244
Restrictions:  ECSE 423, PHYS 423, TECH 423
Coordinator:  Dr Ramesh Rayudu

Advanced analogue and digital electronics, design principles, transform methods of analysis, active and passive filters, oscillators, phase-locked loops, digital signal processors, digital synthesis, communication principles, RF design.

ECEN 404  Electronic Devices  15 PTS
Prerequisites:  ECEN 303
Restrictions:  PHYS 309
Coordinator:  Dr Gideon Gouws

The course will introduce students to the theory and practice of fabrication processes and techniques that can be used to produce electronic, electromechanical and optical devices with micron-sized features. The operating principles of structures such as solar cells, energy harvesters, optical superlenses, metamaterials and microfluidic devices will be covered. The course has will enable students to gain hands-on experience in the design, fabrication, and characterisation of a range of these devices. **This course is not offered in 2017.**

ECEN 405  CRN 18521  Power Electronics  15 PTS  Tri 1
Prerequisite:  ECEN 303 (or PHYS 340)
Coordinator:  Dr Ramesh Rayudu

The course covers the theory, design and application of power electronic circuits and the transformation and control of electrical energy.

ECEN 410  CRN 18522  Advanced Communications Engineering  15 PTS  Tri 1
Prerequisite:  ECEN 310
Coordinator:  Dr Pawel Dmochowski

This course provides an introduction to the fundamentals of wireless communication systems, in particular, digital wireless communications. The characteristics of fading channels are considered, and their effect on the propagation of signals. Countermeasures such as diversity, forward error control, and modulation schemes for wireless communications are studied. Multiple-access techniques such as time-, frequency- and code-division multiple access are examined.
**ECEN 415** CRN 18519  **Advanced Control Systems Engineering**  15 PTS  **Tri 2**

Prerequisite:  
ECEN 315

Coordinator:  
Dr Chris Hollitt

This course builds on and extends the principles of modern control systems engineering introduced in ECEN 315 to enable students to develop skills in developing mathematical models and in using these to design optimal control systems for real-world multivariable engineering systems. Kalman filters and linear quadratic regulators will be introduced and the principles and benefits of modern model-based predictive control systems will be outlined. Methods will be developed for continuous time system descriptions but techniques for converting to discrete time descriptions and for designing controls for discrete time systems will also be presented.

**ECEN 421** CRN 18523  **Advanced Signal Processing**  15 PTS  **Tri 1**

Prerequisite:  
ECEN 320

Restrictions:  
PHYS 421, TECH 421

Coordinator:  
Prof Bastiaan Kleijn

The course provides a geometric intuition to signal processing. This geometric point of view is a powerful tool for the understanding of signal processing techniques including Fourier transforms, sampling theorems, time-frequency analysis and wavelets. The course provides the mathematical depth and rigor that is necessary for the study of more advanced topics in signal processing. Topics covered include Hilbert spaces, operators, bases, frames, discrete time systems, multirate system, polyphase systems, sampling of functions and sequences, polynomial and spline curve interpolation, random variables, stochastic processes introductory estimation theory and the Cramer Rao bound.

**ECEN 422**  **Engineering Optimisation**  15 PTS

Prerequisite:  
ECEN 321, or  ECEN 220 (prior to 2016), or ECEN 320 (in 2016)

Restrictions:  
ECEN426 in 2014-2016

Convex optimisation problems are common in science, engineering, and economics. The course teaches identifying and solving convex optimisation problems. It discusses convex sets and functions, linear and quadratic programs, semi-definite programming, and duality theory. It uses these concepts to solve practical optimisation problems.  
This course is not offered in 2017.
**ECEN 425** CRN 18524  **Advanced Mechatronic Engineering 1:** Hardware and Control

<table>
<thead>
<tr>
<th>Prerequisite:</th>
<th>ECEN 301 (or PHYS 340)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator:</td>
<td>Prof Dale Carnegie</td>
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</tbody>
</table>

This course provides a skills-based approach to the essentials of mechatronics. The emphasis is on "learning by doing" with developmental formative instruction proceeding larger, more complex designs. Practical circuit and sensor considerations are examined via the development of a range-finding system. Several complex mechatronic problems are solved in groups with an emphasis on client design interaction and specification. The interplay of electronic, software and mechanical systems are explored in a large Lego autonomous robot competition. Students are introduced to fundamental mechanical design requirements of mechatronic systems and to rapid prototyping, especially involving the SolidWorks CAD package. High current actuators and modern sensor systems are also explored. This is an essential course for anyone contemplating working in the mechatronics industry.

**ECEN 427** CRN 18524  **Special Topic: Musical Mechatronics**

<table>
<thead>
<tr>
<th>Prerequisite:</th>
<th>ECEN 301 (or PHYS 340)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator:</td>
<td>Prof Dale Carnegie</td>
</tr>
</tbody>
</table>

This course is dedicated to the development of a pathway for problem solving using mechatronic techniques. A musical paradigm is chosen in framing the problems that need to be addressed. Based on the specific problems, a number of objectives are defined and undertaken through a process involving design, construction, and evaluation of a series of mechatronic projects. Appropriate sensor, actuator, music and signal analysis theory is presented in a Problem-Based-Learning environment. In previous years, students have constructed a robotic guitar as the foundation problem to explore, and have considerably advanced the state-of-the-art in musical mechatronics, with students submitting their work for consideration at international conferences.

**ECEN 430** CRN 18576  **Advanced Mechatronic Engineering 2:** Intelligence and Design

<table>
<thead>
<tr>
<th>Prerequisite:</th>
<th>ECEN 301 (or PHYS 340)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator:</td>
<td>A/Prof Will Browne</td>
</tr>
</tbody>
</table>

This course provides a guide to advanced techniques in the field of Mechatronics. The course material studies the interaction between hardware, software and communication components as it relates to embedded systems. Instrumentation systems and robotics are frequently used to illustrate the mechatronic theory. Artificial Intelligence techniques are introduced as a practical method for addressing the complex interactions between the electronic, mechanical and software components. The course is very practically orientated and primarily uses project-based assessments. These include a robotic competition, real-world customer design, industrial design considerations and cognitive robotics.
**ELCO 489** CRN 23071  **Research Project**  30 PTS  **Full Year**
Prerequisite: A research project on a topic approved by the Head of School.
Coordinator: Dr Bryan Ng, Dr Aaron Chen

All candidates for BSc(Hons) in Electronic and Computer Systems are required to take ELCO 489, which is a research project conducted under the supervision of a staff member. The purpose of the BSc(Hons) research project is to provide students with an opportunity to study a particular problem within this area. It is also intended to provide training and experience in individual study and research, and communicating the results thereof. ELCO 489 is a two-trimester course.

**ENGR 401** CRN 18690  **Professional Practice**  15 PTS  **Tri 1**
Prerequisite: 75 300-level pts from the BE(Hons) schedule including ENGR 301, 302
Coordinator: Prof Winston Seah

This course will prepare students’ expectations for many of the events and situations they are likely to meet in the professional working world. This includes: codes of conduct, as determined by professional bodies and company practices; ethical behaviour, as found in the workplace and dictated by company practices; critical thinking and people issues, as relevant in the workplace and in company practice.
ECEN 400-LEVEL COURSES FOR ME AND MEP

BE ENGR 400-level Special Topic and Directed Individual Study courses can be taken by ME and MEP students.

**ENGR 439 CRN 28463 Special Topic: Mechatronic design 15 PTS Tri 3**
Prerequisite: 30 300-level ECEN points

This course presents the fundamentals of sensor and actuator technologies as well as rapid prototyping techniques in the development of mechatronics projects. A number of different sensors and actuators are presented, and the use of microcontroller programming in sensor data measurement, analysis, and actuator control are examined. Basics of PCB design and structural design (using CAD and CAM techniques) and their utilisation in projects involving sensor and actuator technologies are also covered.

**ENGR 440 CRN 26008 CRN 27189 Directed Individual Study 15 PTS Tri 1 Tri 2**
Prerequisite: Permission of Head of School
Coordinator: Dr Pawel Dmochowski

A supervised programme of study approved by the Head of School.

**ENGR 441 CRN 26239 CRN 26009 Directed Individual Study 15 PTS Tri 1 Tri 2**
Prerequisite: Permission of Head of School
Coordinator: Dr Pawel Dmochowski

A supervised programme of study approved by the Head of School.
### DESIGN COURSES FOR COMPUTER GRAPHICS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CRN</th>
<th>Course Name</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDDN 412</td>
<td>CRN 23047</td>
<td>Interaction Design</td>
<td>30 PTS</td>
<td>Tri 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prerequisite: 40 300-level MDDN pts</td>
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</table>

Students will gain advanced level experience with newly emerging interaction design techniques: computer vision, spatial design, user-focused generative feedback and advanced physical computing. An emphasis will be placed on experimentation and pushing the boundaries of the status quo of this discipline.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CRN</th>
<th>Course Name</th>
<th>Credits</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDDN 441</td>
<td>CRN 23067</td>
<td>Computer Graphics for Film</td>
<td>30 PTS</td>
<td>Tri 2</td>
</tr>
<tr>
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<td></td>
<td>Prerequisite: 40 300-level pts from MDDN</td>
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</tbody>
</table>

This course covers computer graphics techniques that are used as current practice in the film industry. While working on projects that span a range of approaches for generating special effects, and algorithmic treatment of media, students will also review and analyse cinematic examples.
500-LEVEL AND 600-LEVEL COURSES (INCLUDING THESES)

CGRA 591 CRN 28345 **Thesis** 120 PTS  **Full Year**
MSc Thesis in Computer Graphics

**COMP 501** CRN 25020 **Research Essay in Computer Science** 15 PTS  **Tri 1**
25021  **Tri 2**
Prerequisites: 60 400-level COMP, NWEN or SWEN points
An investigation into an advanced topic in an area of computer science, reported in an essay.

**COMP 540** CRN 25022 **Directed Individual Study** 15 PTS  **Tri 1**
25023  **Tri 2**
Prerequisites: 60 400-level COMP, NWEN or SWEN points
A supervised programme of study approved by the Head of School

**COMP 588** CRN 8245 **Project** 30 PTS  **Full Year**
All candidates for MCompSc are required to take COMP 588, which is a project conducted under the supervision of a staff member. COMP 588 is a two-trimester course.

**ELCO 580** CRN 23072 **Research Preparation** 30 PTS  **Full Year**
Research preparation for ELCO degrees and qualifications

**ELCO 591** CRN 23073 **Thesis** 120 PTS  **Full Year**
MSc Thesis in Electronic and Computer Systems
ENGR 581  CRN 18693  Directed Individual Study  15 PTS  Tri 1
Prerequisites:  Permission of Head of School
Directed individual study in a topic in Engineering

ENGR 582  CRN 18694  Directed Individual Study  30 PTS  Tri 1
Prerequisites:  Permission of Head of School
Directed individual study in a topic in Engineering

ENGR 591  CRN 18695  Thesis  120 PTS  Full Year
ME Thesis in Engineering

ENGR 592  CRN 18696  Thesis  90 PTS  Full Year
ME Thesis in Engineering

CGRA 691  CRN 28321  Computer Graphics for PhD  120 PTS  Full Year
This is a PhD Thesis, covering all areas of computer graphics.

COMP 690  CRN 1091  Computer Science for PhD  120 PTS  Full Year
This is a PhD Thesis, covering all areas of computer science including artificial intelligence, computer graphics, database and document management, data mining and knowledge discovery, distributed systems, formal method, human-computer interaction, information retrieval, and programming languages.

ELCO 690  CRN 23074  Electronic and Computer Systems for PhD  120 PTS  Full Year
This is a PhD Thesis, covering all the science aspects of electronic and computer system engineering subjects.

ENGR 690  CRN 17446  Engineering for PhD  120 PTS  Full Year
This is a PhD Thesis, covering all areas of engineering at the University, particularly Electronic and Computer System Engineering, Network Engineering, Software Engineering, Intelligent System Engineering, and related interdisciplinary engineering programs.
MASTER OF ENGINEERING PRACTICE

ENGR 501 CRN 28383 Research and Communication Skills 15 PTS Tri 3
Prerequisite: Admission to the MEP degree
Corequisite: ENGR502

The course addresses research and communication skills for engineering practice. It will include finding, understanding, and summarising research papers and engineering resources, writing engineering proposals and reports, and oral communication skills. This course will be offered from Tri 3 in 2017.

ENGR 502 CRN 28384 Engineering Practice 15 PTS Tri 3
Prerequisite: Admission to the MEP degree
Corequisite: ENGR501

The course addresses a range of engineering problems that will require students to apply their technical knowledge to design, implement and evaluate practical engineering problems. Students will work on a variety of industry relevant individual and group projects and will also learn teamwork skills, professional practice skills, and communication skills in the context of engineering problem solving. This course will be offered from Tri 3 in 2017.

ENGR 585 Engineering Project 30 PTS Tri 1
Prerequisite: ENGR501, 502; 15 PTS from MEP Part 1

The course involves a major group project to design, implement and evaluate a solution to an industry based engineering problem. The course will also address a variety of professional, enterprise, and research skills, and a range of topics in engineering practice including legal and IP issues, business contexts, social and environmental issues.

ENGR 589 Industry Research and Development Project 15 PTS Tri 2
Prerequisite: Part 2 of the MEP

Supervised project, working on an industrial software research and development task, generally as a placement in industry.
# MASTER OF SOFTWARE DEVELOPMENT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CRN</th>
<th>Course Title</th>
<th>Points</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWEN 501</td>
<td>28340</td>
<td><strong>Professional Programming Skills</strong></td>
<td>15</td>
<td>Tri 2</td>
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<tr>
<td></td>
<td></td>
<td>Prerequisite: Admission to the MSwDev</td>
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<td>Coordinator: A/Prof Kris Bubendorfer</td>
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<tr>
<td></td>
<td></td>
<td>The course builds on basic programming skills, addressing more complex programming and core programming concepts and techniques, including collection data structures, inheritance and object orientation, fundamental algorithms and data structures, exceptions, testing, version control, and security, networking, and databases.</td>
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<tr>
<td>SWEN 502</td>
<td>28341</td>
<td><strong>Software Development Studio I</strong></td>
<td>45</td>
<td>Tri 2</td>
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<tr>
<td></td>
<td></td>
<td>Prerequisite: SWEN501</td>
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<td></td>
<td>Corequisite: SWEN505</td>
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<td></td>
<td>The course addresses a range of software development skills and builds an understanding of technical and software engineering concepts and techniques. Students will work on a variety of industry relevant group projects which address a range of topics in software development and computer science. The course will teach teamwork skills, professional practice skills, and communication skills in the context of software development.</td>
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<tr>
<td>SWEN 503</td>
<td>28342</td>
<td><strong>Software Development Studio II</strong></td>
<td>45</td>
<td>Tri 3</td>
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<tr>
<td></td>
<td></td>
<td>Prerequisite: SWEN502</td>
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<td></td>
<td>Corequisite: SWEN505</td>
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<td></td>
<td>The course addresses a range of advanced technical concepts and techniques for software development and advanced professional practice skills, including software development methodologies, software project planning, and entrepreneurial practices. The course is based around a series of group projects on a variety of industry relevant problems/tasks, interspersed with instruction based elements addressing advanced technical concepts and methods.</td>
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<tr>
<td>SWEN 505</td>
<td>18598</td>
<td><strong>Professional Seminar</strong></td>
<td>15</td>
<td>Tri 2+3</td>
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<tr>
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<td>Prerequisite: SWEN501</td>
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<tr>
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<td></td>
<td>The course addresses a variety of professional enterprise and research skills, and a range of topics in software development including legal and IP issues, business contexts, social and environmental issues for software, and research and communication skills. The course will include a range of case studies from the local software development industry.</td>
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<tr>
<td>SWEN 589</td>
<td></td>
<td><strong>Industry Research and Development Project</strong></td>
<td>60</td>
<td>Tri 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prerequisite: Part 1 of the MSwDev</td>
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<tr>
<td></td>
<td></td>
<td>Supervised project, working on an industrial software research and development task, generally as a placement in industry.</td>
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</tr>
</tbody>
</table>
ACADEMIC STAFF - RESEARCH AREAS

PETER ANDREAE BE (Hons) (CANT), SM, PhD (MIT), ASSOCIATE PROFESSOR

Peter’s research interests lie in the areas of machine learning and program construction tools. He is particularly interested in the area of learning procedural knowledge from examples – how an agent acting within some world can learn to do actions that achieve reward or generate interesting behaviour. He is exploring the use of non-standard reward mechanisms and agents in worlds containing complex objects. He is also collaborating on other research projects in text mining and evolutionary computing. He is particularly interested in clustering problems.

DIONYSIS ATHANASOPOULOS BSc, MSc, PhD (IOANNINA, GREECE), POST-DOC (POLITECNICO DI MILANO) LECTURER

Dionysis’ research interests belong to the areas of data & software engineering, and cloud computing. In the area of data engineering, he has focused on proposing mechanisms for matching service interfaces and XML schemas automatically. In the area of software engineering, he is interested in the software design, evolution, and maintenance. In particular, he is interested in applying fundamental design principles in service-oriented software and especially, in proposing automated mechanisms for improving the maintainability of this kind of software. Finally, he is also interested in the green-aware service-oriented architecture engineering and especially, in modelling the performance of software installed by providers in the cloud and exposed as a service.

WILL BROWNE BEng (BATH, UK), MSc (CARDIFF, UK), EngD (CARDIFF, UK), ASSOCIATE PROFESSOR

Will’s main area of research is Applied Cognitive Systems, essentially, how to use inspiration from natural intelligence to enable computers/machines/robots to behave usefully. This includes: Cognitive Robotics, Learning Classifier Systems (a branch of evolutionary computation) and Modern Heuristics for industrial application. Blue skies research includes analogues of emotions, abstraction, memory systems, ‘small worlds’ phenomenon, confusion/dissonance and machine consciousness.

KRIS BUBENDORFER BSc, MSc (Hons), PhD (VUW), ASSOCIATE PROFESSOR

Kris is conducting research into cloud related areas of distributed computing, including, services and service oriented architectures, workflows, cloud computing markets, resource allocation, cyber security, high performance computing, scientific computation, eResearch and the associated topics of social computing and reputation systems.

DALE CARNEGIE MSc PhD (WAIKATO), PROFESSOR

Dale heads Victoria’s Mechatronics and Robotics Research Group. This Group has constructed a number of mobile autonomous robots, including MARVIN (Mobile Autonomous Robot for Indoor Navigation). MARVIN can wander office corridors after hours, question people he meets, change his shape to become larger and more intimidating, and alert security guards if required. Other developments include Urban Search and Rescue Robotics, and a growing collection of world-leading musical robotic instruments. Dale also has an interest in engineering education, specifically the identification and removal of barriers to recruitment and success in engineering study.
AARON (GANG) CHEN BE (BIT, CHINA), PhD (NTU, SINGAPORE), SENIOR LECTURER

Aaron has research interests in various aspects of distributed computing systems, including multi-agent systems and peer-to-peer overlay networks. He also has research interests in Artificial Intelligence, such as evolutionary computation, reinforcement learning, and swarm intelligence. Aaron's research focuses on developing AI techniques and applying them to solve problems in distributed systems. He is also exploring the use of machine learning technologies for network security and intrusion detection.

PAWEL DMOCHOWSKI PhD (QUEEN'S CANADA), SENIOR LECTURER

Pawel's research interests lie in the areas of wireless communications and signal processing, focusing on multiple-antenna techniques and Cognitive Radio. Recent projects include the development and analysis of low complexity symbol timing synchronization framework for Multiple-Input Multiple-Output (MIMO) systems. In the realm of Cognitive Radio, the focus has been on the characterization of interference caused by unlicensed users, with the aim of developing effective mitigation strategies. Other projects include Massive MIMO and mmWave systems.

NEIL DODGSON PhD ScD (CAMBRIDGE), PROFESSOR

Neil works in three areas related to computer graphics and imaging. His engineering work involves a long-standing interest in the design and use of stereoscopic (3D) displays, including 3DTV, VR, and AR. His mathematical work is in methods for making smooth 3D models, in particular ways to improve the mathematical tools used in modelling for Computer-Aided Design (CAD) and computer animation. In imaging, he has worked on the analysis of abstract art and on tools to allow artists to work more effectively with images.

ROBIN DYKSTRA PhD (MASSEY), SENIOR LECTURER

Robin’s interest is the development of scientific, industrial and educational instruments. Some examples are: (a) Portable NMR spectrometers using Radio Frequency (RF), digital transceiver, Digital Signal Processing (DSP) and power electronics technologies. (b) Earth’s field NMR systems for education and for the study of the microstructure of Antarctic sea ice. (c) High-performance motor controllers and drive systems for Rheo-NMR. With many of his projects, Robin takes them to the complete product level and are commercialised through Magritek Ltd.

ELF ELDRIDGE BSc (TECH) (Hons) PHD (VUW), LECTURER

Elf's research interests are centred around nanofluidics and the development of novel sensors for a range of applications. His PhD research is on resistive pulse sensing in tunable nanopores for nano- and microparticle detection in liquid samples. Additionally, Elf is interested in sensor fabrication and testing, and data collection, mining, and analysis from systems of sensors.
MARCUS FREAN BSc (Hons) (MASSEY), PhD (EDINBURGH), ASSOCIATE PROFESSOR

Marcus studies machine learning, and in particular combinations of neural networks and probabilistic inference that are inspired by the way we think embodied brains might work. He is interested in how machines can learn useful representations of the world, how they use those representations to drive coherent actions, and what this might tell us about how biological creatures carry out cognition. A parallel interest is theoretical evolutionary biology and complex adaptive systems. Marcus's research has looked at the evolution of cooperation, the counter-intuitive effects that spatial structure can have on population dynamics, and ways in which network structure affects the rate of evolution.

QIANG FU BE (HARBIN), MEngSc (ADELAIDE), MBA (QUT), PhD (UQ), LECTURER

Qiang’s research interests are in the areas of wireless and mobile networking protocols, integration and interworking of wired and wireless networks, network measurement and traffic analysis, Internet protocols and systems, and network security. Prior to his academic career, he had worked in mobile communications and aerospace industries for a number of years. Qiang is particularly interested in realistic network modelling and improving the performance of networking protocols based on "real world" scenarios.

XIAOYING (SHARON) GAO BE, ME (HEBEI), PhD (MELBOURNE), SENIOR LECTURER

Xiaoying’s main research interests are in the area of information extraction, knowledge-based systems, and machine learning. Her research focuses on using knowledge engineering and machine learning technology to develop information agents—intelligent programs that automatically search and extract information from the World Wide Web. She is currently working on algorithms for learning information extraction patterns from semi-structured Web pages.

GIDEON GOUWS PhD (PORT ELIZ), SENIOR LECTURER

Gideon’s research interest is focused on the development of sensors or sensor systems for a variety of applications. Over the past few years he has studied various aspects of ultrasonic sensors, particularly shear mode (TSM) quartz resonators, for application as materials sensors. The use of different measurement configurations, together with signal processing techniques have shown that these sensors can successfully be used as sensors of material characteristics in the vapour, liquid or solid phase. Presently the main focus of his research is on the application of nano- and microstructured materials for ultrasonic sensors and wave propagation. Work is also in progress with Dr Malcom Ingham (SCPS) to develop instrumentation for electrical measurements on sea ice.
LINDSAY GROVES BSc (AUCK), MSc (Hons) (MASSEY), PhD (VUW), ASSOCIATE PROFESSOR

Lindsay's main research interests are in formal methods (essentially, the use of mathematical/logical notation and reasoning) for software specification and design. The main focus of this work is the development of techniques for deriving programs from formal specifications based on the refinement calculus, and the design of tools to support program refinement, but also includes application of formal methods in industrial applications, refinement of logic programs, verification of concurrent systems, and semantics of data models. Lindsay is involved in three externally funded projects: investigating industrial applications of formal specification techniques (jointly with Ray Nickson and Waikato University, funded by FRST); proof methodologies for concurrent algorithms (jointly with Ray Nickson and Sun Microsystems, Boston, funded by Sun); and mathematical foundations for semi-structured data (jointly with Auckland University, funded by the Marsden Fund). He also has more general interests in software engineering, including program visualisation, program understanding, program maintenance/evolution and safety-critical systems.

CHRISTOPHER HOLLITT BE (ELEC) (Hons), BSc (Hons), PhD (ADELAIDE), SENIOR LECTURER

Christopher's research focuses on the practical application of control engineering and of signal processing techniques. In particular, he is using these techniques to develop a low-level robot brain, capable of perceiving and interpreting the world and controlling the robot's actions. A range of reflexes intended to protect the robot and ensure its effectiveness are being developed, as well as a set of fundamental physical actions that can be used as the basis of more intelligent behaviours.

MICHAEL HOMER BSc (Hons), PhD (VUW), LECTURER

Michael's research is in programming languages, with a focus on techniques enabling people performing programming tasks, including novices and non-programmers, to express their intentions in a way that matches their own understanding of the task. In particular, he works with domain-specific languages, extensible type systems, and visual programming, and investigates how and where disjoint programming paradigms can be usefully integrated. He is also interested in data management, the web, and parallels between programming languages and operating system organisation.

BASTIAAN KLEIJN MS (UCR), MS (STANFORD), PhD (UCR), PhD (DELFIT), PROFESSOR

Bastiaan's research interest is to develop solutions based on signal processing, information theory, and machine learning for problems relating to audio (including speech) and video signals. Examples of topics that he worked on recently are blind source separation (aiming to extract the original source signals from a set of signals acquired with microphones with unknown locations), audio and video coding for transmission over imperfect communication networks, and the enhancement of audio signals that have been subjected to noise.
THOMAS KÜHNE MSc, PhD (TUD), ASSOCIATE PROFESSOR

Thomas’ research interests include object-technology, programming languages, component architectures, (meta-) modeling, and model-driven development. He is interested in constructive software engineering – how can one produce systems with built-in quality that need not be checked by analytical methods afterwards? In particular, he is interested in the creation of software systems from high-level descriptions by a series of transformation steps to low-level executable code. Furthermore, he has an interest in multi-level description hierarchies for both modelling and programming.

ZOHAR LEVI MSc (TAU), PhD (TECHNION, ISRAEL), LECTURER

Zohar’s research interest is geometry processing. Problems in the field include: low distortion mappings with applications of shape deformation and surface parametrization; shape interpolation; shape registration; and surface reconstruction. Algorithms and tools developed to address these problems are useful for shape modeling and animation.

JOHN LEWIS BS (Psychology, JOHN HOPKINS), SMVisS (MASSACHUSETTS INSTITUTE OF TECHNOLOGY), ADJUNCT ASSOCIATE PROFESSOR

John ("JP") develops algorithms for computer graphics and computer vision. He works at Weta Digital, where he is a contractor and research lead, and has an adjunct position at Victoria. Previously he has worked at academic and industrial research labs including the University of Southern California and Stanford University, as well as in the film industry at companies including Industrial Light and Magic and Disney. John has software credits on several films including Avatar, The Matrix sequels, and Forrest Gump. His published algorithms have been incorporated in commercial software and adopted in the film and game industries. His current work involves applications of computer vision and machine learning techniques to special effects.

KARSTEN ØSTER LUNDQVIST BSc (UNIVERSITY OF READING), FHEA (UoR), PHD (UoR), SENIOR LECTURER

Karsten is interested in socio-technical research, especially how technology can be used to improve learning and teaching, both in formal and informal learning situations. Through this interest, he has studied how AI techniques can be used to automatise and improve teaching situation, for instance through the use of natural language generation and knowledge representation. He has also run his own Massive Open Online Courses (known as MOOC) with over 170000 participants, which has provided him with a test environment for socio-technical research. This has enabled him to study the implications of massive user engagement through MOOCs.

HUI MA BE (TONGJI), MSc (MASSEY), PhD (MASSEY), SENIOR LECTURER

Hui Ma obtained a PhD in Information Systems from Massey University in 2008. Before joining the School of Engineering and Computer Science at Victoria University in 2008, she worked as an Assistant Lecturer at the Department of Information Systems at Massey University and has been a member of the Information Science Research Centre since 2003. Hui’s research areas are databases and software engineering. She has a particular interest in distributed databases, database programming, database design quality, web information systems, XML, cloud computing, service computing. Hui is also involved in international collaborations on service-oriented modelling and XML data modelling.
STUART MARSHALL BSc (VUW), MSc (VUW), PhD (VUW), SENIOR LECTURER
Stuart is currently working in the fields of user interface modeling, agile development and software preservation. Stuart is particularly interested in techniques to create new (or annotate existing) user interface models informed by data on how users actually use their software. Stuart is also involved in investigating various features of agile development with respect to project management, and in how old software games from the 1970s/80s can be preserved for future generations. Stuart’s Master’s and PhD theses were in the field of software reuse, and he is still interested in how developers can better evaluate candidate reusable components.

YI MEI, PhD (USTC, CHINA), LECTURER
Yi’s research interests include solving complex scheduling and combinatorial optimisation problems with intelligent optimisation methods. From the problem side, his main interests include but not limited to the vehicle and arc routing problems, warehouse layout optimisation, job shop scheduling, tourist itinerary design, web service composition, and any other interesting scheduling problems with significant applications in the real world. From the technique side, he is particularly interested in meta-heuristics (evolutionary and memetic algorithms, tabu search, variable neighbourhood search, particle swarm optimisation, ant colony system, etc.), hyper-heuristics (genetic programming), and machine learning methods such as clustering, transfer learning, and feature selection and construction. He is in the Evolutionary Computation Research Group.

MARK MOIR BSc (Hons) (VUW), PhD (UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL), ADJUNCT PROFESSOR
Mark’s interests concern practical and theoretical aspects of concurrent, distributed, and real-time computing. His current research focuses on hardware and software mechanisms for making it easier to develop scalable, efficient, and correct concurrent programs for shared-memory multiprocessors.

CIARAN MOORE BE (Hons), PhD (CANTERBURY), LECTURER
Ciaran’s areas of research include micro- and nano-fabrication, particularly via optical means (lithography, plasmonics, photonics). His work is arranged roughly into three strands:

- Nanofabrication - how can we manufacture ever-smaller devices, features or patterns to achieve goals that would otherwise be impossible with larger objects?
- Micro- and nano-scropy - assuming that we can fabricate nanoscale paraphernalia, how can we effectively view our creations in ways that identify and expose their unique properties?
- Micro-macro electrical and mechanical interfaces - given that we have started to unlock the power of the nanoscale world, how can we couple that potential into macroscopic scales that we can more readily interact with?

BRYAN NG MENGSC (MMU), PHD (UM), LECTURER
Bryan’s research interests include performance analysis and communication protocols. In particular, he is interested in utilising stochastic processes and methods to assess the performance of networks and gain insights from the analysis. The models help networking practitioners make judicious decisions and improve the user experience on the Internet.
JAMES NOBLE BSc (Hons), PhD (VUW), PROFESSOR

James's research centres around software design. This includes the design of the users' interface, the parts of software that users have to deal with every day, and the programmers' interface, the internal structures and organisations of software that programmers see only when they are designing, building, or modifying software. His research in both of these areas is coloured by his longstanding interest in object-oriented approaches to design. Within software design, his interests are rather broad. His current projects include: aliasing in object-oriented systems, design patterns, usage-centred interface design, global component migration, and program visualisation.

DAVID PEARCE MEng(Hons) (LONDON), PhD (IMP), SENIOR LECTURER

David's research interests include directed graph algorithms and program analysis. In particular, he is interested in developing efficient new algorithms for improving the execution time and precision of pointer analysis. Here, pointer analysis is the problem of tracking how pointer values flow within a program. This can be used, for example, to automatically detect NULL pointer dereferences. To this end, David is currently investigating new algorithms for dynamic topological sort, transitive reduction, transitive closure, and incremental static single assignment form.

ALEX POTANIN BSc (Hons), PhD (VUW), SENIOR LECTURER

Alex's research interests lie in the intersection of Programming Languages and Software Engineering. He is interested in ownership and other ways of dealing with aliasing in object-oriented programming languages. He is also a big fan of Java Generics and how it can be utilised to provide frequently requested features like object immutability, alias protection and much more. Finally, if the formal side (type systems) of these solutions can be accompanied by design patterns demonstrating the usefulness of such features, it will make his day. Please see Alex’s webpage on the school’s website for his publications and a list of possible research projects.

JAMES QUILTY BA, BSc (Hons), PhD (VUW), SENIOR LECTURER

James' research interests span several fields and techniques, from ferroelectric solids to nonlinear optical organic molecules and Raman spectroscopy to ellipsometry. Through these run common threads of lasers, optics and materials science and engineering. Present areas of research are novel techniques for the inscription of holographic gratings, ferroelectrics for sensor applications measured via Raman spectroscopy and UAV-based spectroscopic discrimination of organic and non-organic material. To these areas, James brings a long-standing interest in computational techniques for data analysis and theoretical calculation of materials properties.
RAMESH RAYUDU BE (Hons) (OSMANIA, INDIA), ME (CANTERBURY, NZ), PhD (LINCOLN, NZ), CPM (NZIM, NZ), SENIOR LECTURER

Ramesh’s research interests are mainly in power system engineering and computational intelligence. His current research is in reactive power control and management, computational intelligence applications, power quality analysis of residential non-linear loads, non-invasive load monitoring and analysis, transformer diagnosis, and grid connection aspects of renewable energy systems.

Prior to his academic positions, Ramesh worked as an engineer at Transpower NZ Ltd., New Zealand’s electric transmission company and ISO. His work experience includes power system analysis, power system operation, protection analysis, dynamic line rating, and numerical modelling of power networks and equipment studies.

Currently, Ramesh’s other research areas include monitoring and analysis of wireless sensor networks (with Massey University), Computational Biology (with Lincoln University), Enterprise Architectures for Film Industry (with Wingnut Films) and Micro-Grids and Power Electronics (with IRL).

TAEHYUN RHEE BS (SOGANG), MS (SOGANG, USC), PhD (USC), SENIOR LECTURER

Taehyun Rhee's research concern is to solve scientific problems related to computer graphics, animation, vision, and medical imaging. His current research activity is focused on realistic human body modelling and animation, soft-tissue deformation, surface/volume reconstruction from in vivo scans, and real-time global illumination. Before joining Victoria, he was a project leader and senior researcher at Samsung Advanced Institute of Technology (SAIT). He directed many research projects related to human body deformation, facial animation, real-time global illumination, and augmented reality. From 1996 to 2003, he was a senior engineer of Research Innovation Centre at Samsung Electronics. He developed photorealistic rendering algorithms, rendering systems, 3D user interfaces, VR applications, and was an internal consultant in 3D industrial design process.

WINSTON KHOON GUAN SEAH BSc, MEng (NUS), DENG (KYOTO), PROFESSOR

Winston is actively involved in research and development in the areas of mobile ad hoc and sensor networks and co-developed one of the first Quality of Service models for mobile ad hoc networks. He has worked for more than 15 years in mission-oriented research, taking ideas from theory to prototypes. His latest research focuses on wireless sensor networks (WSNs) powered by ambient energy harvesting, WSNs for structural health monitoring, and mobility-enhanced protocols and algorithms for networked swarm robotics and sensing applications in terrestrial and oceanographic networks. He is also interested in environmentally friendly (green) technology for wireless systems.

Projects:

- Wireless Sensor Networks Powered by Ambient Energy Harvesting (WSN-HEAP)
- Robust end-to-end wireless multihop protocols for harsh environments
- Environmentally-friendly (green) protocols for wireless communications systems
- Networking protocols for swarms of unmanned air/ground/underwater vehicles
- Game-/queueing-theoretic approaches in wireless communications systems
- Cognitive approaches for wireless sensor-actuator networks
MARCO SERVETTO PHD (UNIGE), LECTURER

Marco is an active researcher in the area of Type theory for programming languages and formal programming language design. He is developing 42, a novel programming language whose main goal is to support the use of millions of libraries at the same time. To achieve such ambitious goal, libraries must be oblivious to the user and automatically composed relying on powerful meta-programming support. This, in turn, requires being able to formally reason about the intended properties of libraries, notably over immutability and aliasing of mutable of data.

MANSOOR SHAFI BSc (LAHOR), PhD (AUCK), ADJUNCT PROFESSOR

Mansoor’s research interests are in the physical layer of Communications Systems—specifically in the following areas: Radio Propagation Models; information theoretic and practical aspects of MIMO Systems; Intelligent receiver architectures, adaptive antennas, diversity techniques; Broadband Wireless communications systems; Modulation, channel estimation and equalization; and Cognitive Radio.

DAVID STREADER BA (YORK), MSC (WEST ENGLAND), PhD (QUEEN MARY, UK), SENIOR LECTURER

David research interests are in software verification. In particular the refinement and correct by construction approaches. This work being based on formal models of specification and there subsequent formal refinement, as used in the industrial tools B and Event B. His interests span formal semantics models of both event and state-based system. To make formal development easier he has developed semantics transformations to allow the representation of systems to change during the development process. This way features such as probability and real time can be added when needed during the system development. As specifications are frequently unavailable or out of date, he is interested in generating specifications from code execution.

PAUL TEAL BE (Hons), PhD, ASSOCIATE PROFESSOR

Paul’s areas of research are in the development of algorithms and techniques of signal processing, and the application of these techniques in audio, communications, and biomedical devices. Signal processing is vital to the economy because it underpins almost all other scientific and technological endeavour. Most scientific experiments, for example, involve collection of data by some sort of electronic device. Interpretation of this data will involve some sort of signal processing, and superior techniques will result in superior data interpretation.
IAN WELCH BCA (VUW), MSc (NEWCASTLE UPON TYNE, UK), PhD (NEWCASTLE UPON TYNE, UK), SENIOR LECTURER

Ian studied commercial law and accountancy at Victoria University before working for Andersen Consulting on the redesign of the Inland Revenue tax system. Subsequently, he obtained a Master’s and PhD from the University of Newcastle upon Tyne. While at Newcastle he was involved in three EU projects: Design for Validation; Dependable Systems of Systems; and, Malicious- and Fault- Tolerant Internet Applications. His PhD is in the area of software engineering and application-level security. He has been working at Victoria since 2003 in the Network Engineering Research Group although he also does work with colleagues from the ELVIS Software Research Group. Ian supervises projects on Internet Security (searching the web for malware and measuring the amount of malicious activity on the Internet), anonymous and verifiable auctions (removing the need for a centrally trusted auctioneer) and Grid-enabled Internet Instruments (managing network instruments using workflows). He is also involved with a project to preserve New Zealand’s early computer gaming software.

BING XUE MSc (SZU, CHINA), PhD (VUW), LECTURER

Bing is in the Evolutionary Computation Research Group at VUW. Her main research interests are in the areas of artificial intelligence, machine learning, and data mining. She focuses on evolutionary computation for feature reduction, particularly using particle swarm optimisation, genetic programming or evolutionary multi-objective algorithms for feature subset selection and/or high-level feature construction to reduce the dimensionality of the data space to an order of magnitude, to improve the classification performance, and reduce the computational cost. Bing is currently working on evolutionary feature reduction for classification problems with hundreds or thousands (even tens thousands) of dimensions. She is also interested in portfolio selection, symbolic regression, clustering, and big data.

MENGJIE ZHANG BE, ME (HEBEIAGR), PhD (RMIT) PROFESSOR

Mengjie’s main research interests include Evolutionary Computing (Genetic Programming, Particle Swarm Optimisation, and Evolutionary Multi-objective Optimisation), data mining and machine learning, and intelligent and evolutionary computer vision, image analysis and processing. He currently holds a number of funded projects, including a Marsden grant on genetic programming for classification, a research grant on particle swarm optimisation for image recognition, and a BuildIT funded project on genetic programming and evolutionary computing techniques. He also has a number of other projects including evolutionary art/design and engineering applications. He is also interested in learning theory and Web intelligence.
GENERAL INFORMATION

POSTGRADUATE RESEARCH SUPERVISION

These are prepared and written in close consultation with a staff member who acts as supervisor. Research students are expected to participate in and contribute to research-in-progress seminars organised from time to time by the School.

The Faculty of Graduate Research requires all PhD students to submit six monthly reports in May and November. These reports are prepared in collaboration with their supervisors and are expected to identify what has been achieved, outline agreed timetables for future work and identify any problems and how they can be resolved. Copies of the formal reports are provided to the student and the School's Graduate Coordinators, and put on file in the Faculty Student Administration Office.

Master’s students are required to submit a one-month confirmation of study which includes your research proposal. These are expected one month after enrolment. Master’s students are also required to supply a three and eight-month progress report.

FUNDING

The Research Funding Guide is published by the University’s Research Policy Office and is available at [www.victoria.ac.nz/home/publications/research_funding_guide.pdf](http://www.victoria.ac.nz/home/publications/research_funding_guide.pdf)

The Postgraduate Students’ Association has information on StudyLink funding [www.victoria.ac.nz/pgsa](http://www.victoria.ac.nz/pgsa)

POSTGRADUATE SCHOLARSHIPS, PRIZES, AND GRANTS

Students should check out the University’s Prizes and Scholarships database at [www.victoria.ac.nz/scholarships](http://www.victoria.ac.nz/scholarships)

Faculty Research Grants and Summer Scholarships may also be available, visit [www.victoria.ac.nz/science/study/scholarships](http://www.victoria.ac.nz/science/study/scholarships) or contact Margot Neas for more information [margot.neas@vuw.ac.nz](mailto:margot.neas@vuw.ac.nz)

POSTGRADUATE STUDENTS’ ASSOCIATION

The Postgraduate Students’ Association provides representation and other services for all Victoria's postgraduate students [www.victoria.ac.nz/pgsa](http://www.victoria.ac.nz/pgsa). You can subscribe to the PGSA email list by emailing pgsa-members-subscribe@vuw.ac.nz

VICTORIA ABROAD

Students studying course-taught postgraduate studies are able to participate in an exchange, however, not all of our partner universities are open to postgraduate students—talk to the Victoria Abroad Office about which universities will be open to you. [www.victoria.ac.nz/exchange](http://www.victoria.ac.nz/exchange)

WHO TO CONTACT
Victoria University offers a range of services that covers all student-related matters from applications/enrolment to graduation.

**STUDENT AND ACADEMIC SERVICES — FACULTIES OF SCIENCE AND ENGINEERING**

Address: Level 1, Cotton Building
Phone: 04-463 5101
Email: science-faculty@vuw.ac.nz or engineering@vuw.ac.nz
Hours: 8.30 am–5pm Monday, Wednesday, Thursday, Friday
       9.30 am–5pm Tuesday

At the Student Administration Office, student advisers can help with admission requirements, degree planning, changing courses and transfer of credit from other tertiary institutions. They also deal with other aspects of student administration such as enrolment, exams organisation and the maintenance of student records.

Patricia Stein manages all postgraduate students:
patricia.stein@vuw.ac.nz 04-463 5982

**Johan Barnard**  
Manager, Student and Academic Services  04-463 5980

**A/Prof Peter Andreae**  
Associate Dean (Students)  04-463 5834
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Established in 1999, Āwhina is about people and collective success. The kaupapa of Āwhina is to produce Māori and Pacific science, engineering, architecture and design professionals to contribute to Māori and Pacific community and leadership development. Anyone who assists the building of Āwhina is part of the whānau.

FACULTY OF GRADUATE RESEARCH OFFICE

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