THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING

2015

The University of Auckland

Faculty of Engineering

Undergraduate Handbook

Contents

Welcome to Engineering

Technology is now changing our lives at an unprecedented rate, meaning the engineer's place in the world has never been more important. As the next generation of innovators, problem-solvers and entrepreneurs, we are delighted you have chosen to join New Zealand's leading engineering faculty* to best equip yourself for a life dedicated to building a better tomorrow.

Our engineering ethos is deeply embedded in New Zealand culture. It can be found in the old cliché about the no. 8 wire mentality, in Kiwi ingenuity, resourcefulness, in the ability to think independently and creatively, and to develop and apply technologies to the task at hand. As New Zealanders we are immensely good at this, and at the University of Auckland we attract excellence to take advantage of these strengths on the international stage.

Until recently, and in comparison to many other developed nations, the critical role engineers play in our economy, personal and professional lives has been undervalued in New Zealand. Fortunately, this is now changing rapidly, making this an exciting time for you to be a part of our faculty. We have larger student numbers, higher entry scores, greater achievements and more industry demand than ever before, and research coming out of the Faculty of Engineering is attracting considerable attention.

However, it's important to remember that it isn't all about the numbers. What really matters to us most, is you. The best and brightest, the future 'movers and shakers' – we look forward to welcoming you, teaching you and guiding you through your studies. We are committed to providing our future generations with engineering graduates that have the technical knowledge, personal qualities and leadership skills to first ask the right questions, and then set about solving them. It is no exaggeration to say the outlook of both New Zealand and our global community will depend on these skills and how you develop them during your degree.

So, congratulations on your decision to join us in the Faculty of Engineering and welcome to our family. We hope you enjoy your time with us and we look forward to being a part of your contribution to all of our futures.

PROFESSOR NIC SMITH
Dean of Engineering
The University of Auckland
New Zealand

**QS World University Rankings by Faculty, 2014/15.*

Using this handbook

This handbook contains important information to help guide and inform you during your programme of study. Additional information can be found on our faculty website at **www.engineering.auckland.ac.nz.**

Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only for students and is subject to alteration. All students enrolling at the University of Auckland must consult its official document, the current Calendar of the University of Auckland, to ensure that they are aware of and comply with all regulations, requirements and policies.

The *2015 University of Auckland Calendar* can be viewed online at **www.auckland.ac.nz/calendar**.

Key dates

Summer School 2015	Semester code: 1150
Summer School begins	Tuesday 6 January
Last day to add, change or delete Summer School courses	*Monday 12 January*
Auckland Anniversary Day	Monday 26 January
Waitangi Day	Friday 6 February
Lectures end	Friday 13 February
Study Break	Saturday 14 February
Examinations	Monday 16 – Wednesday 18 February
Summer School ends	Wednesday 18 February

Semester One 2015	Semester code: 1153
Superstart in Mathematics course	10 day course: Monday 16 – Friday 27 February 7 day course : Thursday 19 – Friday 27 February
Orientation - WEN and MAPTES welcome	Monday 23 February
Orientation - Faculty of Engineering day	Tuesday 24 February
Last day for Part II students to register for Workshop Practice (ENGGEN 299)	Sunday 1 March
Semester One begins	Monday 2 March
Last day to add, change or delete Semester One courses	*Friday 13 March*
Last day to add or delete double semester (A and B) courses	*Friday 27 March*
Easter break / Mid-semester break	Friday 3 – Saturday 18 April
ANZAC Day	Monday 27 April
Autumn Graduation	Monday 4, Wednesday 6, Friday 8 May
Queen's Birthday	Monday 1 June
Lectures end	Friday 5 June
Study break	Saturday 6 – Wednesday 10 June
Examinations	Thursday 11 – Monday 29 June
Semester One ends	Monday 29 June
Inter Semester Break	Tuesday 30 June - Saturday 18 July

Semester Two 2015	**Semester code: 1155**
Semester Two 2015 admission applications close	Saturday 4 July
Orientation - Semester Two	Week beginning 13 July
Semester Two begins	Monday 20 July
Last day to add, change or delete Semester Two courses	*Friday 31 July*
Mid-semester break	Monday 31 August – Saturday 12 September
Spring Graduation	Tuesday 29 September
Lectures end	Friday 23 October
Study break	Saturday 24 – Wednesday 28 October
Labour Day	Monday 26 October
Examinations	Thursday 29 October – Monday 16 November
Semester Two ends	Monday 16 November
Summer School - 2016	**Semester code: 1160**
Summer School begins	Wednesday 6 January 2016
Semester One - 2016	**Semester code: 1163**
Semester One begins	Monday 29 February 2016

Admission

Dates to remember	
Please note closing dates for applications for admission in 2015	
MAPTES and Accelerated Pathway	21 November 2014
BE(Hons) Semester One entry	8 December 2014
BE(Hons) Semester Two entry	4 July 2015

Admission to Part I

There are 800 places available in Part I (first year) of the BE(Hons). Places are strictly limited and subject to selection. Successful candidates require a strong background in calculus, physics and/or engineering studies. In all cases, selection is based upon your most recent and highest level of academic study.

For detailed admission information, including entry requirements to the BE(Hons) and various alternative pathways, please visit **www.engineering.auckland.ac.nz/entry**.

Admission to Part II

Part II of the BE(Hons) programme is divided into nine specialisations. Entry into each specialisation is strictly limited to a set number of places; the faculty will not exceed the University Council's approved limitations on entry into Part II specialisations, as stated in the *University of Auckland Calendar*.

The 2015 limits are:

Specialisation	Places available
Biomedical Engineering	28
Chemical and Materials Engineering	75
Civil and Environmental Engineering	220
Computer Systems Engineering	60
Electrical and Electronic Engineering	110
Engineering Science	45
Mechanical Engineering	130
Mechatronics Engineering	80
Software Engineering	75

Pathways into Part II

Priority placement is given to current University of Auckland students who have recently completed Part I of the BE(Hons).

Subject to availability of places, students who have completed the first year of a BE programme at another tertiary institution may also be considered for admission directly into Part II, dependent on their academic performance (at least a B average) and the equivalence and relevance of their prior study. There is no automatic acceptance or transfer of credit for engineering qualifications and each case will

be considered individually. Students wishing to transfer need to complete an application via Student Services Online, indicating the specialisation for which they wish to be considered under "Academic Plan", eg, Engineering – Civil.

The prior completion of certain qualifications may also provide direct entry into Part II, subject to a Grade Point Average (GPA) of at least 5.0 and places remaining available. Such qualifications include a completed New Zealand Diploma of Engineering, Bachelor of Science, Bachelor of Technology or Bachelor of Surveying with appropriate subjects.

Students who are offered direct entry into Part II from another degree and/or institution must still complete the requirements for ENGGEN 199 English Language Competency and ACADINT A01 Academic Integrity Course without exemption. International applicants must also meet certain English language requirements as per University policy. Further information can be found at **www.auckland.ac.nz/english-language-requirements**.

The faculty will not permit entry into Part II of the BE(Hons) in Semester Two, unless students have prior study elsewhere which can be substituted for the courses they have missed in Semester One.

Part II selection criteria

Current Part I students will be invited to nominate their preferred specialisations before the end of Semester Two. To be considered for admission into your preferred specialisation you must have:

- Completed a minimum of 90 points of Part I, including ENGSCI 111 (or ENGGEN 150 for a conjoint degree).
- Completed or been given credit for any specified Part I course regarded as a prerequisite for your preferred specialisation (eg, CHEMMAT 121 for Chemical and Materials; ELECTENG 101 for Computer Systems Engineering and Electrical and Electronic; and ENGGEN 121 for Civil, Mechanical and Mechatronics).
- Completed requirements for ENGGEN 199.
- Completed requirements for ACADINT A01.

Places in your preferred specialisation are not guaranteed and you may be offered a place in another specialisation if places are no longer available in your first (or even second or third) choice.

Where demand exceeds the number of places available in a specialisation, all students will be ranked according to their GPA in Part I (excluding their General Education course). If you have not completed ENGGEN 199 and ACADINT A01, you will not be ranked.

Different admission requirements are in place for Māori and Pacific students who are eligible for entry into Part II. However, Māori and Pacific students are also not guaranteed a place in their preferred specialisation if they fail to meet these requirements.

If you fail up to 30 points of courses in Part I, you are advised to repeat those failed courses at Summer School. Similarly, if you only began the BE(Hons) in Semester Two (and have only completed 60 points of Part I) you are also strongly encouraged to make up your remaining 30 points for Part I at Summer School, in order to be considered for entry into Part II the following year. If you are admitted to Part II in Semester One, 2015 before you have completed all of Part I, you will be required to complete any outstanding Part I courses in Summer School, 2016 (except students admitted via Bachelor of Science [BSc] or Bachelor of Technology [BTech] alternative pathways). You will not be permitted to enrol in the outstanding Part I courses during Semester One or Two of 2016. The requirements for ENGGEN 199 and ACADINT A01 must also be completed BEFORE your place in Part II can be confirmed.

Any student who does not complete Part I within two years of initial enrolment may not be permitted to continue in the BE(Hons).

Enrolment

Dates to remember	
Please note important dates for enrolment for 2015	
Enrolment opens for Part I 2015	Monday 3 November 2014
Enrolment opens for Parts II-IV 2015	Friday 12 December 2014
Enrolment help lab open	6 January to 27 February 2015
Last day to change Summer School courses	*Monday 12 January 2015*
Recommended date for enrolment completion	Friday 13 February 2015
Last day to change Semester One courses	*Friday 13 March 2015*
Last day to change double Semester (A and B) courses	*Friday 27 March 2015*
Last day to change Semester Two courses	*Friday 31 July 2015*

Part I students in 2015

Part I course requirements of the BE(Hons) programme are listed on page 12. After your application into the BE(Hons) programme is received and you have accepted your offer of place, you will be sent documents detailing how to enrol.

Enrol in your courses through Student Services Online. If you find that any of your pre-selected lecture, tutorial or lab streams are already full, you will need to re-plan your schedule before completing your online enrolment.

It is highly recommended that you complete your enrolment by **Friday 13 February 2015** as classes fill up fast. If you haven't completed your enrolment by this date your place in the BE(Hons) may be withdrawn.

Conjoint students

It is advised that you prioritise enrolment in your BE(Hons) courses, as these course schedules can be inflexible and places fill fast. Conjoint requirements and regulations can be found on page 15-17.

Accelerated Pathway students

A special enrolment help lab is conducted for all new Accelerated Pathway students on the last day of the compulsory Induction Week. Details of the time and venue will be provided to you.

MAX (MATHS 153) students

Students from the MAX programme usually enrol in Mathematical Modelling 2 (ENGSCI 211) in their first year of engineering. However, those intending to complete a conjoint degree or with a low pass in MATHS 153 should consider other options. MAX students can contact Peter Bier for advice on mathematics courses.

Peter Bier
Phone: +64 9 923 3014
Email: p.bier@auckland.ac.nz

Parts II, III and IV students in 2015

Before attempting to enrol online, read our guidelines for returning students available on the faculty website.

Enrolment will be open from 12 December 2014 via Student Services Online.

If you failed a course in 2014, you will only be able to enrol in those courses you have yet to complete in that Part. If you need to enrol in a course at a higher level, you will need to apply for an enrolment concession via Student Services Online. If approved, Student Centre staff will enrol you in the appropriate course(s).

If you encounter a timetable clash, you must also apply for an enrolment concession via Student Services Online and await approval from the department course adviser.

Conjoint students will also be prompted to apply online for an enrolment concession for their proposed course of study before online enrolment access is granted.

Enrolment assistance

If you do not have access to a computer at home or need some assistance with your enrolment, the faculty will be operating a help lab. This will be available from 6 January to 27 February 2015.

Enrolment help lab
Engineering Student Centre (Room 402-406)
Level 4, 20 Symonds Street
Open: Monday to Friday 9am-4pm
Phone: +64 9 373 7599 ext 88120
Email: foe-enquiries@auckland.ac.nz

Changes to enrolment

Once you have enrolled in courses and paid your tuition fees, changes to courses can be made online only within the first week of Summer School and the first two weeks of the semester in which the course is run. After this period, an attempt to delete a course is classified as a withdrawal and will be entered on your student record as such (please note that a "withdrawal" is regarded as a fail). Your fees cannot be refunded after these dates, apart from in exceptional circumstances.

If you fail to attend a final examination, and you did not "withdraw" from the course at least three weeks before lectures ended, your academic record will show "Did Not Sit" or "Did Not Complete". Note that "Withdrawn", "Did Not Sit" and "Did Not Complete" all constitute fail grades. Enquiries may be directed to the Student Centre Manager in the Engineering Student Centre, or emailed to foe-enquiries@auckland.ac.nz.

Planning your degree

Bachelor of Engineering (Honours) degree structure

The BE(Hons) degree at the University of Auckland is a four-year programme leading to registration as a professional engineer. It consists of 480 points usually divided into four Parts (equivalent to one year each). Each Part consists of courses totalling 120 points.

In general, Part I must be completed before Part II, which must be completed before Part III, which must be completed before Part IV. Any exceptions must be approved by the Associate Dean Undergraduate on a semester-by-semester basis.

All students are eligible for the award of Honours. The BE(Hons) is awarded to those who achieve a sufficiently high GPA in Parts II, III and IV. Students who do not achieve this will be awarded the BE degree. For more information on GPA calculation and Honours, refer to page 102.

Did you start your degree prior to 2008?

In 2008 we replaced our BE degree with the current BE(Hons) degree. If you started your degree prior to 2008, you can choose whether to complete your degree under the "old" BE regulations, or transfer to the current BE(Hons) programme. Please indicate your preference at the Engineering Student Centre; no form will be taken to mean no change (ie, you will remain with the "old" BE requirements).

Part I

Part I is a common year covered in your first year of study. You gain exposure to each of the nine different engineering specialisations and study a broad base of engineering and professional fundamentals. A summary of your Part I enrolment is depicted below.

Part I - 120 points comprising:

Semester One			Semester Two		
ENGGEN 121	Engineering Mechanics	15	CHEMMAT 121	Materials Science	15
ENGGEN 140	Engineering Biology and Chemistry	15	ELECTENG 101	Electrical and Digital Systems	15
ENGSCI 111	Mathematical Modelling 1	15	ENGGEN 131	Engineering Computation and Software Development	15
ENGGEN 115 Principles of Engineering Design (Semester One or Two)					15
General Education (Semester One or Two)					15
ENGGEN 199 English Language Competency					0
ACADINT A01 Academic Integrity Course					0

General Education courses

The University of Auckland is the only New Zealand university to include a General Education component in its undergraduate degrees. General Education courses are designed to broaden your education, increase your understanding of New Zealand and its place in the world, give you an opportunity to mix with students from different disciplines and develop your awareness of cross-disciplinary research.

As a BE(Hons) student, you must pass one General Education course (15 points) in Part I of your degree. Special arrangements may apply for conjoint students or students that have transferred from another tertiary institution with credit.

You can choose from a range of subjects. As a BE(Hons) student you can pick a course from either the "General Education Open Schedule" or the "Engineering, Medical and Health Sciences, and Science Schedule (EMHSS)".

Please refer to the University website for details: **www.auckland.ac.nz/generaleducation**

Students are encouraged to seek advice on General Education in their degree from the Engineering Student Centre.

In some cases, courses are available both as part of the General Education programme and as part of regular degree programmes. If you choose such a course, you MUST enrol in the G version of the course (eg, HISTORY 103G). Enrolment in the "non-G" version may not be counted as fulfilling the General Education requirement.

English Language Competency - ENGGEN 199

As a student entering the BE(Hons) programme, you are required to undertake a brief "Diagnostic English Language Needs Assessment" (DELNA) to demonstrate that you have a level of proficiency in English that will enable you to succeed in your Engineering studies and future career.

This is a compulsory requirement for the degree without exceptions, regardless of whether English is your first language or an additional language.

For more information, see page 18 or visit **www.delna.auckland.ac.nz**

Academic Integrity Course – ACADINT A01

The University of Auckland introduced an online academic integrity course in 2013 for undergraduate and postgraduate students admitted for the first time to a programme at the University. All new students are required to complete the course. More details are provided at **www.auckland.ac.nz/academic_honesty**.

Parts II-IV

In Parts II to IV, you choose one of the following specialisations:

- Biomedical Engineering
- Chemical and Materials Engineering

- Civil and Environmental Engineering
- Computer Systems Engineering
- Electrical and Electronic Engineering
- Engineering Science
- Mechanical Engineering
- Mechatronics Engineering
- Software Engineering

Parts II–IV of each degree consist of specialist subjects, with a common core of mathematical modelling, technical communication and professional development courses studied by all students. In general, once your specialisation has been confirmed, there is little choice in the actual courses taken, although most specialisations allow one or two approved electives.

Course requirements and descriptions for each specialisation are outlined on pages 21-47.

Electives in Parts II and III

Most degree specialisations include one or two electives which can be chosen from within your specialisation's department or from other engineering departments. Electives from outside your department or the faculty (and not listed on pages 21-47) require the approval of your departmental course adviser.

Electives in Part IV

Electives in Part IV allow you to specialise even further in some area of engineering. However, there is limited opportunity to take electives outside of your own department. You may be able to take fourth-year electives from other engineering specialisations, approved courses from Parts IV or V of the Bachelor of Architecture degree programme, or courses from another faculty, but all such cases will require approval from your departmental course adviser.

Workshop Practice – ENGGEN 299

Prior to enrolling in Part III, you must have completed a recognised course in Workshop Practice. You will not be permitted to enrol in Part III courses if this has not been completed in Part II of your studies. Registration details and course dates will be emailed to all Part II students, and can be found at **www.engineering.auckland.ac.nz/workshop-practice**.

Approved courses are held at the Auckland University of Technology (AUT) throughout the year, and also at Manukau Institute of Technology (MIT) during semester breaks. Students must ensure that the timetabling of their workshop practice does not clash with their other academic courses.

You must register online for a suitable course by midnight, Sunday 1 March 2015. Late registrations will not be accepted.

Any exemption requests must be supported by documentary evidence of having attended a similar course elsewhere.

Practical Work – ENGGEN 499

As part of your BE(Hons) degree you are required to experience some of the trade and sub-professional skills relevant to your engineering specialisation. At least 800 hours of approved engineering employment must be undertaken before graduation. After each period of work you will submit a report detailing your experience. Further information about practical work experience can be found on pages 95-100.

Students will not be considered to have met the requirements to graduate until both Workshop Practice and Practical Work have been completed.

Conjoint degree programmes

The conjoint degree programme is an option that many students consider. It can be an excellent choice if you know that the other degree component will be beneficial in your proposed career or if you are a capable student with skills in various areas. You might also consider the relative merits of combining undergraduate and postgraduate study as an alternative to completing two undergraduate degrees.

A conjoint degree enables you to complete a BE(Hons) and another degree concurrently, with a reduction in the total points required for each degree component.

Most BE(Hons) conjoint programmes can be completed in five years. They generally consist of engineering courses totalling 405 points and 270 points from the other degree courses. An exception is the BE(Hons)/LLB (the LLB component requires 390 points).

The workload for a conjoint programme is higher than that of a single degree (usually 135 points per year, compared with 120 points per year for a single degree). The BE(Hons) programme alone is considered to have a high workload so conjoint students must be prepared for an even higher workload. Because of this, there is a higher entry requirement for BE(Hons) conjoint programmes: a GPA of at least 5.5 in the last year of full-time study is required. In addition, you must maintain at least a B- average (GPA of 4.0) across all courses for the duration of your conjoint degree. Failure to maintain this standard will result in you being dropped from the conjoint programme.

The conjoint combinations currently available with Engineering are:

- BE(Hons) / Bachelor of Arts (BA)
- BE(Hons) / Bachelor of Commerce (BCom)
- BE(Hons) / Bachelor of Property (BProp)
- BE(Hons) / Bachelor of Laws (LLB)
- BE(Hons) / Bachelor of Science (BSc)

Note: as per the regulations of the University of Auckland, students cannot enrol for courses that have substantially similar content. Thus, certain BE(Hons)/BSc conjoint programmes (such as a BSc major in Computer Science, Physics, Applied Mathematics, or Statistics) must have formal prior approval from the Faculty of Engineering and may even be declined.

BE(Hons) conjoint degree regulations

The requirements of the BE(Hons) component of a conjoint degree are the same for all combinations.

You must pass at least 405 points comprising:

(i) 90 points at Part I: CHEMMAT 121, ELECTENG 101, ENGGEN 115, 131, 140, 150, 199

(ii) 15 points: ENGGEN 204

(iii) 195 points at Parts II and III from courses listed in the schedule of your chosen BE(Hons) specialisation.

(iv) 105 points at Part IV (including ENGGEN 403) from courses listed in the schedule of your chosen BE(Hons) specialisation.

Note:

1 *If you pass all your courses and complete all other requirements for the BE(Hons) but your performance in the courses is deemed not to be of Honours standard, you will be awarded the conjoint degree with a BE.*

2 *There are specific regulations related to the other degree component of your conjoint programme. Please consult the Conjoint Degrees' Regulations in the University of Auckland Calendar and relevant faculty handbooks to ensure you fulfil the requirements.*

Planning a conjoint programme

Planning a conjoint degree can be complex. Your timetable will be a major constraint when selecting your courses. You are advised to select your BE(Hons) courses first and then fill your points with courses from your other degree, as the latter usually provides more timetable flexibility. It is recommended that each year you discuss your courses with advisers from both faculties, as well as consulting your programme requirements in Student Services Online.

In general, the BE(Hons) component of a conjoint programme consists of 405 points, ie, 75 points less than the full BE(Hons). This reduction in points is accounted for by:

- Replacing the combined 30 points of ENGSCI 111 and ENGGEN 121 with a single 15-point course, ENGGEN 150.
- Not including the 15-point General Education course in the Engineering component of the conjoint degree.
- Omitting 30 points from Part II or III of the BE(Hons) component that are essentially covered by courses with similar content in the other component of the conjoint degree.
- Omitting 15 points from Part IV electives.

BCom/BE(Hons) students: Note that for Part I of the BCom you are not required to complete MATHS 108 General Mathematics 1 as ENGGEN 150 Advanced Mechanics and Mathematical Modelling covers the necessary material.

The BE(Hons) degree regulations specify that Part I be completed before Part II, which must be completed before Part III, etc. While this may not be possible for conjoint enrolments, you should try to follow the principle as closely as possible. When selecting your Engineering courses, discuss your courses with the departmental course adviser to ensure you are covering all necessary prerequisites for your chosen specialisation.

Detailed conjoint planners specific to each BE(Hons) specialisation are available at the Engineering Student Centre and on the Faculty of Engineering website. Information on the requirements of your other degree component can be found in the *University of Auckland Calendar* or relevant faculty handbook.

Part I of a conjoint degree

All students selected for a conjoint degree will be expected to have calculus and physics to a level which will enable them to take the course ENGGEN 150 Advanced Mathematical Modelling and Mechanics in place of the two courses ENGSCI 111 and ENGGEN 121. For conjoint students Part I will therefore comprise as follows:

Semester One			Semester Two		
ENGGEN 140	Engineering Biology and Chemistry	15	CHEMMAT 121	Materials Science	15
ENGGEN 150	Advanced Mechanics and Mathematical Modelling	15	ELECTENG 101	Electrical and Digital Systems	15
			ENGGEN 131	Engineering Computation and Software Development	15
ENGGEN 115 Principles of Engineering Design (Semester One or Two)					15
Conjoint course - General Education (Semester One or Two)					15
Conjoint course (Semester One or Two)					15
Conjoint course (Semester One or Two)					15
ENGGEN 199 English Language Competency					0
ACADINT A01 Academic Integrity Course					0

Parts II-IV of a conjoint degree

As a conjoint student you will also choose your preferred Engineering specialisation at the end of Part I. This choice will guide your course selection for Parts II, III and IV of your BE(Hons). Courses for your other degree will need to fit around your BE(Hons) requirements. Detailed conjoint degree planners are available on the faculty website for each specialisation. Use these to plan your courses each year, before checking your proposed enrolment with course advisers from both faculties.

Did you start your conjoint degree prior to 2008?

In 2008 we replaced our BE degree with the current BE(Hons) degree. If you started your degree prior to 2008, you can choose to complete your conjoint under the "old" BE conjoint regulations, or transfer to the BE(Hons) conjoint programme. You must indicate your preference to the Engineering Student Centre; no form will be taken to mean no change (ie, you will remain with the "old" BE requirements).

Preparing for your first semester

DELNA screening for ENGGEN 199

All students entering the BE(Hons) degree are required to complete ENGGEN 199 English Language Competency as a compulsory component of their Part I requirements (even if entering the degree at Part II level).

In order to fulfil the requirements of ENGGEN 199 you must complete the 30-minute DELNA screening assessment. For most students, completion of this screening will be sufficient. Results are not graded except for an indication of whether you have completed (CPL) the requirements for ENGGEN 199.

If recommended by the DELNA team, you may be required to complete a two-hour diagnosis, which you must book before the semester's end. If this diagnosis indicates that you need to work on your academic language skills, you may be obliged to undertake a programme of language skill development coordinated by the University's English Language Enrichment centre (ELE). You will not be permitted to enrol in any further courses until you have met all of the requirements for ENGGEN 199.

The DELNA screenings take place on campus in one of the University's computer labs. We strongly encourage you to book a screening during Orientation and complete this requirement early. Bookings can be made at **www.delnatask.com/booking**.

Academic Integrity Course – ACADINT A01

The University of Auckland introduced an online academic integrity course in 2013 for all students admitted for the first time to a programme at the University. All new students are required to complete the course, and BE(Hons) students MUST do so in their first year of study. We advise you to complete this early in the year before your workload increases. For more information, visit **www.auckland.ac.nz/academic_honesty**.

Superstart in Mathematics

Superstart is a pre-semester catch-up course in mathematics jointly run by the Departments of Mathematics and Engineering Science. It aims to help ensure that participating students' first experience of mathematical modelling is both enjoyable and successful. Typically, Superstart students achieve pass rates at or above class averages in the first year ENGSCI 111 Mathematical Modelling course.

You are encouraged to complete this course if you:

- Have gaps in your calculus preparation, either from incomplete Level 3 NCEA credits or by having only completed CIE "AS" rather than full "A" level.
- Have a low level of achievement in NCEA Level 3 Calculus (Achieved, rather than Merit or Excellence in all credits), or a C grade or less in CIE "A" level Mathematics.
- Did well in Mathematics at Year 13 level, but have not studied calculus for some time.

Note that Superstart is aimed at students already accepted into the BE(Hons) programme. It does not fulfil the calculus/mathematics subject entry requirements nor is it a substitute for the MATHS 102 Summer School course (which is a formal subject entry alternative for students who have not studied mathematics with calculus at high school).

For more information, contact:

Wendy Stratton
Phone: +64 9 923 5757
Email: superstart@math.auckland.ac.nz
www.math.auckland.ac.nz/uoa/superstart

10 day course
Recommended for most students
Date: Monday 16 - Friday 27 February 2015 9am-4pm
Course fee: $260

7 day course
Recommended for students with strong algebra and a good understanding of functions but with gaps in calculus and/or trigonometry
Date: Thursday 19 - Friday 27 February 2015 9am-4pm
Course fee: $190

Course information

Degree specialisations

Biomedical Engineering

What is it?

Biomedical engineers combine engineering, medicine, and biology to resolve challenges in the healthcare industry with the aim of improving the quality of human lives. They respond to challenging problems like: how can we diagnose ill health sooner? How can we design medical therapies and devices for more effective treatment and quicker recovery? How might autonomous technology and telemedicine improve healthcare delivery? Biomedical Engineering is a diverse and rapidly growing field. As the role of technology in healthcare becomes more prominent, biomedical engineers find themselves at the forefront of real-world, life-changing outcomes.

What will I study?

In Parts II and III of the Biomedical Engineering specialisation, you will take courses that provide you with a solid foundation in mathematics, mechanics, bioinstrumentation, engineering design and computation, in addition to medical science courses in biology and physiology. Part IV provides scope to specialise; you will be able to focus on areas that interest you most, such as biomedical imaging, biotechnology, medical devices, computational physiology, or sports science. You will also carry out your own research project based on problems relevant to industry or research. In the past, students have worked on a wide variety of projects including orthopaedic implant design, needle-free jet injection, respiratory technologies, tissue and genetic engineering, instrument design, sports biomechanics, and cardiac diagnostic imaging. You will have excellent facilities and outstanding expertise at your fingertips within the Faculty of Engineering, the Auckland Bioengineering Institute, the Faculty of Medical and Health Sciences, and the Faculty of Science.

Where will it take me?

Much of the biomedical engineering landscape remains uncharted. Transformative changes are expected over the coming decades, and many areas of the industry remain open for exploration and innovation. As a Biomedical Engineering graduate, you will find career opportunities in biomedical companies, research facilities, hospitals, and government regulatory agencies. You could design medical devices, prostheses or implants, develop drugs or drug delivery systems, improve sports and injury assessment, or work in medical IT. There is high demand for biomedical engineers from established companies in New Zealand and abroad, such as Fisher and Paykel Healthcare, Orion Health, and Siemens. You could go on to do postgraduate study, kick-starting a career working on cutting edge research. Our graduates are making their mark by creating new companies in emerging areas such as implantable and wearable technology. Biomedical engineers are some of the most versatile engineers, with a breadth of knowledge that can be applied to seemingly unrelated fields, such as software development, electronics, engineering and management consulting, financial modelling, and the food/meat/wool science industries.

For more information, visit:
www.des.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Biomedical Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
BIOMENG 221	Mechanics of Engineered and Biological Materials	15	BIOMENG 241	Instrumentation and Design	15
BIOSCI 107	Biology for Biomedical Science: Cellular Processes and Development	15	BIOMENG 261	Tissue and Biomolecular Engineering	15
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
ENGSCI 233	Computational Techniques and Computer Systems	15	MEDSCI 142	Biology for Biomedical Science: Organ Systems	15
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
BIOMENG 321	Continuum Modelling in Bioengineering	15	BIOMENG 341	Bioinstrumentation and Design	15
ENGGEN 303	Managing Projects and Innovation	15	ENGSCI 331	Computational Techniques 2	15
ENGSCI 314	Mathematical Modelling 3ES	15	MEDSCI 309	Biophysics of Nerve and Muscle	15
MEDSCI 205	The Physiology of Human Organ Systems	15			
15 points of electives from the following:					
			CHEM 380	Materials Chemistry	15
			CHEM 392	Issues in Drug Design and Development	15
			CHEMMAT 315	Chemical Reactor Engineering	15
			COMPSYS 303	Microcomputers and Embedded Systems	15
			ENGSCI 355	Applied Modelling in Simulation and Optimisation	15
			ENGSCI 391	Optimisation in Operations Research	15

	MATHS 362	Methods in Applied Mathematics	15
	MECHENG 313	Real Time Software Design	15
	MECHENG 352	Manufacturing Systems	15
	MECHENG 371	Digital Circuit Design	15
	MEDSCI 305	Systematic Pharmacology	15
	MEDSCI 312	Endocrinology of Growth and Metabolism	15
	MEDSCI 314	Immunology	15
Or other courses approved by the Head of Department.			

Please consult the Biomedical Engineering study tracks for a list of Part II and Part III elective suggestions: **www.des.auckland.ac.nz/uoa/bme-tracks**

Part IV

120 points comprising:

Semester One			Semester Two		
ENGSCI 700 A & B Research Project					30
ENGSCI 753	Computational Techniques in Mechanics and Bioengineering	15	ENGGEN 403	Managing a Business	15
60 points of electives from the following:					
CHEMMAT 753	Non-metallic Materials	15	CHEMMAT 754	Materials Engineering	15
ELECTENG 722	Control Systems	15	CHEMMAT 757	Engineering Biotechnology	15
ELECTENG 733	Signal Processing	15	ENGSCI 712	Computational Algorithms for Signal Processing	
ENGSCI 711	Advanced Mathematical Modelling	15	ENGSCI 741	Advanced Mathematical and Computational Modelling in Mechanics	15
ENGSCI 740	Advanced Mechanics in Modern Research and Technology	15	ENGSCI 772	Whole Organ Modelling	15
MECHENG 743	Composite Materials	15	MATHS 764	Mathematical Biology	15
MEDSCI 703	Advanced Biomedical Imaging	15	MEDSCI 737	Biomedical MRI	15
Or other courses approved by the Head of Department (up to 30 points).					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Chemical and Materials Engineering

What is it?

Have you ever wondered how products like petrol, plastic bottles, and synthetic polyester are produced from oil? Or are you more interested in developing new, sustainable replacements to these everyday items? These topics are within the domain of Chemical and Materials Engineering. Concerned with the transformation of raw materials into valuable end-products, this sub-discipline aims to optimise these transformations to develop high-performance materials for use in our modern, technological society. Chemical and materials engineers understand how to chemically or physically alter a substrate in order to produce something useful in the safest, most cost-effective way. For this reason, these engineers are often "big picture" professionals, with responsibility for the overall design, operation and quality of what are often giant-scale processes.

What will I study?

Many universities offer distinct Chemical Engineering and Materials Engineering programmes, meaning the combination of both disciplines offered by the University of Auckland holds real-world value. Throughout your specialisation, you will gain a solid grounding in applied chemistry, materials characterisation, process engineering, energy and mathematical modelling. You will also get a taste of chemical reactor engineering, food process engineering and biotechnology. On the whole, you will come away with a well-rounded qualification and specialist knowledge that can be applied in a number of key industries, both in New Zealand and abroad. With a BE(Hons) in Chemical and Materials Engineering, you will have skills that are particularly important in areas such as plant design and operations, and you will be an expert when it comes to choosing, designing and optimising materials in any business.

Where will it take me?

The Chemical and Materials Engineering specialisation provides graduates with a diverse and exciting range of career opportunities. Major industries requiring employees with this specialist expertise include dairy and food industries, pharmaceuticals, paper and pulp, petrochemicals, energy processing and production, construction and cement, timber, water treatment, resource development and management, electronics, and mineral processing industries such as aluminium and steel production. As well as being essential to the New Zealand economy, these industries are major growth areas on a global scale. Furthermore, as sustainable practices become more important than ever, chemical and material engineers will be required to re-evaluate and re-design many of the fundamental products and processes that these industries have been built upon. Graduates of our specialisation can be found in a wide range of relevant areas, including process operations, research and development, construction and installation, design, manufacturing and production, administration, management and consulting.

For more information, visit:
www.ecm.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Chemical and Materials Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
CHEMMAT 211	Introduction to Process Engineering	15	CHEMMAT 212	Energy and Processing	15
CHEMMAT 221	Materials	15	CHEMMAT 213	Transfer Processes 1	15
CHEMMAT 242	Applied Chemistry	15	CHEMMAT 232	Process Design 1	15
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
ENGGEN 299 Workshop Practice to be completed during Part II		0			

Part III

120 points comprising:

Semester One			Semester Two		
CHEMMAT 312	Transfer Processes 2	15	CHEMMAT 313	Advanced Process Engineering	15
CHEMMAT 322	Materials Processing and Performance	15	CHEMMAT 315	Chemical Reactor Engineering	15
CHEMMAT 331	Process Design 2	15	ENGSCI 311	Mathematical Modelling 3	15
ENGGEN 303	Managing Projects and Innovation	15			
15 points of electives from the following:					
			CHEMMAT 317	New Developments in Process Engineering	15
			CHEMMAT 754	Materials Engineering	15
			CHEMMAT 755	Electronic Materials and their Applications	15
			CHEMMAT 757	Engineering Biotechnology	15
Or other courses approved by the Head of Department.					

Part IV

120 points comprising:

Semester One			Semester Two		
CHEMMAT 750 A & B Design Project					30
CHEMMAT 751 A & B Research Project					30
CHEMMAT 752	Process Dynamics and Control	15	ENGGEN 403	Managing a Business	15
30 points of electives from the following:					
CHEMMAT 724	Advanced Materials Characterisation	15	CHEMMAT 754	Materials Engineering	15
CHEMMAT 753	Non-metallic Materials	15	CHEMMAT 755	Electronic Materials and their Applications	15
CHEMMAT 756	Food Process Engineering	15	CHEMMAT 757	Engineering Biotechnology	15
Or other courses approved by the Head of Department, such as:					
			ENGGEN 701	Professional Project	15
			ENGGEN 705	Advanced Innovation and New Product Development	15
Students who take ENGGEN 701 are not permitted to enrol for ENGGEN 705 and vice versa.					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Civil and Environmental Engineering

What is it?

When you think of engineering, you might conjure an image of a hard hat-wearing project manager overseeing the construction of skyscrapers, motorways, bridges, tunnels or dams. That stereotypical figure is likely to be a civil engineer. Civil engineers plan, design, construct and maintain projects which make modern life possible. They are the ones who calculate the maximum weight a bridge will be able to hold, or work out how to earthquake-proof new buildings. Because environmental protection and sustainability are now crucial factors to consider in any major construction project, environmental expertise is closely linked with civil engineering principles. Environmental engineers are able to technically evaluate structures, equipment and systems for potentially harmful effects of human activity, and design practical solutions that help mitigate further harm to our planet. You can see how, as disciplines, civil and environmental engineering will only become further entwined as time passes.

What will I study?

In Part II of the Civil and Environmental Engineering specialisation, you will get a taste of both sub-disciplines; you will learn the fundamentals of structural engineering, environmental principles, fluid mechanics, geotechnical engineering, materials, design and management. In Parts III and IV, you will be able to tailor your electives to focus on either civil or environmental engineering, or maintain a broad coverage of both if you prefer. Regardless of your focus, you will learn how to apply technical maths and science knowledge to the designs of major construction projects, while practising skills in teamwork, management, creativity and communication.

Where will it take me?

The demand for civil and environmental engineers will very soon exceed supply as cities continue to grow, aging infrastructure needs replacing and the need to rectify human harm to the environment becomes critical. As a graduate, you will find opportunities that involve the design, construction and maintenance of earth structures for roads, dams and urban developments; structural refits and construction of earthquake-resistant structures in steel, concrete and timber; use of water resources and environmental protection; and general supervision and management of large projects. Our graduates can be found in state-owned enterprises, in regional and district councils, and in the private sector, working as civil engineering contractors or for firms of consulting engineers. You might also use your qualification as a stepping stone into other careers; a number of our graduates are working in the top echelons of business around the world.

For more information, visit:
www.cee.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Civil and Environmental Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
CIVIL 201	Land Information Systems	10	CIVIL 211	Structures and Design 1	10
CIVIL 210	Introduction to Structures	15	CIVIL 221	Geomechanics 1	10
CIVIL 220	Introductory Engineering Geology	10	CIVIL 250	Civil Engineering Materials and Design	10
CIVIL 230	Fluid Mechanics 1	10	ENGGEN 204	Managing Design and Communication	15
ENGSCI 211	Mathematical Modelling 2	15	ENVENG 244	Environmental Engineering 1	15
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
CIVIL 322	Geomechanics 2	10	CIVIL 361	Transportation Engineering 2	10
CIVIL 331	Hydraulic Engineering	10	ENGSCI 311	Mathematical Modelling 3	15
CIVIL 360	Transportation Engineering 1	10	ENVENG 333	Engineering Hydrology	10
ENGGEN 303	Managing Projects and Innovation	15			
15 points of electives in each of Semester One and Two from the following:					
CIVIL 312	Structures and Design 2	15	CIVIL 313	Structures and Design 3	15
ENVENG 341	Environmental Engineering 2	15	ENVENG 342	Environmental Engineering Design	15
10 points of electives from the following:					
			CIVIL 314	Structural Dynamics	10
			CIVIL 324	Geomechanics 3	10
			CIVIL 332	Fluid Mechanics 2	10

Part IV

120 points comprising:

Semester One			Semester Two		
CIVIL 705 A & B Research Project					30
CIVIL 790	Civil Engineering Administration	15	ENGGEN 403	Managing a Business	15
60 points of electives from the following:					
CIVIL 713	Structures and Design 4	15	CIVIL 714	Multistorey Building Design	15
CIVIL 718	Light Gauge Steel	15	CIVIL 715	Advanced Structural Concrete	15
CIVIL 719	Matrix Structural Analysis	15	CIVIL 726	Engineering Geology	15
CIVIL 721	Foundation Engineering	15	CIVIL 741	Ground Improvements and Geosynthetics Engineering	15
CIVIL 725	Geotechnical Earthquake Engineering	15	CIVIL 750	Timber Engineering	15
CIVIL 731	Water Resources Modelling	15	CIVIL 759	Highway and Transportation Design	15
CIVIL 733	Coastal Engineering 1	15	CIVIL 782	Water Resources Engineering	15
CIVIL 758	Traffic Systems Planning and Design	15	ENVENG 740	Water and Wastewater Engineering	15
CIVIL 791	Construction Management	15			
ENVENG 701	Urban Stormwater Management	15			
ENVENG 702	Engineering Decision Making in Aotearoa	15			
ENVENG 747	Soil-Contaminant Fate Processes and Modelling	15			
ENVENG 750	Advanced Sustainability Engineering	15			
Or other courses approved by the Head of Department (up to 15 points), such as:					
CIVIL 701	Studies in Civil Engineering 1	15	CIVIL 710	Advanced Structural Dynamics	15
			ENGGEN 701	Professional Project	15
			ENVENG 746	Surface Water Quality Modelling	15
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Computer Systems Engineering

What is it?

Computer systems now pervade almost every aspect of our world, with ubiquitous computers hidden within a myriad of electro-mechanical environments. Their influence and application within our daily lives is limitless. Such computers are used as controllers and components of wireless communication systems, home automation systems, appliances, automobiles, factory processes, mechatronics, instrumentation, embedded systems and nano-systems. Computer Systems Engineering is the crucial branch of the discipline that solves practical engineering problems with computer-based solutions, often by embedding a computer system into a large and complex operation. These computers must sense, problem-solve and act in the real world, so their design requires specialised knowledge that encompasses both hardware and software. A degree in Computer Systems Engineering will provide you with the fundamental tools to keep up with this fast-paced area of expanding innovation.

What will I study?

The pace of change in computer systems is phenomenal. As it's not possible to provide a lasting professional education based on the technology alone, a BE(Hons) in Computer Systems Engineering provides a well-rounded foundation that will equip you for this dynamic and rapidly changing field. You will study a combination of: fundamental knowledge in computer systems, practical skills in hardware and software design and general problem solving skills required for designing and building systems. Through stimulating project work and exposure to a variety of existing and leading-edge electronic, hardware and software technologies, you will learn about embedded systems, computational intelligence, distributed computing, information engineering, intelligent robotics, industrial decision support systems, home automation, automobiles and instrumentation. All of this is supplemented with a solid grounding in electrical and electronic engineering.

Where will it take me?

The opportunities for computer systems engineers are vast. As innovative design and product development continues at pace, so too does the demand for qualified engineers. As a graduate, you may work in the mainstream computer industry or in other areas of electrical and engineering. Opportunities exist in multinational computer companies, consultancy firms, the telecommunications industry, and in the research and development teams of companies in a multitude of sectors. You might become a computer network manager, a product development engineer, a system test or automation engineer, an embedded systems designer, or a field specialist. As an extension of your Part IV research project, you could develop a new technology and form your own start-up company. Or, you might decide on a research-oriented career pathway and continue into postgraduate study. Whatever your path, we are confident that you won't be short of options.

For more information, visit:
www.ece.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Computer Systems Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
COMPSYS 201	Fundamentals of Computer Engineering	15	COMPSYS 202	Object Oriented Design and Programming	15
ELECTENG 202	Circuits and Systems	15	ELECTENG 204	Engineering Electromagnetics	15
ELECTENG 210	Electronics 1	15	ELECTENG 209	Analogue and Digital Design	15
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
COMPSYS 302	Design: Software Practice	15	COMPSYS 301	Design: Hardware Software Systems	15
COMPSYS 305	Digital Systems Design 1	15	ELECTENG 303	Systems and Control	15
ENGGEN 303	Managing Projects and Innovation	15			
ENGSCI 313	Mathematical Modelling 3ECE	15			
30 points of electives from the following:					
			COMPSYS 303	Microcomputers and Embedded Systems	15
			COMPSYS 304	Computer Architecture	15
			SOFTENG 325	Software Architecture	15
Or other courses approved by the Head of Department (up to 15 points).					

Part IV

120 points comprising:

Semester One			Semester Two		
COMPSYS 700 A & B Research Project					30
			ENGGEN 403	Managing a Business	15
75 points of electives from the following:					
COMPSYS 701	Advanced Digital Systems Design	15	COMPSYS 704	Advanced Embedded Systems	15
COMPSYS 723	Embedded Systems Design	15	COMPSYS 705	Formal Methods for Engineers	15
COMPSYS 726	Robotics and Intelligent Systems	15	COMPSYS 725	Computer Networks and Distributed Applications	15
ELECTENG 722	Control Systems	15	ELECTENG 704	Advanced Control Systems	15
ELECTENG 732	Communication Systems	15	ELECTENG 706	Digital Signal Processing	15
ELECTENG 733	Signal Processing	15	ELECTENG 726	Digital Communications	15
ELECTENG 734	Power Electronics	15	SOFTENG 761	Agile and Lean Software Development	15
SOFTENG 701	Advanced Software Engineering Development Methods	15			
SOFTENG 751	High Performance Computing	15			
Or other courses approved by the Head of Department (up to 15 points), such as:					
			ENGGEN 701	Professional Project	15
			ENGGEN 705	Advanced Innovation and New Product Development	15
Students who take ENGGEN 701 are not permitted to enrol for ENGGEN 705 and vice versa.					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Electrical and Electronic Engineering

What is it?

Modern society is highly dependent on reliable power, communications and electronic systems. Electrical and electronic engineers design the equipment and systems that provide these essential services. This sub-discipline encompasses a range of exciting and diverse fields, from heavy electrical power generation, to sophisticated medical electronics, computer modelling, electromagnetics, information technology and expert systems. Electrical and Electronic Engineering includes the worldwide telecommunications network, incorporating both satellite links and fibre-optic undersea cables to connect people around the world. We will have professional electrical and electronic engineers to thank when new forms of green electricity are developed, when electric vehicles replace our fossil fuel-powered fleet, and when smart phones recharge by resting on an inductively-powered mat, rather than requiring a plug point.

What will I study?

The pace of change in electrical and electronic engineering is so rapid that it's neither possible nor desirable to cover all aspects of current technology within a four-year degree programme, even in a fairly limited field of specialisation. With our programme, you will get a solid foundation of basic science, engineering science, electrical engineering science and selected fields of current technology. You can later build upon this as you progress in your career as a professional engineer. In Part II, you'll learn about electrical materials and electronic devices, circuit theory, software design and mathematical modelling tools. We provide an introduction to engineering electromagnetics and computer systems, and the programme is broadened by examining how engineers communicate material of a complex and technical nature. These strands of knowledge are further developed in the core courses of Part III. Elective courses of your choice throughout Parts III and IV allow you to further specialise in specific areas that interest you.

Where will it take me?

Virtually no other engineering discipline changes as rapidly, or provides such a vast variety of career paths. With this in mind, it may be difficult to envision the types of technology you might be working on by the time you graduate – they may not even be invented yet! However, with electronic technology becoming ever more central to our everyday lives, it is safe to assume you'll have a broad number of opportunities available to you after graduation. Today, our graduates are employed in roles relating to communications, wireless computing technologies, electronics, instrumentation, power electronics and motor-control. Opportunities also exist in processing industries such as timber, pulp and paper, steel, aluminium, meat, and dairy.

For more information, visit:
www.ece.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Electrical and Electronic Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
COMPSYS 201	Fundamentals of Computer Engineering	15	COMPSYS 202	Object Oriented Design and Programming	15
ELECTENG 202	Circuits and Systems	15	ELECTENG 204	Engineering Electromagnetics	15
ELECTENG 210	Electronics 1	15	ELECTENG 209	Analogue and Digital Design	15
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
ENGGEN 299 Workshop Practice to be completed during Part II		0			

Part III

120 points comprising:

Semester One			Semester Two		
ELECTENG 310	Electrical Engineering Design 1	15	ELECTENG 303	Systems and Control	15
ENGGEN 303	Managing Projects and Innovation	15	ELECTENG 305	Electronics 2	15
ENGSCI 313	Mathematical Modelling 3ECE	15	ELECTENG 311	Electrical Engineering Design 2	15
30 points of electives from the following:					
COMPSYS 302	Design: Software Practice	15	COMPSYS 303	Microcomputers and Embedded Systems	15
COMPSYS 305	Digital Systems Design 1	15	COMPSYS 304	Computer Architecture	15
ELECTENG 307	Transmission Lines and Systems	15	ELECTENG 309	Power Apparatus and Systems	15
			SOFTENG 325	Software Architecture	15
Or other courses approved by the Head of Department.					

Part IV

120 points comprising:

Semester One			Semester Two		
ELECTENG 700 A & B Research Project					30
			ENGGEN 403	Managing a Business	15
75 points of electives from the following:					
COMPSYS 723	Embedded Systems Design	15	COMPSYS 725	Computer Networks and Distributed Applications	15
COMPSYS 726	Robotics and Intelligent Systems	15	ELECTENG 701	Wireless Communication	15
ELECTENG 721	Radio Systems	15	ELECTENG 703	Advanced Power Systems	15
ELECTENG 722	Control Systems	15	ELECTENG 704	Advanced Control Systems	15
ELECTENG 731	Power Systems	15	ELECTENG 706	Digital Signal Processing	15
ELECTENG 732	Communication Systems	15	ELECTENG 724	Special Topic	15
ELECTENG 733	Signal Processing	15	ELECTENG 726	Digital Communications	15
ELECTENG 734	Power Electronics	15	ELECTENG 735	Special Topic	15
			ELECTENG 736	Analog and Digital Filter Synthesis	15
			ELECTENG 738	Selected Topics in Advanced Power Systems	15
Or other courses approved by the Head of Department, such as:					
			ENGGEN 701	Professional Project	15
			ENGGEN 705	Advanced Innovation and New Product Development	15
Students who take ENGGEN 701 are not permitted to enrol for ENGGEN 705 and vice versa.					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Engineering Science

What is it?

Engineering scientists are problem solvers. They use their intellect and advanced computing and mathematical skills to find better solutions for many aspects of our daily lives. How can a forest be managed to make a profit while still remaining environmentally friendly? How can a sail be designed to work in low wind conditions? What prices should be charged for airline tickets to maximise the revenue from a given flight? These are all questions an engineering scientist can answer. Engineering scientists are becoming increasingly important to modern society as their understanding of science, mathematics and computing underpins how everything operates around us, and their unique skill set can be applied to an extremely broad range of everyday problems.

What will I study?

In addition to core courses in mathematics, design, mechanics and computational techniques, you will be able to choose elective courses in areas that interest you most. You might align with one of the themes of Engineering Science: operations research, energy or computational mechanics. Operations research, or "the science of better", involves solving mathematical puzzles to design the best solutions to practical problems, such as optimising bicycle routes. Energy is concerned with energy systems for generation or distribution. Computational mechanics examines how the application of force affects different materials – for instance, how a car is damaged when it crashes or how a bubble rises. Other study areas include environmental modelling, biomedical engineering, analytics and financial mathematics. You will find that the diverse range of options available throughout your degree will directly contribute to your own professional versatility.

Where will it take me?

As a graduate with skills spanning mathematics, mechanics, computers, problem solving and project management, you will be able to apply yourself in more areas of business than you can imagine. You might end up modelling an optimal production process for a large manufacturer, using your advanced programming skills as a software designer, or applying your logical thinking and communications skills in a management position with a bank or financial consultancy. Our graduates can be found in many leading New Zealand companies such as Fonterra, Air New Zealand, Meridian Energy, Navman, Orion, government organisations such as NIWA and Transpower, and engineering consultancies such as Beca and Maunsell.

For more information, visit:
www.des.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Engineering Science specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
BIOMENG 221	Mechanics of Engineered and Biological Materials	15	ENGGEN 204	Managing Design and Communication	15
ENGSCI 211	Mathematical Modelling 2	15	ENGSCI 263	Engineering Science Design I	15
ENGSCI 233	Computational Techniques and Computer Systems	15			
ENGSCI 255 Modelling in Operations Research (Semester One or Two)		15			
30 points of electives approved by the Head of Department.					
ENGGEN 299 Workshop Practice to be completed during Part II		0			

Part III

120 points comprising:

Semester One			Semester Two		
ENGGEN 303	Managing Projects and Innovation	15	ENGSCI 331	Computational Techniques 2	15
ENGSCI 314	Mathematical Modelling 3ES	15	ENGSCI 363	Engineering Science Design II	15
ENGSCI 343	Mathematical and Computational Modelling in Mechanics	15			
ENGSCI 391	Optimisation in Operations Research	15			
30 points of electives approved by the Head of Department, such as:					
			ENGSCI 355	Applied Modelling in Simulation and Optimisation	15

Please consult the Engineering Science study tracks for a list of Part II and Part III elective suggestions: **www.des.auckland.ac.nz/uoa/engsci-tracks**

Part IV

120 points comprising:

Semester One			Semester Two		
ENGSCI 700 A & B Research Project					30
			ENGGEN 403	Managing a Business	15
75 points of electives from the following:					
ENGSCI 711	Advanced Mathematical Modelling	15	ENGSCI 712	Computational Algorithms for Signal Processing	15
ENGSCI 740	Advanced Mechanics in Modern Research and Technology	15	ENGSCI 741	Advanced Mathematical and Computational Modelling in Mechanics	15
ENGSCI 753	Computational Techniques in Mechanics and Bioengineering	15	ENGSCI 763	Advanced Simulation and Stochastic Optimisation	15
ENGSCI 760	Algorithms for Optimisation	15	ENGSCI 768	Advanced Operations Research and Analytics	15
ENGSCI 761	Integer and Multi-objective Optimisation	15	GEOTHERM 785	Geothermal and Reservoir Engineering	15
ENGSCI 762	Scheduling and Optimisation in Decision Making	15			
Or other courses approved by the Head of Department (up to 30 points), such as:					
			ENGSCI 772	Whole Organ Modelling	15
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Mechanical Engineering

What is it?

Mechanical Engineering is the innovative application of science and technology to the design, production and operation of mechanical devices, machinery and systems. Mechanical engineers excel at applying technical knowledge from a variety of areas – mathematical modelling, materials, thermal engineering, fluid dynamics, vibrations and structures – to design complex systems such as robots, wind turbines and cars. Their work spans a range of scales, from nanotechnologies to large-scale industrial machinery and processes such as paper mills or car assembly plants. Mechanical engineers also understand how to efficiently use energy in processes, so they might be involved in designing a heating system for a hospital or a refrigeration plant for a food export company.

What will I study?

Engineers must not only have a good understanding of the engineering sciences, but also be able to communicate effectively and to apply their knowledge and experience to new problems. As a student of Mechanical Engineering, you will learn the fundamentals of engineering science – dynamics, fluid mechanics, heat transfer, thermodynamics, industrial engineering, control systems, solid mechanics and materials. You will then apply this theory to practical problems, whilst practising essential aspects of professional engineering, including design, communication and project management. In Part IV, you will be able to choose elective courses to specialise in a field that interests you. Throughout our specialisation, we emphasise design and project work, so that you are able to practise applying your knowledge to the development of new products.

Where will it take me?

Mechanical engineers can utilise their knowledge and skills in a wide range of industries. As a graduate, you might pursue opportunities in major primary process plants that produce things like wood pulp, dairy, meat, aluminium, steel, petroleum and electricity. Or you might be employed in the manufacturing industries, working on washing machines, packaging, agricultural machinery or wood processing. The transport industry also employs mechanical engineers who ensure the efficient and reliable operation of trains, aircraft and buses. Many of our graduates go on to work as consulting engineers; they are commissioned by other companies to provide design, construction and technical advice. For example, a company planning a new brewery, an airport baggage-handling system or an air-conditioning system would usually turn to a consulting mechanical engineer. Because graduates are valued for their analytical and problem-solving skills, there are also opportunities for them in commercial areas like insurance assessment, banking and management.

For more information, visit:
www.mech.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Mechanical Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
MECHENG 235	Design and Manufacture 1	15	MECHENG 211	Thermofluids	15
MECHENG 242	Mechanics of Materials 1	15	MECHENG 222	Dynamics	15
			MECHENG 236	Design and Manufacture 2	15
15 points of electives from the following:					
MECHENG 201	Electronics and Computing for Mechanical Engineers	15			
Or other courses approved by the Head of Department.					
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
ENGGEN 303	Managing Projects and Innovation	15	ENGSCI 311	Mathematical Modelling 3	15
MECHENG 322	Control Systems	15	MECHENG 311	Thermal Engineering	15
MECHENG 334	Engineering Design 3M	15	MECHENG 325	Dynamics of Fluids and Structures	15
MECHENG 340	Mechanics of Materials 2	15	MECHENG 352	Manufacturing Systems	15

Part IV

120 points comprising:

Semester One			Semester Two		
MECHENG 763 A & B Research Project					30
MECHENG 731	Engineering Design 4M	15	ENGGEN 403	Managing a Business	15
60 points of electives from the following:					
MECHENG 712	Aerohydrodynamics	15	MECHENG 715	Building Services	15
MECHENG 713	Energy Technology	15	MECHENG 724	Multivariable Control Systems	15
MECHENG 722	Engineering Vibrations	15	MECHENG 726	Acoustics for Engineers	15
MECHENG 743	Composite Materials	15	MECHENG 747	Manufacturing and Industrial Processes	15
MECHENG 752	Technology Management	15	ENGGEN 701	Professional Project	15
Or other courses approved by the Head of Department, such as:					
			ENGGEN 705	Advanced Innovation and New Product Development	15
Students who take ENGGEN 701 are not permitted to enrol for ENGGEN 705 and vice versa.					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Mechatronics Engineering

What is it?

Mechatronics Engineering integrates mechanical design, electronics and computer systems, to design and develop automated systems. Specialists in this discipline work with sensors and actuators, develop control algorithms and use advanced functional materials to design mechatronic products such as chassis-stabilising systems, anti-lock brakes, engine control units, disk drives, cameras, service and surgical robots and medical devices. All of these systems are largely mechanical in nature, but could not function without their essential electronic and computer control system components. Sometimes considered to be 'jacks of all trades', mechatronics engineers often work in and coordinate teams of different engineering disciplines. Very often mechatronics engineers are generalists rather than specialists, and this versatility can lead to their employment in a very wide range of industries.

What will I study?

The Department of Mechanical Engineering has offered this specialisation since 2002. Because a significant number of core courses in Parts II and III are identical to those required for the Mechanical Engineering specialisation, Mechatronics students are provided with a strong foundation in mechanical engineering. This base is supplemented with an emphasis on software design and electronics courses. In Part III, the balance between mechanical, electrical and computer engineering courses is almost equal. You will study software design, sensors and actuators, signal processing, analog and digital circuit design, microcontroller systems, systems modelling, digital control and industrial automation. A particular feature of the degree programme is the strong emphasis placed on design and project work, in which students acquire the ability to apply their knowledge to the development of new products and develop skills in teamwork and communication.

Where will it take me?

In recent years, Mechatronics Engineering has become an internationally-recognised sub-discipline, with degree programmes now being offered in a number of universities worldwide. Because of your broad foundations in several key areas of engineering – mechanics, electronics and computer systems – your employment opportunities as a mechatronics graduate will be plentiful and varied. Our degree programme is fully in line with the modern world's desire for a high-tech, knowledge-based economy, and as society moves closer toward 'smart' homes, cities and grids, mechatronics engineers will be in high demand. Our graduates can be found in a wide range of jobs that involve the design and improvement of high-tech products, such as home appliances, medical devices and machine tools, and processes related to precision agriculture and remote sensing.

For more information, visit:
www.mech.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Mechatronics Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
ENGSCI 211	Mathematical Modelling 2	15	ENGGEN 204	Managing Design and Communication	15
MECHENG 235	Design and Manufacture 1	15	MECHENG 211	Thermofluids	15
MECHENG 242	Mechanics of Materials 1	15	MECHENG 222	Dynamics	15
			MECHENG 270	Software Design	15
15 points of electives from the following:					
ELECTENG 208	Electric Circuit Analysis	15			
Or other courses approved by the Head of Department.					
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
ENGGEN 303	Managing Projects and Innovation	15	ENGSCI 311	Mathematical Modelling 3	15
MECHENG 312	Sensors and Actuators	15	MECHENG 313	Real Time Software Design	15
MECHENG 322	Control Systems	15	MECHENG 325	Dynamics of Fluids and Structures	15
MECHENG 370	Analog Circuit Design	15	MECHENG 371	Digital Circuit Design	15

Part IV

120 points comprising:

Semester One			Semester Two		
MECHENG 762 A & B Mechatronics Research Project					30
MECHENG 705	Mechatronics Systems	15	ENGGEN 403	Managing a Business	15
MECHENG 706	Mechatronics Design	15			
45 points of electives from the following:					
COMPSYS 726	Robotics and Intelligent Systems	15	MECHENG 715	Building Services	15
MECHENG 709	Industrial Automation	15	MECHENG 724	Multivariable Control Systems	15
MECHENG 712	Aerohydrodynamics	15	MECHENG 726	Acoustics for Engineers	15
MECHENG 722	Engineering Vibrations	15	MECHENG 735	Microelectromechanical Systems	15
MECHENG 743	Composite Materials	15	MECHENG 736	Biomechatronic Systems	15
MECHENG 752	Technology Management	15	MECHENG 747	Manufacturing and Industrial Processes	15
			ENGGEN 701	Professional Project	15
Or other courses approved by the Head of Department, such as:					
			ENGGEN 705	Advanced Innovation and New Product Development	15
Students who take ENGGEN 701 are not permitted to enrol for ENGGEN 705 and vice versa.					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Software Engineering

What is it?

Software engineering is behind many of the things we now take for granted – internet banking, online shopping, mobile payments. It is the apps on your smart phone, the games on your computer, and the cloud storage you depend on to back up your devices. Software engineers combine their expertise in computer science, engineering and mathematics to design, develop and test software for various uses. The sub-discipline as a whole involves software architecture, system performance, testing and quality assurance, requirements engineering, computer and human interaction, and documentation, all amongst considerations of ethical, social, legal, economic and safety issues. This area of engineering is complex and fast-paced, but propelled by the momentum of intuitive software and app development, the possibilities stretch as far as your imagination.

What will I study?

The Software Engineering specialisation produces graduates capable of engineering large, complex and fault-tolerant systems which function reliably and can be effectively developed and maintained. As a student of Software Engineering, you will build on the general engineering literacy you acquired in Part I by developing specialist software and programming knowledge. You will learn about operating systems, programming languages, computer organisation and architecture, software design and construction, data communications and algorithm design and analysis, all alongside fundamental mathematics, project management and professional ethics. Our degree is co-taught by the Departments of Computer Science and Electrical & Computer Engineering. This means you will receive a strong engineering perspective in addition to skills and knowledge relating to leading-edge computing applications, computing technology, and computer systems. By the end of Part IV, you'll not only have superior ICT training, but an ability to understand and work through the entire lifecycle of software development and maintenance.

Where will it take me?

We consider Software Engineers to be the newest generation of IT workforce leaders, and believe graduates of this sub-discipline will continue to be 'in demand' for the foreseeable future. Infrastructure, government agencies, businesses, and individuals are increasingly reliant on intuitive, dependable, cloud-based software, and this movement is not expected to slow. With a BE(Hons) in Software Engineering, you could end up in virtually any company, managing their information storage and sharing technologies. You will also find ample opportunities in dedicated software consultancy firms. Here, you won't just be writing programs, you'll be discussing requirements with clients and designing solutions, making quotes and meeting budgets, and potentially directing your own team. You might end up in management, as an IT CEO, CTO, project leader or specialist technical lead. Other graduates of ours have extended their Part IV projects with postgraduate research, using this to kick-start their very own start-up companies.

For more information, visit:
www.ece.auckland.ac.nz

Courses outlined in the following pages for Parts II, III and IV of the Software Engineering specialisation are those being taught in 2015.

Part II

120 points comprising:

Semester One			Semester Two		
COMPSYS 201	Fundamentals of Computer Engineering	15	ENGGEN 204	Managing Design and Communication	15
ENGSCI 213	Mathematical Modelling 2SE	15	SOFTENG 206	Software Engineering Design 1	15
SOFTENG 250	Introduction to Data Structures and Algorithms	15	SOFTENG 211	Software Engineering Theory	15
SOFTENG 251	Object Oriented Software Construction	15	SOFTENG 254	Quality Assurance	15
ENGGEN 299 Workshop Practice to be completed during Part II					0

Part III

120 points comprising:

Semester One			Semester Two		
ENGGEN 303	Managing Projects and Innovation	15	SOFTENG 306	Software Engineering Design 2	15
SOFTENG 350	Human Computer Interaction	15	SOFTENG 325	Software Architecture	15
SOFTENG 351	Fundamentals of Database Systems	15	SOFTENG 370	Operating Systems	15
30 points of electives from the following:					
COMPSCI 373	Computer Graphics and Image Processing	15	COMPSCI 367	Artificial Intelligence	15
COMPSYS 305	Digital Systems Design 1	15	COMPSYS 303	Microcomputers and Embedded Systems	15
SOFTENG 364	Computer Networks	15	COMPSYS 304	Computer Architecture	15
Or other courses approved by the Head of Department.					

Part IV

120 points comprising:

Semester One			Semester Two		
SOFTENG 700 A & B Research Project					30
SOFTENG 750	Software Development Methodologies	15	ENGGEN 403	Managing a Business	15
60 points of electives from the following:					
COMPSYS 723	Embedded Systems Design	15	COMPSYS 705	Formal Methods for Engineers	15
COMPSYS 726	Robotics and Intelligent Systems	15	SOFTENG 702	Advanced Human Computer Interaction	15
ENGSCI 760	Algorithms for Optimisation	15	SOFTENG 752	Formal Specification and Design	15
SOFTENG 701	Advanced Software Engineering Development Methods	15	SOFTENG 761	Agile and Lean Software Development	15
SOFTENG 751	High Performance Computing	15			
Or other courses approved by the Head of Department (up to 30 points).					
ENGGEN 499 Practical Work to be completed before and during Part IV					0

Course descriptions

All courses specified in the degree specialisation schedules and offered by the Faculty of Engineering in 2015 are listed below. For a complete list of undergraduate and postgraduate courses, please refer to the *2015 University of Auckland Calendar*.

Biomedical Engineering

Stage II

BIOMENG 221 (15 Points) Mechanics of Engineered and Biological Materials

The principles of mechanics and the special circumstances associated with applying these principles to living and prosthetic structures will be presented. Topics include: introduction to linear elasticity, stresses and strains specific to direct and torsional loading, material constitutive relationships (including anisotropy, nonlinearity, and viscoelasticity), axial and transverse loading of bone, pressure loading of the heart, and theories of failure.

Restriction: ENGSCI 274

BIOMENG 241 (15 Points) Instrumentation and Design

An introduction to engineering instrumentation related to the measurement of biological signals. Topics include: fundamentals of measurement systems (electric circuits, basic electronics, frequency domain signal analysis and transient analysis, measurement systems). This course will cover the design methodology of instrumentation systems and include an instrumentation design project.

Prerequisite: ELECTENG 101
Restriction: BIOMENG 233

BIOMENG 261 (15 Points) Tissue and Biomolecular Engineering

Overview of molecular and tissue engineering principles emphasising biochemical kinetics, gene regulation, cell behaviour and biomedical ethics. Laboratory practice and design project in cell culture and molecular biology techniques. Topics include enzymes and regulation of metabolic pathways, thermodynamic principles of biochemical reactions, systems biology and regulatory motifs in biochemical networks, cell culture techniques, research and medical ethics.

Prerequisite: BIOSCI 107, ENGSCI 211
Restriction: BIOMENG 361

Stage III

BIOMENG 321 (15 Points) Continuum Modelling in Bioengineering

An introduction to continuum modelling approaches to bioengineering problems across a range of spatial scales. Topics include: tensor analysis, molecular and cellular mechanics of striated muscle; finite deformation elasticity and constitutive relations for soft biological materials; conservation equations for momentum, mass and heat transfer in fluids; viscous flow; boundary layers; pure conduction and diffusion; advective transport of mass and heat.

Restriction: ENGSCI 343, 371

BIOMENG 341 (15 Points) Bioinstrumentation and Design

Sensors and actuators (temperature, position, force, pressure, flow, bioelectric, optical sensors and instruments). Signals, systems and controls (s-domain signal notation, transfer functions, frequency response functions, block diagrams, the Laplace transform, first and second order systems, characterisation methods, fundamentals of control). Bioinstrumentation design methodology, Biomedical instrumentation design project.

Restriction: ENGSCI 372, 373

Chemical and Materials Engineering

Stage I

CHEMMAT 121 (15 Points)
Materials Science

Introduction to materials science starting with the fundamentals of atomic structure and bonding and how this builds up a microstructure to create a solid. Metals, polymers, ceramics, electronic materials, composite and biomaterials will be covered and the properties, advantages and disadvantages of each discussed. Considerations such as corrosion, degradation and failure will be studied with a focus on improving design and creating new materials for our future world.

Stage II

CHEMMAT 211 (15 Points)
Introduction to Process Engineering

Materials and energy balancing with and without chemical reaction, materials and energy balances in multiphase systems such as crystallisation, evaporation, drying, humidification, dehumidification, absorption, distillation, extraction and filtration. An introduction to the most important unit operations in the chemical industry, design concept and safety as applied to processing.

CHEMMAT 212 (15 Points)
Energy and Processing

Introduction to thermodynamics for process engineering. The second law of thermodynamics. Thermodynamics of power and refrigeration cycles and flow processes. Classical chemical thermodynamics including concepts of chemical potential, fugacity and activates; their applications to vapour-liquid equilibria and reacting systems. Multi-component physical equilibria. Multiple reaction equilibria and system-free energy minimisation. Practical examples and applications.

CHEMMAT 213 (15 Points)
Transfer Processes 1

Fluid properties: specific gravity, viscosity, surface tension and types of flow. Fluid statics and manometry. Math models of fluid motion: the Bernoulli equation. Dimensional analysis and similitude: Reynolds Number, Friction factor and Prandtl number. Flow measurement, pumps/pumping and valves. Heat transfer via steady state conduction, convection and radiation. Effect of geometry, force and natural convection. Dimensionless correlations of heat transfer processes with flow processes. Film and overall heat transfer coefficients. Practical examples and applications.

CHEMMAT 221 (15 Points)
Materials

Solid state transformation – diffusion, vacancies, solidification, nucleation and growth. Dislocations and plastic deformation, strengthening mechanisms. Mechanical performance of materials. Iron-carbon alloy systems and transformations (including pearlitic, austenitic, bainitic and martensitic), effects of alloying elements. Analytical methods: X-ray diffraction and electron microscopy. Polymers, structure/property relationships; viscoelasticity.

CHEMMAT 232 (15 Points)
Process Design 1

Mechanics of solids and analysis of stress and strain. Introduction to materials selection. Design of thin-walled pressure vessels. Application to the design of vessels, tanks, reactors, piping and heat transfer equipment. Introduction to the chemical industry, unit operations, line diagrams and process equipment. Report writing and oral communication skills.

Restriction: CHEMMAT 231

CHEMMAT 242 (15 Points) Applied Chemistry

Topics in analytical, physical and organic chemistry, biochemistry and polymeric materials. Surface and interfacial processes. Introduction to analytical chemistry including instrumental techniques. Atomic structure, chemical bonding, kinetics and equilibrium. Fundamentals of organic chemistry. Carbohydrates, lipids and proteins, enzymes and fermentation. Polymeric materials and relevant industrial applications including plastics materials, coatings and adhesives.

Stage III

CHEMMAT 312 (15 Points) Transfer Processes 2

Principles of continuous and staged processes. Mass transfer in various media, systems and phases. Interrelating equipment design to mass transfer processes. Studies of selected separation processes such as absorption, solvent extraction and distillation. Heat transfer with phase change; nucleate and film boiling of liquids.

CHEMMAT 313 (15 Points) Advanced Process Engineering

An in-depth analysis of selected topics that influence the design, operation and performance of process plants. Topics may include particulate technology, particle mechanics and particle motions, non-Newtonian fluid flow, two-phase solid-liquid and gas-liquid flow, flow through porous media and packed beds, filtration, centrifugation, fluidisation, variable analysis of variations in materials and product processing, membrane separation methods and optimisation techniques.

Restriction: CHEMMAT 316, 411

CHEMMAT 315 (15 Points) Chemical Reactor Engineering

Kinetics of multiple reactions, analysis of basic reactors - batch, plug flow and continuous stirred tank. Performance under isothermal, adiabatic and varying temperature. Effect of semi-continuous, counterflow and recycle on performance. Heterogeneous reactions and catalysis, diffusion and reaction in porous catalysts, effects of external mass transfer resistance, fixed and fluidised bed reactors, gas-liquid reactors. Reactor engineering for biological and electrochemical systems.

CHEMMAT 317 (15 Points) New Developments in Process Engineering

Focusing on Green Process Engineering, this course aims to improve the sustainability and minimise the environmental impact of all process design and engineering. This includes: overview and quantification of human environmental impacts, waste and energy minimisation, clean technologies, life cycle analysis, Industrial Ecology and emissions regulation. Unit operations covered: adsorption, strippers, precipitation, flocculation, ion exchange, membrane separations and advanced oxidations.

CHEMMAT 322 (15 Points) Materials Processing and Performance

Materials Performance: materials degradation and protection, including high temperature corrosion and high temperature materials, corrosion principles and practice, testing methods, corrosion resistant materials and corrosion protection. Cast irons and non-ferrous alloys; performance of polymers and ceramics. Materials Processing: liquid metal processes, metal smelting, solidification and casting; mechanical forming processes.

Restriction: CHEMMAT 321, 421

CHEMMAT 331 (15 Points) Process Design 2

The nature and function of design – process conception, alternatives, constraints and their simulation. Raw materials, safety and environmental considerations. Flow sheet

representation of information. Separation systems, heat exchanger networks and specification of equipment. Process economics and project documentation.

Stage IV

CHEMMAT 724 (15 Points) Advanced Materials Characterisation

The underlying theory essential to understanding modern methods of advanced materials analysis including: electron microscopy, surface analysis, atomic force microscopy and nanoindentation. Teaching is highly research informed with examples drawn from the Research Centre for Surface and Materials Science (RCSMS) and involves principles, practical experience and independent project work related to the application of these techniques.

CHEMMAT 750A (15 Points) CHEMMAT 750B (15 Points) Design Project

Specification, planning and executing a specific process design project. The detailed considerations in the project to include environmental impact, safety and occupational health issues, material selection, process energy demand and efficiency, costing and economics, process start-up and operation.

Restriction: CHEMMAT 431, 432
To complete this course students must enrol in CHEMMAT 750 A and B

CHEMMAT 751A (15 Points) CHEMMAT 751B (15 Points) Research Project

Students are required to submit a report on independent investigation carried out on a topic assigned by the Head of Department of Chemical and Materials Engineering. The work shall be supervised by a member of staff.

Restriction: CHEMMAT 441, 442
To complete this course students must enrol in CHEMMAT 751 A and B

CHEMMAT 752 (15 Points) Process Dynamics and Control

Application of mathematical modelling and simulation for understanding modern methods of process control via open-ended workshop study projects. Includes rigorous treatment of control fundamentals (dynamics, hardware, transient analysis, feedback, tuning), advanced classical control (feed-forward, cascade), and advanced control (multiple variable control, whole plant control and model predictive control). Research informed with examples from the Industrial Information and Control Centre (I2C2).

Restriction: CHEMMAT 311, 411, 412

CHEMMAT 753 (15 Points) Non-metallic Materials

Polymers – structure and physical properties, influence of structure and temperature on mechanical properties. Engineering polymers and design. Biological materials – structural and hierarchical relationships, structural proteins, natural fibres. Biological tissues as integrated multicomponent systems. Growth, adaptation and remodelling. Ceramics - bonding, structure, mechanical and thermal properties, high performance ceramics, glasses and composites, processing techniques.

Restriction: CHEMMAT 422

CHEMMAT 754 (15 Points) Materials Engineering

Advanced aspects of mechanical behaviour, primarily application of fracture mechanics and failure analysis. Nanomaterials and nanotechnology, synthesis, processing and characterisation of nanomaterials. Applications in devices - sensing, catalysis and biomedical areas. Selected topics on surface engineering - coating and thin films technology. Further topics on tribology, friction and wear of materials, powder metallurgy, welding technologies.

Restriction: CHEMMAT 423

CHEMMAT 755 (15 Points)
Electronic Materials and their Applications

Introduction to electronic properties of materials and their applications. Contents include: basic theories of electrical conduction, conducting and insulating materials, semiconductor properties and materials, dielectric, magnetic, optical, thermal and sensing properties and materials, and superconductors. This course will cover the basic properties, processing methods and performance of electronic materials. The applications of electronic materials in energy and environmental engineering will be emphasised.

Restriction: CHEMMAT 424

CHEMMAT 756 (15 Points)
Food Process Engineering

Application of engineering principles to food processing. Study of main food processing operations: heating and thermal processing, cooling, freezing and thawing, evaporation, dehydration, the use of membranes and packaging. Innovative thermal and non-thermal food processes, and most fundamental areas of engineering relevant for food processing such as heat and mass transfer, are covered. Process impact on food safety, quality and preservation is also discussed.

Restriction: CHEMMAT 463

CHEMMAT 757 (15 Points)
Engineering Biotechnology

Principles of biochemical engineering. Exploitation of bioreaction and bioprocess systems. Introduction to biomolecular techniques and their applications. Enzyme and microbial reaction kinetics, bioreactor design and downstream processing. Examples of biochemical process and food industry applications.

Restriction: CHEMMAT 361, 464, FOODSCI 704

Civil Engineering

Stage II

CIVIL 201 (10 Points)
Land Information Systems

Aspects of elementary engineering surveying as used for gathering site information for the design and setting out of works. Land information systems, modern methods of gathering, processing and presenting information for engineering purposes.

CIVIL 210 (15 Points)
Introduction to Structures

Structural forms and systems. Analysis of determinate systems, elasticity. Engineering beam theory, elasticity, failure theories. Introduction to structural design.

Prerequisite: ENGGEN 121 or 150
Restriction: ENVENG 210, RESOURCE 210

CIVIL 211 (10 Points)
Structures and Design 1

Introduction to structural design – philosophy, loads, codes; design of simple structural elements in various materials.

CIVIL 220 (10 Points)
Introductory Engineering Geology

Principles of physical and structural geology. Elementary stratigraphy. Applied geomorphology. Geologic surveying and mapping. Elementary seismology; microzoning and seismotectonic hazard evaluation. Engineering properties, description and identification of geologic materials. General applications of geology to engineering.

CIVIL 221 (10 Points)
Geomechanics 1

The basic concepts and principles governing the mechanical behaviour of soil, including phase relationships, permeability and seepage, the principle of effective stress, soil strength, compressibility and basic stability analysis.

CIVIL 230 (10 Points)
Fluid Mechanics 1

Fluid properties and definitions. Hydrostatics and stability of floating bodies. Fluid flow, energy and continuity relationships. Viscosity. Force and momentum relationship. Dimensional analysis and similarity. Introduction to turbomachinery.

CIVIL 250 (10 Points)
Civil Engineering Materials and Design

Properties and manufacturing of concrete, steel and timber structural products. Design principles and examples for concrete, steel and timber members.

Stage III

CIVIL 312 (15 Points)
Structures and Design 2

Structural analysis of indeterminate structures. Moment-area method for deformations. Loading actions as per NZS 1170 and load collation. Design of structural members in timber portal frames.

CIVIL 313 (15 Points)
Structures and Design 3

Design of structures in reinforced concrete, prestressed concrete and structural steel. Computer analysis of structures; use of a commercial analysis program. Design project.

CIVIL 314 (10 Points)
Structural Dynamics

Dynamics of single and multi-degree-of-freedom systems. Ground motion, response spectra, time-history and spectral modal analysis; introduction to seismic design.

CIVIL 322 (10 Points)
Geomechanics 2

Stability analysis in geotechnical engineering; slope stability, soil pressures on retaining structures, bearing capacity. Consolidation and settlement.

Prerequisite: CIVIL 221

CIVIL 324 (10 Points)
Geomechanics 3

Shear strength of soil - triaxial testing, measurement of pore water pressures and interpretation of test data. Effective and total stress paths for drained and undrained loading in laboratory tests and field applications. Consolidation and the use of preloading to accelerate consolidation. Application of elastic solutions in geomechanics.

Restriction: CIVIL 420

CIVIL 331 (10 Points)
Hydraulic Engineering

Pipe flow – fluid resistance, friction factor, simple pipe flow and minor losses, steady-state pipe flow and pipe networks. Open channel flow – energy and momentum, uniform flow and flow resistance, critical flow, specific energy and flow force, backwater analysis, channel transitions.

CIVIL 332 (10 Points)
Fluid Mechanics 2

Laminar and turbulent flow. Ideal fluid flows. Boundary layer theory and separation, drag and lift. River morphology and flows. River pollution. Unsteady flow in channels.

CIVIL 360 (10 Points)
Transportation Engineering 1

Highway alignment geometrics (horizontal, vertical and cross sectional design). Basis of the main pavement design techniques, pavement materials, stabilisation, compaction and bituminous surfacings.

CIVIL 361 (10 Points)
Transportation Engineering 2

Planning for land transport facilities and urban development. Arrangement of street networks and environmental areas. Basic operational analyses at priority and signalised intersections for vehicles and pedestrians. Highway capacity analyses. Parking design. Introduction to transportation planning modelling.

Stage IV

CIVIL 701 (15 Points)
Studies in Civil Engineering 1

Advanced course on topics to be determined each year by the Head of Department of Civil and Environmental Engineering.

CIVIL 705A (15 Points)
CIVIL 705B (15 Points)
Research Project

Restriction: CIVIL 408
To complete this course students must enrol in CIVIL 705 A and B

CIVIL 710 (15 Points)
Advanced Structural Dynamics

Advanced topics in structural dynamics, such as wave guide representation, holistic consideration of structural behaviour including soil, main and secondary structures interaction, nonlinearities of soil-foundation-structure system including uplift, pile-soil separation, plastic hinge or pounding. The core skills are taught and accompanied by an individual project in which independent research is undertaken to solve a challenging structural dynamics problem.

Prerequisite: Departmental approval

CIVIL 713 (15 Points)
Structures and Design 4

Continuation of the design and detailing of structures in structural steel, reinforced concrete, reinforced masonry, and timber including connections in steelwork, composite steel/concrete beams, masonry structures and retaining walls in reinforced masonry. Practical understanding and design of concrete ground floor slabs. Introduction to the NZ Standard for light timber frame construction. Introduction to fire engineering. Techniques in the checking of existing structures and lessons learned from failures.

Prerequisite: CIVIL 312 and 313 or equivalent
Restriction: CIVIL 411

CIVIL 714 (15 Points)
Multistorey Building Design

Techniques for the design of structures to resist seismic loading. Derivation of design actions, alternative structural systems for resisting these loads, design of structural components subject to cyclic inelastic action, detailing of members and joints to enhance earthquake resistance. Techniques of seismic isolation. Design project.

Prerequisite: CIVIL 313 or equivalent

CIVIL 715 (15 Points)
Advanced Structural Concrete

Behaviour of reinforced and prestressed concrete components and systems under complex loading and environmental conditions. Thermal and other loading conditions in bridge structures.

Prerequisite: CIVIL 313 or equivalent

CIVIL 718 (15 Points)
Light Gauge Steel

Use of thin steel load bearing structural components in walls, floors and roofs. Behaviour of members and connections under the full range of structural actions. Theory and design application including the Direct Strength Method of design. Use of light gauge steel acting compositely with other materials such as concrete and structural foams.

Prerequisite: CIVIL 313 or equivalent

CIVIL 719 (15 Points)
Matrix Structural Analysis

Direct stiffness method applied to linear, nonlinear and stability analyses. Introduction to variational principles and finite element method. Projects in practical modelling of major structures such as bridges and multi-storey buildings. Use of commercial software.

Restriction: CIVIL 416

CIVIL 721 (15 Points)
Foundation Engineering

Foundation performance requirements. Foundation types. Foundation design loads. Limit state design. Design of shallow foundations. Design of deep foundation. Case histories illustrating construction, performance and failure of foundations. Design and performance of gravity retaining structures, embedded retaining walls and reinforced earth walls.

Restriction: CIVIL 323, 421

CIVIL 725 (15 Points)
Geotechnical Earthquake Engineering

Advanced topics in earthquake effects on geotechnical structures, including: dynamic properties of soils; earthquake-induced ground response; seismic stability of slopes, embankments; earth-retaining structures; soil liquefaction; ground deformations; remediation and mitigation techniques. Design applications and advanced methods of analysis with case history analyses of major earthquakes. An independent research project will be used to solve a challenging geotechnical earthquake engineering problem.

Prerequisite: CIVIL 324 or equivalent

CIVIL 726 (15 Points)
Engineering Geology

Introduction to fundamentals in soil and rock mechanics and their application to engineering projects. Discussion of natural hazards and their implications on infrastructure design. Practical exercises in field mapping, core logging, aerial photograph interpretation, and basic laboratory tests.

Restriction: CIVIL 404, EARTHSCI 372, GEOLOGY 372

CIVIL 731 (15 Points)
Water Resources Modelling

Risk and uncertainty in water resources systems; evaluation of alternatives in water resources; hydrologic modelling; hydraulic modelling; river basin modelling; water resources economics.

CIVIL 733 (15 Points)
Coastal Engineering 1

Coastal, port and ocean engineering. Theories governing waves, tides and currents. Design of structures subject to a marine environment.

CIVIL 741 (15 Points)
Ground Improvements and Geosynthetics Engineering

Advanced ground improvement techniques including: densification, consolidation, preloading and surcharge, soil reinforcement, stabilisation and thermal ground improvement.

Restriction: CIVIL 403

CIVIL 750 (15 Points)
Timber Engineering

The practical understanding of timber and its use in the construction industry. Design and detailing techniques for connections in timber structures, plywood structures, pole structures, timber floor systems, bridges, multi-storey buildings, formwork and falsework, arches and cable stayed systems.

Prerequisite: CIVIL 312 or equivalent
Restriction: CIVIL 451

CIVIL 758 (15 Points)
Traffic Systems Design

Traffic signal timing analysis. Gap acceptance parameters. Intersection analysis of performance (priority, roundabouts and signalised). Some human factors. Introduction to transportation planning modelling. Planning land transport in NZ under the Resource Management and other requirements. Computer modelling and simulation.

Prerequisite: CIVIL 361
Restriction: CIVIL 403, 460, 660

CIVIL 759 (15 Points)
Highway and Transportation Design

Economic and environmental assessments of transport projects. Land transport funding in NZ. Road safety engineering. Crash reduction and prevention methods. Pavement asset

management. Pavement rehabilitation techniques. Heavy-duty pavements, highway drainage and chip seal design.

Prerequisite: CIVIL 360
Restriction: CIVIL 461, 661

CIVIL 782 (15 Points) Water Resources Engineering

A selection from the following: reservoir design and optimisation, flood control and design of flood control structures, micro to large scale hydroelectric engineering, river engineering and sedimentation. A water resources engineering design project.

Prerequisite: ENVENG 333 or equivalent
Restriction: CIVIL 480, 482

CIVIL 790 (15 Points) Civil Engineering Administration

The application of legal principles to problems in civil engineering and environmental engineering management. Examines the administration of national and international engineering contracts. Discusses statutes affecting engineering business. Investigates the implications of resource management and natural resource allocation legislation on engineering projects. Analyses processes for resolving engineering disputes.

Restriction: CIVIL 401, 490

CIVIL 791 (15 Points) Construction Management

Understanding topics necessary for effective construction management. Using a generic construction project life cycle, essential aspects of construction projects including client brief preparation, the tendering process, preparing tenders, tender evaluation, project planning, resource allocation, teamwork, site safety and contract types are covered. Case studies are used to reinforce the application of theoretical ideas to the successful running of construction projects.

Restriction: CIVIL 409

Computer Systems Engineering

Stage II

COMPSYS 201 (15 Points) Fundamentals of Computer Engineering

Digital systems and binary coding; binary numbers; Boolean algebra and computer logic; combinational logic circuits; sequential logic circuits; hardware description language; digital design flow; register transfer level descriptions and design; data paths and control units; from circuits to microprocessors; basic computer organisation; introduction to modern microprocessors; timers and interfacing; C and assembly language for microprocessors; designing digital systems using microprocessors.

Prerequisite: ELECTENG 101

COMPSYS 202 (15 Points) Object Oriented Design and Programming

A project-based course with extensive hands-on programming experience. Includes: an introduction to object oriented design including UML, sequence diagrams, use-case analysis; an introduction to object oriented programming in a modern high level language, algorithms, data abstraction and elementary data structures.

Prerequisite: ENGGEN 131 or ENGSCI 131

Stage III

COMPSYS 301 (15 Points) Design: Hardware Software Systems

An appreciation of the engineering design process as applied to computer systems. Design skills are enhanced through engineering projects which typically include elements of: computer hardware design, computer software design, system design and control, sensing, actuation and interfacing.

Prerequisite: COMPSYS 302, and COMPSYS 305 or ELECTENG 304, and ELECTENG 206 or 209

COMPSYS 302 (15 Points)
Design: Software Practice

A project-based course to gain experience in software design emphasising problem solving techniques and applications in computer systems engineering. The course includes practical, real-world project(s) involving a representative subset of the following topics: algorithm and data structure selection and implementation, parsing and translation, object-orientated and multi-threaded programming, scripting languages, peer-to-peer communication over internet.

Prerequisite: COMPSYS 202 or ELECTENG 203

COMPSYS 303 (15 Points)
Microcomputers and Embedded Systems

Embedded applications. Microprocessors, microcontrollers, architecture, organisation, programming memories, I/O interfacing. Sensors, actuators, analog interfaces. Hardware/Software partitioning and interfacing. Concurrency. Implementing data transformations and reactivity. Case studies.

Prerequisite: COMPSYS 202 or SOFTENG 251, and COMPSYS 201

COMPSYS 304 (15 Points)
Computer Architecture

Modern processor architectures. Principles of modern processor design; pipelining; memory hierarchies; I/O and network interfacing; compiler and OS support; embedded processors; performance; multiprocessing.

Prerequisite: 15 points from COMPSYS 201, ELECTENG 205

COMPSYS 305 (15 Points)
Digital Systems Design 1

Digital Systems implementation technologies with emphasis on hardware description languages and design abstraction levels; structural, architectural and behavioural modelling; register-transfer level design; datapath and control units; functional and timing simulations; FPGA-based implementation design flow and case studies.

Prerequisite: COMPSYS 201

Stage IV

COMPSYS 700A (15 Points)
COMPSYS 700B (15 Points)
Research Project

Students are required to submit a report on project work carried out on a Computer Systems Engineering topic assigned by the Head of Department. The work shall be supervised by a member of staff.

Prerequisite: COMPSYS 301, and 45 points from COMPSCI 313, COMPSYS 302, 303, 304, 305, ELECTENG 303, 304
Restriction: COMPSYS 401
To complete this course students must enrol in COMPSYS 700 A and B

COMPSYS 701 (15 Points)
Advanced Digital Systems Design

Advanced concepts in digital design including: System-on-Chip (system level description, behavioural and register-transfer descriptions); advanced modelling techniques and design flows; design space exploration and optimisation; hardware-software partitioning and trade-offs; component reusability; reconfigurable systems; low-power systems; case studies (speech, image, video algorithms implementation, application specific processor design); individual research projects to analyse the problem, model and implement the required hardware-software components.

Prerequisite: 15 points from COMPSYS 305, ELECTENG 304 or equivalent

COMPSYS 704 (15 Points)
Advanced Embedded Systems

Selected advanced topics from current research in embedded systems such as: embedded systems based on formal models of computation;

centralised and distributed architectures for embedded systems; static and dynamic embedded systems; languages and frameworks for distributed embedded systems; actor and agent systems; verification. Includes a significant individual research project.

Prerequisite: COMPSYS 302, 723 or SOFTENG 306

COMPSYS 705 (15 Points) Formal Methods for Engineers

Mathematical modelling techniques for embedded, automation, and mechatronic systems; advanced techniques for validation and verification; techniques for formal specification; methods of verification such as bisimulation and model checking; state space explosion problem and solutions such as BDDs, symbolic model checking, and modular verification; verification of HDL/C using model checking tools. Includes a significant individual research project.

Prerequisite: COMPSYS 302, 305 or ELECTENG 304 or SOFTENG 211

COMPSYS 723 (15 Points) Embedded Systems Design

Concurrency and models of computation, task models and race conditions, real-time operating systems based approach, synchronous approach, Safe state machines, key properties: determinism and reactivity, SoPC and MPSoC, cyber-physical embedded systems, static analysis techniques, case studies in smart grid, automotive, medical devices and the like.

Prerequisite: COMPSYS 303, 304 or ELECTENG 304 or SOFTENG 370
Restriction: COMPSYS 402, 403, 727

COMPSYS 725 (15 Points) Computer Networks and Distributed Applications

Network layers and protocols. Packet switching. Broadband network principles. Low versus high bandwidth services. Network interfaces and instrumentation. Wireless networks in embedded applications. Industrial networking.

Prerequisite: COMPSYS 201 or ELECTENG 205, and COMPSYS 202 or ELECTENG 203
Restriction: COMPSYS 405

COMPSYS 726 (15 Points) Robotics and Intelligent Systems

Robotics and intelligent systems, including: robot manipulators and mobile robots, navigation techniques, planning and programming of robot actions, sensors and actuators, kinematic analysis and may include topics in artificial intelligence, artificial neural nets, fuzzy systems, genetic algorithms. Core concepts are extended by an individual research project where a challenging robotics problem is analysed and a solution implemented and tested.

Prerequisite: 15 points from COMPSYS 302, MECHENG 313, SOFTENG 306
Restriction: COMPSYS 406

Electrical and Electronic Engineering

Stage I

ELECTENG 101 (15 Points) Electrical and Digital Systems

An introduction to electrical, computer and electronic systems and technology. Digital circuits and analysis techniques, computer organisation. Analog circuits and analysis techniques. Inductive power transfer, power systems and electric machines. Communication systems.

Restriction: ELECTENG 202, 204, 208, 210

Stage II

ELECTENG 202 (15 Points) Circuits and Systems

This course aims to provide a good understanding of the way electrical circuits work. It covers DC and AC circuit theorems and analysis; transient analysis, including the Laplace transform; transfer functions; AC power calculations; and time and

frequency representation of signals.

Prerequisite: ELECTENG 101

ELECTENG 204 (15 Points) Engineering Electromagnetics

Electrical conduction theories, conducting materials and insulators, magnetic and dielectric properties and materials, electrostatics and magnetostatics, steady electric currents, the magnetic field of steady electric currents, Ampere's law and its applications, electromagnetic induction, Faraday's law and its applications, electromagnetism, simple transmission lines, magnetic circuits, permanent magnets, inductors, transformers, introduction to electrical machines.

Prerequisite: ELECTENG 101

ELECTENG 208 (15 Points) Electric Circuit Analysis

Aims to provide a good understanding of the way electrical circuits work. The course covers DC and AC circuit theorems and analysis. It also introduces some semiconductor devices (diodes, transistors and operational amplifiers) and gives examples of their applications.

Prerequisite: ELECTENG 101
Restriction: ELECTENG 202

ELECTENG 209 (15 Points) Analogue and Digital Design

This project-based course provides an introduction to real-world design of analogue and digital circuits. Practical skills will be gained in electronic circuit analysis, use of CAD tools, PCB design and construction, circuit testing and calibration using laboratory equipment. Appropriate design methodology will be developed in a practical framework.

Prerequisite: ELECTENG 101, 202, ELECTENG 205 or COMPSYS 201, ELECTENG 207 or 210

ELECTENG 210 (15 Points) Electronics 1

Semiconductor devices and applications, diodes, bipolar junction transistors and operational amplifiers. Elementary device physics. Linear and non-linear devices, terminal characteristics, small-signal modelling and analysis. Frequency-dependent behaviour of circuits and analysis methods. Linear and non-linear circuits such amplifiers and switching circuits. Biasing, coupling and bypass techniques. Operational amplifiers, frequency-dependence and characteristic limitations, frequency selective and non-linear switching circuits.

Prerequisite: ELECTENG 101

Stage III

ELECTENG 303 (15 Points) Systems and Control

Introduction to linear, time-invariant, continuous-time system theory from both a time-domain and frequency domain standpoint. This leads on to the fundamental body of knowledge underlying the control and enhancement of system behaviour, with application to the analysis and control of electrical systems.

Prerequisite: ELECTENG 202

ELECTENG 305 (15 Points) Electronics 2

The operation, analysis and design of a range of electronic devices and systems will be discussed, taking examples from the full spectrum of electrical engineering. Such analysis will consider non-ideal circuit models and their frequency dependence. Selected applications will be taken from the fields of signal conditioning, amplifiers, communications systems and energy conversion.

Prerequisite: ELECTENG 202, 207 or 210

ELECTENG 307 (15 Points)
Transmission Lines and Systems

The basic concepts of electromagnetism are completed with a formal treatment of Maxwell's equations and their applications, including electromagnetic wave propagation, transmission lines, the Smith chart and an introduction to antennas and radio systems.

Prerequisite: ELECTENG 204

ELECTENG 309 (15 Points)
Power Apparatus and Systems

Introduces students to three-phase electric machines and power system components. Covers theory, modelling and practical aspects for synchronous machines, induction machines, transformer connections, transmission lines and substation components.

Prerequisite: ELECTENG 204

ELECTENG 310 (15 Points)
Electrical Engineering Design 1

An appreciation of the design process as applied to various electrical and electronic engineering systems. Design skills are enhanced through a variety of engineering projects which typically introduce students to modelling, simulation and analogue and digital electronic hardware design.

Prerequisite: ELECTENG 202, ELECTENG 203 or COMPSYS 202, ELECTENG 205 or COMPSYS 201, ELECTENG 206 or 209, ELECTENG 207 or 210

ELECTENG 311 (15 Points)
Electrical Engineering Design 2

The formal introduction to the design process is completed by one or more open-ended projects which typically include elements of design from concept to working prototype.

Prerequisite: ELECTENG 310 or ELECTENG 203, 205, 206, 207

Stage IV

ELECTENG 700A (15 Points)
ELECTENG 700B (15 Points)
Research Project

Students are required to submit a report on project work carried out on a topic assigned by the Head of Department. The work shall be supervised by a member of staff.

Prerequisite: ELECTENG 303, 305, ELECTENG 301 or 310 and 311
Restriction: ELECTENG 401
To complete this course students must enrol in ELECTENG 700 A and B

ELECTENG 701 (15 Points)
Wireless Communication

Aspects of the design and planning of wireless communication systems. Introduction to cellular system design. Issues related to radio propagation: multipath, path loss prediction, channel characterisation. System aspects: cellular technologies, system planning and reliability estimation. Wireless systems and standards.

Prerequisite: ELECTENG 421 or 721

ELECTENG 703 (15 Points)
Advanced Power Systems

Electricity markets: structure, pricing, optimisation, ancillary services; Power system protection practices; Distribution network development: Smart Grid, Demand Side participation; HVDC and FACT Devices Theory and Application; Renewable energy grid integration.

Prerequisite: ELECTENG 411 or 731
Restriction: ELECTENG 738

ELECTENG 704 (15 Points)
Advanced Control Systems

Advanced theory of modern control systems with emphasis on optimisation techniques for both deterministic and stochastic processes. State-space modelling of dynamic systems and choice of suitable performance criteria. Adaptive,

nonlinear and sliding mode control systems. Core concepts are extended by an individual research project in which a challenging control problem is analysed and solved.

Prerequisite: ELECTENG 422 or 722

ELECTENG 706 (15 Points) Digital Signal Processing

Advanced digital signal processing of discrete-time deterministic and stochastic signals. System response to stochastic signals; adaptive systems; Gauss-Markov processes; Wiener and Kalman filtering. Estimation and decision theory. Linear algebra in DSP: linear vector spaces; vector and matrix norms; fundamental matrix subspaces; inverse problems; conditioning and regularisation; singular value decomposition. Research projects with challenging digital signal processing problems.

Prerequisite: ELECTENG 413 or 733

ELECTENG 721 (15 Points) Radio Systems

Transmission lines and waveguides, impedance matching, devices. Radio propagation, antennas and arrays. Radio system design - mobile, point-to-point, area coverage.

Prerequisite: ELECTENG 302 or 306 or 307
Restriction: ELECTENG 421, 737

ELECTENG 722 (15 Points) Control Systems

State space analysis, relationship to transfer function methods, controllability and observability, multivariable plant. Computer simulation. Stability considerations. State variable feedback. Digital control system, design and realisation of digital controllers, adaptive controllers. Nonlinear systems, phase-plane and describing function techniques, Liaponov's method of stability analysis, design of controllers for non-linear systems. Variable structure systems.

Prerequisite: ELECTENG 303
Restriction: ELECTENG 422

ELECTENG 724 (15 Points) Special Topic

An advanced course on topics to be determined each year by the Head of Department.

ELECTENG 726 (15 Points) Digital Communications

Advanced principles and techniques in digital transmission systems: base-band and pass-band digital systems. Geometric representation of signals: theory of orthonormal signals, correlation demodulators, optimal detector. Digital phase (PSK) and frequency (FSK) modulation. Digital communication systems with noise. Information theory, capacity theorem and applications. Signal and information coding: data compression, digital transmission, error detection and correction, block and convolutional codes. Noise, thermal noise, noise figure. Traffic theory. Digital networks and OSI model.

Prerequisite: ELECTENG 303, 732
Restriction: ELECTENG 426, 741

ELECTENG 731 (15 Points) Power Systems

Builds on the knowledge of three-phase power systems components to understand modelling, formulation and typical analysis carried out by electricity transmission, distribution and generation entities. Load flow, fault, stability and power quality. Supplemented by laboratories where students learn to use professional software to implement the theoretical aspects.

Prerequisite: ELECTENG 302 or 309
Restriction: ELECTENG 411

ELECTENG 732 (15 Points) Communication Systems

Analog AM and FM modulation. Noise in AM and FM systems. AM modulators and demodulators. Coherent and non-coherent receivers. Superheterodyne receivers. Multiplexing: FDM, TDM, CDMA. Pulse modulation. Nyquist theorem; PCM modulation and multiplexing. Baseband digital transmission; optimal filtering;

matched filter detection; probability of error. Intersymbol interference, waveform coding and data compression, base-band data transmission. Introduction to digital systems and modulations.

Prerequisite: ELECTENG 303
Restriction: ELECTENG 412

ELECTENG 733 (15 Points) Signal Processing

Analog signals and systems: Spectral analysis, linear time-invariant systems, power spectral density, correlation, and the Weiner-Khinchine theorem. Digital signals and systems: Sequence classification, linear and circular convolution and correlation, Z-transform, discrete Fourier transform, causality and stability conditions. Random signal analysis: Representation, functions of a random variable, multiple random variables, random vectors, correlation, stochastic processes, stationarity, ergodicity, and spectral analysis.

Prerequisite: ELECTENG 303
Restriction: ELECTENG 413

ELECTENG 734 (15 Points) Power Electronics

Selected advanced concepts in power electronics are introduced through a practical and research based individual design project, utilising modern power converter topologies with supporting lectures that include: inductive power transfer and control, DC-DC converter design and control, high frequency magnetics design, semiconductor switches, practical design issues, controlled rectifiers and PWM converters with application to conventional and brushless DC motors.

Prerequisite: ELECTENG 303
Restriction: ELECTENG 414

ELECTENG 735 (15 Points) Special Topic

An advanced course on topics to be determined each year by the Head of Department.

ELECTENG 736 (15 Points) Analog and Digital Filter Synthesis

Filter concepts and network functions, a review of approximation techniques and frequency transformations, leading to a thorough treatment of passive, active and digital filter implementations.

Prerequisite: ELECTENG 303
Restriction: ELECTENG 416

ELECTENG 738 (15 Points) Selected Topics in Advanced Power Systems

Electricity markets: structure, pricing, optimisation, ancillary services; Power system protection practices; Distribution Network Development: Smart Grids, Demand Side Participation, Integration of DG/renewable sources and Electric Vehicles. Core concepts are extended by an individual research project, a self-guided protection laboratory and industry engagement in advanced power system practices.

Prerequisite: ELECTENG 411 or 731
Restriction: ELECTENG 703

Energy Technology

Stage IV

GEOTHERM 785 (15 Points) Geothermal and Reservoir Engineering

Topics include: worldwide geothermal development, types of geothermal systems, geothermal geology, resource estimation, thermodynamics, properties of water and steam, steam-field equipment, geothermal power cycles, direct use of geothermal energy, completion tests, two-phase flow, flow measurements, geothermal reservoir engineering modelling theory, reinjection, scaling and corrosion, drilling engineering, heat exchangers, geothermal well-test analysis, stimulation, sedimentary geology, oil and gas formation, petroleum reservoir engineering.

Prerequisite: CHEMMAT 313 or ENGSCI 343 or MECHENG 311
Restriction: GEOTHERM 601, 602, 603, 620

Engineering General

Stage I

ENGGEN 115 (15 Points) Principles of Engineering Design

An introduction to the principles of design as a fundamental part of engineering practice and a foundation for subsequent design courses. Students are also introduced to essential drawing skills and CAD, and complete group-based design projects. Topics include systems life cycle, design, and introductions to professional issues such as health and safety, ethics, sustainability, cultural diversity, communication, leadership and teamwork.

ENGGEN 121 (15 Points) Engineering Mechanics

An introduction to planar mechanics including: free body diagrams, planar equilibrium of rigid bodies, friction, distributed forces, internal forces, shear force and bending moment diagrams, kinematics and kinetics of particles, work and energy, relative motion, kinematics and kinetics of rigid bodies.

Restriction: CIVIL 210, MECHENG 222

ENGGEN 131 (15 Points) Introduction to Engineering Computation and Software Development

Introduction to problem solving in engineering through the use of the software package MATLAB, and the high level programming language C.

Restriction: ENGSCI 233, 331

ENGGEN 140 (15 Points) Engineering Biology and Chemistry

Introduction to chemical and biological systems. The application of engineering analysis and design techniques to facilitate understanding the multiscale structure, function and interactions of such systems. The use of case studies to illustrate systems approaches to chemistry and biology.

ENGGEN 150 (15 Points) Advanced Mechanics and Mathematical Modelling

An accelerated course replacing ENGGEN 121 and ENGSCI 111 for well-prepared and conjoint students. Topics include: Free body diagrams, equilibrium of rigid bodies, internal forces, shear force and bending moment diagrams, work and energy, motion of particles and rigid bodies. Introduction to mathematical modelling. Differentiation and integration. Differential equations, Vector and matrix algebra. Introduction to probability.

Restriction: ENGGEN 121, ENGSCI 111

ENGGEN 199 (0 Points) English Language Competency

To complete this course students must attain a level of competency in the English language as determined by the Faculty of Engineering.

Stage II

ENGGEN 204 (15 Points) Managing Design and Communication

The management of engineering design based on systems engineering, plus the practical application of advocacy, and individual and group-based communication skills. Scenarios representative of real-world issues are addressed through team-based projects and problem solving. The professional issues introduced in ENGGEN 115 (health and safety, ethics, sustainability, cultural diversity, communication, leadership and teamwork) are continued and developed.

Prerequisite: ENGGEN 115, 199

ENGGEN 299 (0 Points) Workshop Practice

Stage III

ENGGEN 303 (15 Points) Managing Projects and Innovation

Introduction to theory and practice of managing projects, innovation, product development and service delivery. Students work in interdisciplinary teams to complete a project based on a complex real-world systems scenario. Project management and innovation topics are integrated with design studies covered in previous courses, and extended to wider business issues of risk and opportunities, entrepreneurship, financial management and regulatory issues.

Prerequisite: ENGGEN 204 and 104 or 199

Stage IV

ENGGEN 403 (15 Points) Managing a Business

An introduction to the commercial drivers and business practices which prepare students for successful roles in the commercial, government and non-profit sectors after graduation. Students are presented with a systems thinking approach to managing large, complex, multidisciplinary challenges. Professional issues (such as health and safety, sustainability, resilience, ethics, leadership and cultural diversity) from previous courses are expanded.

Restriction: ENGGEN 303

ENGGEN 499 (0 Points) Practical Work

ENGGEN 701 (15 Points) Professional Project

A comprehensive investigation, analysis and reporting of a complex engineering design, development or professional engineering problem. Problem synthesis, solution specification, development and reporting as approved by the Head of Department of Mechanical Engineering.

Prerequisite: Departmental approval required

Restriction: ENGGEN 401, 405, 410, 705

ENGGEN 705 (15 Points) Advanced Innovation and New Product Development

An advanced course dealing with the theoretical foundations of innovation, design and new product development. Theory is linked to practice in multidisciplinary teams engaged in innovation and design simulations and case studies.

Prerequisite: ENGGEN 303 with a grade of B or better

Restriction: ENGGEN 401, 405, 410, 701, MGMT 305

Engineering Science

Stage I

ENGSCI 111 (15 Points) Mathematical Modelling 1

Introduction to mathematical modelling. Differentiation and integration (polynomials, trigonometric, exponential, logarithmic and rational functions). Integration by parts, substitution and partial fractions. Differential equations and their solutions (including Euler's method). Vector and matrix algebra, transformations, solving systems of linear equations. Modelling using probability.

Restriction: ENGSCI 211, 213, 311, 313, 314, MATHS 108, 150, 153

Stage II

ENGSCI 211 (15 Points) Mathematical Modelling 2

First and second order ordinary differential equations and solutions. Laplace transforms. Taylor series and series in general. Multivariable and vector calculus including divergence, gradient and curl. Further linear algebra. Eigenvalues and eigenvectors. Fourier series.

Application of the techniques through appropriate modelling examples. Introductory data analysis and statistics.

Prerequisite: ENGSCI 111 or ENGGEN 150 or MATHS 108 or MATHS 150 or MATHS 153
Restriction: ENGSCI 212, 213

ENGSCI 213 (15 Points) Mathematical Modelling 2SE

Probability theory, random variables and distributions, data analysis and statistics, linear algebra, stochastic process.

Restriction: ENGSCI 211, 212

ENGSCI 233 (15 Points) Computational Techniques and Computer Systems

Introduction to digital electronics, computer organisation and computational techniques. Digital gates, combinatorial and synchronous circuits, data representation, instruction sets, memory, hardware, interfacing. Numerical computation, numerical algorithms.

Prerequisite: ENGSCI 111 or ENGGEN 150, and ENGGEN 131 and ELECTENG 101
Corequisite: ENGSCI 211 or 213
Restriction: BIOMENG 233

ENGSCI 255 (15 Points) Modelling in Operations Research

Emphasises the relationship between business and industrial applications and their associated operations research models. Software packages will be used to solve practical problems. Topics such as: linear programming, transportation and assignment models, network algorithms, queues, inventory models, simulation, analytics and visualisation will be considered.

Prerequisite: 15 points at Stage I in Statistics or Mathematics or Engineering
Restriction: STATS 255

ENGSCI 263 (15 Points) Engineering Science Design 1

Introduction to concepts of modelling of engineering problems, including model formulation, dimensional analysis, solution procedures, comparisons with reality, and shortcomings, with examples from elementary mechanics, structures, hydrostatics, one-dimensional heat, diffusion and fluid motion. Further development of problem-solving skills and group project work. The use of computer tools in engineering design, including advanced spreadsheeting integrated with solid modelling.

Prerequisite: ENGSCI 111 or ENGGEN 150, and ENGGEN 115
Corequisite: ENGSCI 211 or 213
Restriction: ENGSCI 261, 262

Stage III

ENGSCI 311 (15 Points) Mathematical Modelling 3

A selection from: ordinary differential equations, systems of equations, analytical and numerical methods, non-linear ODEs, partial differential equations, separation of variables, numerical methods for solving PDEs, models for optimisation, industrial statistics, data analysis, regression, experimental design reliability methods.

Prerequisite: ENGSCI 211
Restriction: ENGSCI 312, 313, 314

ENGSCI 313 (15 Points) Mathematical Modelling 3ECE

Complex Analysis, including complex numbers, analytic functions, complex integration, Cauchy's theorem, Laurent series, residue theory; Laplace transforms; Modelling with partial differential equations, including electronic and electrical applications; Fourier Analysis, Fourier transform, Fast Fourier transform; Optimisation, including unconstrained and constrained models, linear programming and nonlinear optimisation.

Prerequisite: ENGSCI 211
Restriction: ENGSCI 311, 312, 314

ENGSCI 314 (15 Points)
Mathematical Modelling 3ES

Mathematical modelling using ordinary and partial differential equations. Topics include: probability, conditional probability, random variables as models of a population, common distribution models, the Poisson process, applications to reliability, exploratory data analysis, confidence intervals, tests of hypothesis, t-tests, sample tests and intervals, paired comparisons. Introduction to one-way ANOVA. Linear and polynomial regression, regression diagnostics.

Prerequisite: ENGSCI 211
Restriction: ENGSCI 311, 312, 313, 321

ENGSCI 331 (15 Points)
Computational Techniques 2

Numerical algorithms and their translation to computer code. A selection of topics from numerical solution of linear equations, eigen problems, ordinary differential equations, numerical integration, nonlinear equations, finite differences and partial differential equations.

Prerequisite: ENGSCI 233
Corequisite: ENGSCI 311 or 313 or 314

ENGSCI 343 (15 Points)
Mathematical and Computational Modelling in Mechanics

Vector calculus and integral theorems. Continuum hypothesis, indicial notation, deformation, strain, traction, stress, principal directions, tensors, invariants, constitutive laws, isotropy, homogeneity. Navier-Stokes and Navier's equations. Isotropic elasticity, elastic moduli, plane stress and plane strain. Airy stress function, Viscous flow, simple solutions of the Navier-Stokes equations. Flow over flat plates, boundary layers. Ideal flow, velocity potential, stream function, 2-D flows.

Prerequisite: BIOMENG 221 or ENGSCI 263
Restriction: BIOMENG 321, ENGSCI 341, 342

ENGSCI 355 (15 Points)
Applied Modelling in Simulation and Optimisation

Use of optimisation modelling languages and simulation software, with an emphasis on practical problem solving and laboratory-based learning.

Prerequisite: 15 points from ENGSCI 255, STATS 255

Restriction: OPSRES 385, 392

ENGSCI 363 (15 Points)
Engineering Science Design II

Applications of elasticity and fluid dynamics theory to engineering problems including design and analysis of mechanical assemblies. Group projects to formulate design proposals, including costings for development and manufacture. Underlying Finite Element Modelling (FEM) and Continuum Mechanics concepts. Utilisation of 3D CAD and FEM software during both design and analysis phases.

Prerequisite: ENGSCI 343
Restriction: ENGSCI 342, 361

ENGSCI 391 (15 Points)
Optimisation in Operations Research

Linear programming, the revised simplex method and its computational aspects, duality and the dual simplex method, sensitivity and post-optimal analysis. Network optimisation models and maximum flow algorithms. Transportation, assignment and transhipment models, and the network simplex method. Introduction to integer programming.

Prerequisite: 15 points from ENGGEN 150, ENGSCI 111, MATHS 208, 230, 250, 253, and one of COMPSCI 101, ENGGEN 131, ENGSCI 131, MATHS 162, STATS 220
Restriction: STATS 391

Stage IV

ENGSCI 700A (15 Points)
ENGSCI 700B (15 Points)
Research Project

An investigation carried out under the supervision of a member of staff on a topic assigned by the Head of Department of Engineering Science. A written report on the work must be submitted.

Restriction: ENGSCI 400
To complete this course students must enrol in ENGSCI 700 A and B

ENGSCI 711 (15 Points)
Advanced Mathematical Modelling

A selection of modules on mathematical modelling methods in engineering, including theory of partial differential equations, integral transforms, methods of characteristics, similarity solutions, asymptotic expressions, theory of waves, special functions, non-linear ordinary differential equations, calculus of variations, tensor analysis, complex variables, wavelet theory and other modules offered from year to year.

Prerequisite: ENGSCI 311 or 312 or 313 or 314
Restriction: ENGSCI 414, 415

ENGSCI 712 (15 Points)
Computational Algorithms for Signal Processing

Advanced topics in mathematical modelling and computational techniques, including topics on singular value decomposition, Principle Component Analysis and Independent Component Analysis, eigen-problems, and signal processing (topics on neural network models such as the multi-layer perception and self organising map).

Prerequisite: ENGSCI 314 and 331
Restriction: ENGSCI 416, 452

ENGSCI 740 (15 Points)
Advanced Mechanics in Modern Research and Technology

Applications of continuum mechanics to problems in biomechanics, fluid mechanics and solid mechanics. Including topics such as large deformation elasticity theory applied to soft tissues, inviscid flow theory, compressible flows, viscous flows, meteorology, oceanography, coastal ocean modelling, mixing in rivers and estuaries. Fracture, composite materials and geomechanics.

Prerequisite: ENGSCI 363 or Departmental approval
Restriction: ENGSCI 440

ENGSCI 741 (15 Points)
Advanced Mathematical and Computational Modelling in Mechanics

Turbulence and turbulence modelling. Advanced numerical techniques in computational fluid dynamics (CFD). Application of CFD to environmental flows and aerodynamics. A variety of topics in engineering solid mechanics which could include composite materials, geomechanics, contact mechanics, fracture mechanics, rheology, thermomechanics, constitutive theory and computational methods.

Prerequisite: ENGSCI 363 or Departmental approval
Restriction: ENGSCI 442, 443

ENGSCI 753 (15 Points)
Computational Techniques in Mechanics and Bioengineering

Theoretical and applied finite element and boundary element methods for static and time dependent problems of heat flow, bioelectricity, linear elasticity and non-linear mechanics.

Prerequisite: ENGSCI 311 or 312 or 313 or 314
Restriction: ENGSCI 450, 451, 471

ENGSCI 760 (15 Points)
Algorithms for Optimisation

Meta-heuristics and local search techniques such as Genetic Algorithms, Simulated Annealing, Tabu Search and Ant Colony Optimisation for practical optimisation. Introduction to optimisation under uncertainty, including discrete event simulation, decision analysis, Markov chains and Markov decision processes and dynamic programming.

Restriction: ENGSCI 450, 451, 460

ENGSCI 761 (15 Points)
Integer and Multi-objective Optimisation

Computational methods for solving optimisation problems. Algorithms for integer programming including branching, bounding, cutting and pricing strategies. Algorithms for linear and integer programmes with multiple objective functions.

Prerequisite: 15 points from ENGSCI 391, STATS 391

Restriction: ENGSCI 450, 451, 460

ENGSCI 762 (15 Points)
Scheduling and Optimisation in Decision Making

A course of advanced topics arising in the practical application of optimisation models for machine and resource scheduling, routing applications, staff rostering and performance measurement.

Prerequisite: 15 points from ENGSCI 391, STATS 391
Restriction: ENGSCI 463

ENGSCI 763 (15 Points)
Advanced Simulation and Stochastic Optimisation

Advanced simulation topics with an emphasis on optimisation under uncertainty. Uniform and non-uniform random variate generation, input distribution selection, output analysis, variance reduction. Simulation-based optimisation and stochastic programming. Two-stage and multi-stage programs with recourse. Modelling risk. Decomposition algorithms. Scenario construction and solution validation.

Prerequisite: 15 points from ENGSCI 391, STATS 391
Restriction: ENGSCI 461, 464

ENGSCI 768 (15 Points)
Advanced Operations Research and Analytics

Advanced Operations Research and Analytics topics including selected theory, algorithms and applications for non-linear programming, smooth and non-smooth optimisation, equilibrium programming and game theory.

Prerequisite: 15 points from ENGSCI 391, STATS 391
Restriction: ENGSCI 791, 792

ENGSCI 772 (15 Points)
Whole Organ Modelling

Advanced computational modelling of whole organs with an emphasis on integrative physiology and coupled field problems in bioengineering. Finite deformation elasticity theory and computational aspects. Current flow in excitable tissue. Finite element collocation techniques. Coupled finite element – boundary element problems.

Prerequisite: PHYSIOL 210 or MEDSCI 205, ENGSCI 371 or BIOMENG 321
Restriction: ENGSCI 472

Environmental Engineering

Stage II

ENVENG 244 (15 Points)
Environmental Engineering 1

Water quality, water and wastewater characteristics - physical, chemical and biological treatments (unit operations and processes). Solid waste characteristics and disposal, hazardous waste treatment. Stormwater management.

Restriction: RESOURCE 244, ENVENG 243

Stage III

ENVENG 333 (10 Points) Engineering Hydrology

Hydrologic processes, analysis of rainfall-runoff relationships. Statistical analysis of hydrological data. Groundwater movement.

ENVENG 341 (15 Points) Environmental Engineering 2

Examines natural environmental processes and their relevance to engineering. Soil and water chemistry, equilibrium and organic chemistry, microbiology, biochemistry and biological processes will be examined, focusing on the application of these in engineering design, practice and management.

Restriction: RESOURCE 341

ENVENG 342 (15 Points) Environmental Engineering Design

The applications of design practice in environmental engineering with a number of design projects. Elements of water and wastewater engineering. Landfill design and air pollution control.

Restriction: RESOURCE 342, ENVENG 405

Stage IV

ENVENG 701 (15 Points) Urban Stormwater Management

Design and application of stormwater runoff quantity and quality control systems for urban development including: bioretention, living roofs, swales, permeable/porous pavement, detention ponds, and constructed wetlands. An independent project couples technical design, safety, maintenance, construction, hydrologic and water quality modelling, and stakeholder engagement in an application of "Low Impact Design" from the site to the catchment scale.

Prerequisite: ENVENG 244 and 333 or equivalent

ENVENG 702 (15 Points) Engineering Decision Making in Aotearoa

Advanced systems engineering based decision making; complex problem framing including ontology analysis; cultural opportunity mapping; absolute sustainability analysis; risk threshold determination; temporal cumulative effects; and effective consultation. Independent research is undertaken to solve a complex engineering decision making problem.

ENVENG 740 (15 Points) Water and Wastewater Engineering

Chemistry and microbiology of water and wastewater treatment, flow models and reactors. Unit operations and process analysis and design. Treatment plant design and operation. Nutrient removal process. Effluent and residues disposal.

Restriction: ENVENG 441

ENVENG 746 (15 Points) Surface Water Quality Modelling

Advanced specialist topics in modelling of lakes and rivers. Specific topics covered include response to different loadings applied to surface water systems, and modelling of organic matter, dissolved oxygen consumption, eutrophication, and toxic substances. The core taught skills are extended by an individual project in which independent research is undertaken to solve a challenging surface water quality engineering problem.

Prerequisite: ENVENG 341, 342 or equivalent

ENVENG 747 (15 Points) Soil-Contaminant Fate Processes and Modelling

Focuses on modelling sorption, degradation kinetics, and leaching of chemicals in the soil environment. Topics include deriving sorption parameters, parent and metabolite fitting with statistical rigours, calculating degradation end-points, novel adsorbents for removing contaminants in soil and water. The core taught skills are extended by an individual project in

which independent research is undertaken to solve an environmental issue.

Prerequisite: ENVENG 341 or equivalent

ENVENG 750 (15 Points) Advanced Sustainability Engineering

Focuses on an advanced understanding of the science of sustainability and its application to engineering practice and management, including complex systems thinking, tools to assess sustainability, management, leadership and decision making leading to sustainability, global directions towards sustainability across cultural systems. Develops critical analytical thinking and research based knowledge through debates and an applied research project.

Prerequisite: B grade or higher

Mechanical Engineering

Stage II

MECHENG 201 (15 Points) Electronics and Computing for Mechanical Engineers

Mechanical engineers need to be familiar with those electronics and software elements that are now vital components of most mechanical products and processes. Introduces sensors and actuators, analogue and digital circuit elements for signal processing, and computing and software programming.

Prerequisite: ELECTENG 101

MECHENG 211 (15 Points) Thermofluids

The fundamentals of fluid mechanics, thermodynamics and heat transfer with practical applications to engineering devices and systems.

MECHENG 222 (15 Points) Dynamics

Kinematics of particles, rectilinear and curvilinear motion, kinematics of rigid bodies in the plane. Kinetics of particles, systems of particles and rigid bodies. Impulse and momentum, mechanism motion in the plane. Vibration of a particle.

Prerequisite: 15 points from ENGGEN 121, 150

MECHENG 235 (15 Points) Design and Manufacture 1

The design process as a teamwork, and system based, problem-solving activity. Design methodology and evaluation, design failure and safety, communicating design intent through graphical means. Introduction to engineering material properties and concepts of material failure. Introduction to motive power sources, machine elements and production and fabrication processes.

Prerequisite: ENGGEN 115
Restriction: MECHENG 223, 234

MECHENG 236 (15 Points) Design and Manufacture 2

Introduction to computer-assisted design animation and virtual mechanisms and computer-aided production processes. Basic hydraulics and pneumatics systems and components. Fundamental techniques for the determination of material behaviour under external loads. Further production processes. Design reliability. Basic principles of "Design for X".

Prerequisite: MECHENG 235
Restriction: MECHENG 223, 234

MECHENG 242 (15 Points) Mechanics of Materials 1

Statically determinate stress systems; stress – strain relations. Bending of beams: stress – moment and moment - curvature relations; beam deflections; buckling of struts. Shear in joints, couplings, beams and circular shafts. General analysis of plane stress. Introduction to failure criteria by yield and fracture. Safety factors.

Prerequisite: ENGGEN 121 or 150

MECHENG 270 (15 Points)
Software Design

Fundamentals of software design and high-level programming making use of case studies and programming projects. Includes: requirements analysis, specification methods, software architecture, software development environments, software quality, modularity, maintenance, reusability and reliability; models of software development.

Stage III

MECHENG 311 (15 Points)
Thermal Engineering

Second Law of Thermodynamics, entropy. Cycles and applications. Heat transfer, heat exchangers.

Prerequisite: MECHENG 211

MECHENG 312 (15 Points)
Sensors and Actuators

An introduction to mechatronics engineering and its main elements. Topics include interfacing and signal processing, sensors, actuators, control technologies, systems modelling, simulation and analysis.

Restriction: ELECTENG 428

MECHENG 313 (15 Points)
Real Time Software Design

Introduces the principles of software design in a real time environment. Main topics include computer/ microprocessor architecture, programming in real-time environment, software design, embedded C or C# and data acquisition systems.

MECHENG 322 (15 Points)
Control Systems

An introduction to classical control of mechanical and mechatronic systems. Topics include: transfer functions, block diagrams, time response characteristics, stability, frequency response characteristics and controller design (eg, pole placement, lead-lag compensation, PID). Applications in MATLAB/Simulink and with physical systems.

Prerequisite: ENGSCI 211, MECHENG 222

MECHENG 325 (15 Points)
Dynamics of Fluids and Structures

3D rigid body kinetics – inertia tensor, Euler's equations, gyroscopic motion. Vibration of single and two degree of freedom systems. Applications to vibration engineering. Introductory acoustics and spectral analysis. Mass, energy and momentum equations. Angular momentum equation. Dimensional analysis. Similarity. Turbulence, logarithmic overlap law, pipe losses and networks, Bernoulli obstruction theory. External flows, lifting bodies. Pumps, turbines. Open channel flows.

Prerequisite: MECHENG 211, 222
Restriction: MECHENG 324

MECHENG 334 (15 Points)
Engineering Design 3M

Good practice and standard methods in mechanical engineering design. Conceptual and detailed design in projects involving machine elements, engineering sciences and engineering mechanics. Some of the advanced computer-aided tools (eg, CAD, CAM, CAE) will be introduced and utilised in some projects.

Prerequisite: MECHENG 235, 236
Restriction: MECHENG 332, 333

MECHENG 340 (15 Points)
Mechanics of Materials 2

States of stress and strain at a point in a general three-dimensional stress system, failure theories for ductile materials, elementary plasticity. Generalised stress - strain relations for linearly elastic isotropic materials. Axisymmetric stress systems: thick-walled pressure cylinders, spheres and rotating discs. Advanced topics in bending of beams. Failure theories for brittle materials. Fatigue in ductile materials.

Prerequisite: MECHENG 242
Restriction: MECHENG 341

MECHENG 352 (15 Points)
Manufacturing Systems

An introduction to the procedures and technological aspects of typical manufacturing systems; basic concepts of plant and work design; automation; planning, implementation; simulation, and monitoring of production processes; project-based introduction to the tools and techniques applied by professional engineers in modern manufacturing plants.

Restriction: MECHENG 351

MECHENG 370 (15 Points)
Analog Circuit Design

An introduction to the design, analysis and implementation of electronic circuits or systems for various applications such as signal conditioning, interfacing and signal generation, and high power electronics. These include PCB design and testing.

Prerequisite: ELECTENG 101 or 208

MECHENG 371 (15 Points)
Digital Circuit Design

Introduction to a variety of techniques in digital system design ranging from simple combinational logic to finite state machines including issues relating to digital circuit such as hazards, thermal management and signal integrity. Students will be exposed to the use of FPGA to rapid prototype digital systems using schematic and hardware description language entries.

Prerequisite: ELECTENG 101 or 208

Stage IV

MECHENG 705 (15 Points)
Mechatronics Systems

Modelling and analysis of electro-mechanical systems, including MEMS sensors, actuators, smart/functional materials, structures. Fundamentals of digital control and systems applied to electro-mechanical systems.

Prerequisite: MECHENG 312, 322
Restriction: MECHENG 405

MECHENG 706 (15 Points)
Mechatronics Design

A range of projects that demonstrate the application and integration of the material taught in lecture courses to create practical intelligent products and manufacturing processes.

Prerequisite: MECHENG 312, 322
Restriction: MECHENG 406

MECHENG 709 (15 Points)
Industrial Automation

Automation technologies used in the manufacturing and processing industry. Topics include: robotics, PLCs, industrial process visualisation, data collection and supervisory control, robot sensors, computer vision systems, automated assembly systems, condition monitoring.

Prerequisite: MECHENG 312
Restriction: MECHENG 409

MECHENG 712 (15 Points)
Aerohydrodynamics

The study of fluid mechanics relevant to external flows, eg, wind turbines, yachts, aircraft or wind loadings on buildings, boundary layers, computational fluid dynamics.

Prerequisite: MECHENG 325
Restriction: MECHENG 412, 771

MECHENG 713 (15 Points)
Energy Technology

Industrial thermodynamics and energy conversion/efficiency, power cycles, availability and irreversibility, simple combustion analysis, mass transfer, energy studies, boiling and condensation.

Prerequisite: MECHENG 311
Restriction: MECHENG 413

MECHENG 715 (15 Points)
Building Services

Principles and practice of heating, ventilation, air-conditioning and refrigeration (HVAC&R), psychrometry, heating/cooling loads, mass

transfer and air quality, refrigeration/heat pump systems, cooling towers, pumps, fans, valves, pipes and ducts.

Prerequisite: MECHENG 311
Restriction: MECHENG 411

MECHENG 722 (15 Points) Engineering Vibrations

Selected topics in vibration engineering: Multiple degree of freedom and continuous systems; Spectral analysis; analytical, approximate and numerical methods, including FEA; vibration instrumentation, measurement and testing; modal analysis; vibration treatment.

Restriction: MECHENG 421

MECHENG 724 (15 Points) Multivariable Control Systems

Advanced control of mechanical and mechatronic systems. Topics include: state-space representations, linearisation, discretisation, stability, state feedback control design, optimal control, state estimation and Kalman filters. Applications in MATLAB/Simulink and with physical systems.

Prerequisite: MECHENG 322
Restriction: MECHENG 423

MECHENG 726 (15 Points) Acoustics for Engineers

Wave equations, sources, directionality; behaviour of sound waves. Principles of active control for sound. The ear and hearing system. Measurement of sound fields. Philosophy of annoyance. Legal and Standards requirements. Sound fields in enclosures. Mass Law. General insulation equation. Materials as absorbers and reflectors, room acoustics, requirements in auditoria, sound system design principles and transducer performance.

Restriction: MECHENG 425

MECHENG 731 (15 Points) Engineering Design 4M

A variety of engineering projects requiring the development and communication of design solutions to a professional standard, and using a wide range of advanced engineering methods.

Restriction: MECHENG 431

MECHENG 735 (15 Points) Microelectromechanical Systems

Design principles of micro-electromechanical systems (MEMS) with medical applications case studies. Learning objectives are: basic MEMS design fundamentals with emphasis on mechanical and electrical properties, representative MEMS sensors and actuators, MEMS applications, with an emphasis on medical technologies, MEMS fabrication methods, construction and testing of simple MEMS as part of a laboratory component.

Prerequisite: MECHENG 312

MECHENG 736 (15 Points) Biomechatronic Systems

Explores mechatronic principles and techniques for measuring and manipulating biological systems. Learning objectives are: human biomechanics and motion control, advanced serial and parallel robots, compliant soft robots, software and functional safety, human robot interaction and force control, novel sensors and actuators, and biomechatronics design principles.

Prerequisite: MECHENG 312

MECHENG 743 (15 Points) Composite Materials

Applications and manufacturing of composite materials. Mechanics of composite lamina/laminate. Failure prediction, design and finite element analysis of composite laminates and structures. Analysis and design of sandwich structures.

Prerequisite: MECHENG 340
Restriction: MECHENG 441, 772

MECHENG 747 (15 Points)
Manufacturing and Industrial Processes

Theory of plasticity; material characterisation; process analyses; extrusion, wiredrawing, forging, rolling; metal cutting: thin shear model and Merchant's diagram, tool wear and tool life; sheet forming; forming limit diagram; thermal analyses of industrial operations including transient conduction and drying; casting; polymer processing; basic polymer science: thermosets and thermoplastics, profile extrusion, sheet extrusion; blown-film extrusion, filament extrusion, blow moulding.

Prerequisite: MECHENG 340

Restriction: MECHENG 342, 447

MECHENG 752 (15 Points)
Technology Management

An appreciation of the strategic systems and technology management aspects of manufacturing systems. Industry based projects that explore the design and optimisation of manufacturing operations form a major part of the course.

Prerequisite: ENGGEN 303 with a grade of B or better

Restriction: MECHENG 451

MECHENG 762A (15 Points)
MECHENG 762B (15 Points)
Mechatronics Research Project

An innovative mechatronics project covering the research and design phases of problem analysis, specification and conceptual design, detailed design, prototype implementation and verification.

Restriction: MECHENG 407, 408, 462
To complete this course students must enrol in MECHENG 762 A and B

MECHENG 763A (15 Points)
MECHENG 763B (15 Points)
Research Project

A comprehensive investigation leading to an oral presentation, a display and a report on a topic assigned by the Head of Department of Mechanical Engineering.

Restriction: MECHENG 461
To complete this course students must enrol in MECHENG 763 A and B

Software Engineering

Stage II

SOFTENG 206 (15 Points)
Software Engineering Design 1

Project work. Skills and tools in systematic development of software, including testing, version control, build systems, working with others.

Prerequisite: SOFTENG 250, 251

SOFTENG 211 (15 Points)
Software Engineering Theory

Sets. Formal languages, operations on languages. Deterministic and nondeterministic automata, designing automata, determinisation. Regular expressions. Logic. Induction. Recursion. Program correctness. Computability. Counting. Elements of graph algorithms.

Prerequisite: ENGGEN 131 or COMPSCI 101

SOFTENG 250 (15 Points)
Introduction to Data Structures and Algorithms

Introduction to the analytical and empirical behaviour of basic algorithms and data structures.

Prerequisite: ENGGEN 131 or COMPSCI 101

Corequisite: ENGSCI 213

SOFTENG 251 (15 Points)
Object Oriented Software Construction

An introduction to Object Oriented software development. Programming with classes; objects and polymorphism. Evolutionary and test-driven development. Analysis and design. Modelling with UML. Design patterns. Design for reuse, for testing, and for ease of change.

Prerequisite: ENGGEN 131 or COMPSCI 101

SOFTENG 254 (15 Points)
Quality Assurance

Software verification and validation. Static and dynamic QA activities as part of the software lifecycle. Unit, integration, system, and usability testing. Use of visual notations, automation, and tools to support development activities. Metrics to quantify strength of testing and complexity of programs.

Prerequisite: SOFTENG 250, 251

Stage III

SOFTENG 306 (15 Points)
Software Engineering Design 2

Working in project teams to develop software to meet changing requirements for a large application. Project Planning. Requirements gathering. Estimating, costing and tracking. Acceptance and unit testing. Evolutionary design and development. Collaborative development tools.

Prerequisite: SOFTENG 206, 254, 350

SOFTENG 325 (15 Points)
Software Architecture

Taxonomy of software architecture patterns, including client/server and multi-tier.

Understanding quality attributes. Methodologies for design of software architectures. Technologies for architecture level development, including middleware.

Prerequisite: 15 points from SOFTENG 351, COMPSYS 302

SOFTENG 350 (15 Points)
Human Computer Interaction

Human behaviour and humans' expectations of computers. Computer interfaces and the interaction between humans and computers. The significance of the user interface, interface design and user centred design process in software development. Interface usability evaluation methodologies and practice. Includes an evaluation project, group design project, and implementation using current techniques and tools.

Prerequisite: SOFTENG 206
Restriction: COMPSCI 345, 370

SOFTENG 351 (15 Points)
Fundamentals of Database Systems

Relational model, Relational algebra, Relational calculus, SQL and programming languages, Entity-Relationship Model, Normalisation, Query processing, Query optimisation, Distributed databases, Transaction management, Concurrency control, Database Recovery.

Prerequisite: SOFTENG 211 or COMPSCI 225

SOFTENG 364 (15 Points)
Computer Networks

Principles of data communications; representation, transmission. Physical layer, signals in time and frequency domain. Modulation and coding. Data layer and protocols. Layered architecture model of computer networks, OSI and TCP/IP, Flow control, error control. Local area networks and IEEE standards, Ethernet and Wireless LAN. Circuit, message and packet switching. The internet protocol (IPv4 and IPV6), routing algorithms, design of subnets. TCP and UDP. Network security. Introduction to ATM.

Prerequisite: 15 points from COMPSYS 201, SOFTENG 252 and 15 points from SOFTENG 206, 211, 250, 251, 254, 325

SOFTENG 370 (15 Points)
Operating Systems

History of operating systems. Multi-user systems. Scheduling. Concurrent processes, threads and synchronisation. Memory allocation and virtual memory. Managing files, disks and other peripherals. Security, protection and archiving. Engineering distributed systems; location, migration and replication transparency. Real-time programming and embedded systems.

Prerequisite: COMPSYS 201 or SOFTENG 252, 250

Stage IV

SOFTENG 700A (15 Points)
SOFTENG 700B (15 Points)
Research Project

Students are required to submit a report on project work carried out on a Software Engineering topic assigned by the Head of Department.

Prerequisite: SOFTENG 306
Restriction: SOFTENG 401
To complete this course students must enrol in SOFTENG 700 A and B

SOFTENG 701 (15 Points)
Advanced Software Engineering Development Methods

Advanced studies in methods and techniques for developing complex software systems including topics in software engineering environments, advanced software design, tool construction and software architectures. The core taught skills are extended by individual projects in which independent research is undertaken to address challenging software system problems.

Prerequisite: COMPSYS 302 or SOFTENG 306

SOFTENG 702 (15 Points)
Advanced Human Computer Interaction

Advanced topics in human computer interaction and human aspects of computer systems relevant to commercial solution development and computer science research. Sample topics: advanced evaluation methods; support of pen and touch-based interaction; trends with domain specific user interface design, such as interfaces for enterprise systems.

Prerequisite: COMPSCI 345 or SOFTENG 350
Restriction: COMPSCI 705

SOFTENG 750 (15 Points)
Software Development Methodologies

Software lifecycle; software process models; examples of software processes; software process improvement; project management; tool support for software development; issues in software engineering.

Prerequisite: SOFTENG 306
Restriction: SOFTENG 450

SOFTENG 751 (15 Points)
High Performance Computing

Advanced parallel and high performance computing concepts and techniques such as memory architecture and networks; multicores, hardware acceleration devices; shared memory and data parallel programming; object oriented and low level parallel programming; parallelisation process: subtask decomposition, dependence analysis and scheduling. Core concepts are extended by a hands-on research project in which a challenging parallel computing problem is analysed and solved.

Prerequisite: SOFTENG 306 or COMPSYS 302 or MECHENG 313 or 30 points at Stage III in Computer Science
Restriction: SOFTENG 461

SOFTENG 752 (15 points)
Formal Specification and Design

Formal specification, design, and (automatic) analysis of software systems. Quality assurance through precise description and rigorous verification on the design. Introduction to the Z, OCL, and CSP notations. Comparison of approaches, emphasising their practical application.

Prerequisite: SOFTENG 306
Restriction: SOFTENG 462

SOFTENG 761 (15 Points)
Agile and Lean Software Development

Advanced software engineering concepts focussing on Agile and Lean software development; including hands-on iterative and incremental software development, self-organising teamwork, project management, and an individual research component to explore challenging issues in this discipline.

Prerequisite: SOFTENG 306 or equivalent

Information for students

General information

Timetables

Class timetables for 2015 will be available from mid-December 2014 via Student Services Online, Class Schedule on the University website **www.studentservices.auckland.ac.nz**.

Note: Room allocations, and occasionally class times, may change during the first two weeks of semester.

Communication with students

Staff-student and student-student written communication is done using email and notice boards.

- **Email:** as a student you will be allocated a unique University email address. You are expected to check this email account frequently, or redirect it to another account.
- **Notice boards:** there are notice boards on Level 3 of the Faculty of Engineering building for Engineering students of each Part. These are normally used to communicate routine administration matters and job vacancies. It is your responsibility to check them regularly for notices that may affect you personally. Each department also has a notice board near the departmental office which may display results of tests, worked solutions to problems, job vacancies and information about postgraduate study.
- **Online:** notices and events are also posted on the faculty website and Facebook page. Stay informed at **www.facebook.com/uoaengineering**.

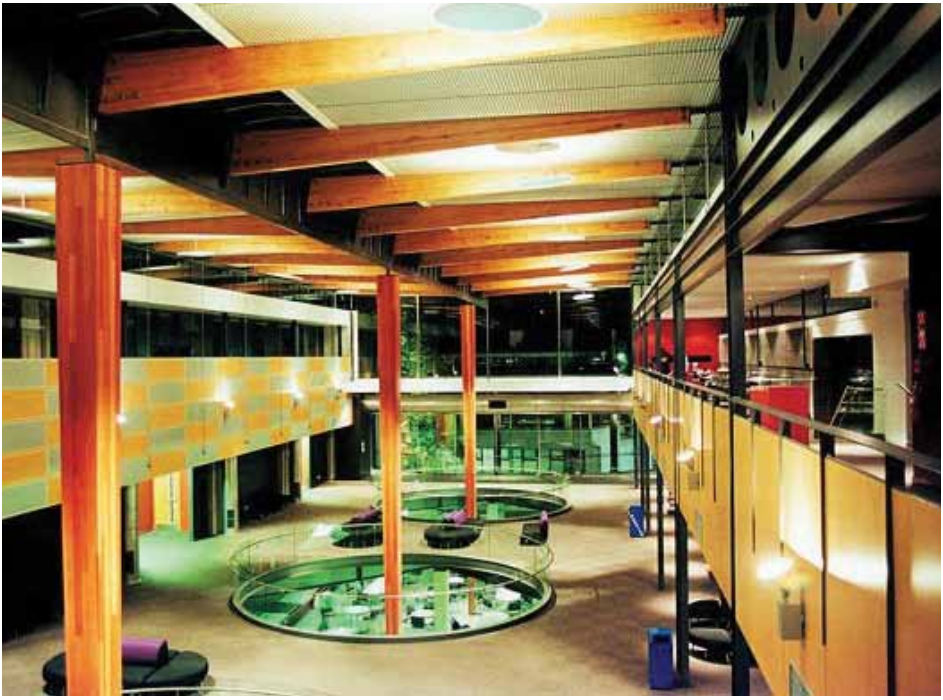
Building access

All engineering students are allowed to enter the Engineering building between 7am and midnight seven days a week. Access to the labs is based on the specialisation and the year of study of the student.

General access is as follows:

- The main doors to the building will be operational from 7.30am-6.30pm.
- You will need your access card to enter/exit the building between 7-7.30am and 6.30pm-midnight. During these times, you may only enter/exit the building via door 401.2.00C1 (Level 2 leading from the staff carpark) and door 401.3.00L1/1 (Level 3 leading in from the subway).
- Security officers will check the premises at 11.45pm every night and remind students to vacate the building by midnight.
- Access cards will not open any internal or external doors after midnight.
- These hours also apply to all study areas and computer labs.

Download the AucklandUni mobile app
Find out where you are on campus maps, search for staff contact details, view your class timetable, log into student services, browse courses and search for library books – all from your iPhone or Android device.



Access cards

An access card can be purchased at the Engineering Student Centre for $6. This is a one-off payment and not a deposit. There will be no refunds at any time. Once purchased, the card must be activated by completing the online application form on the Engineering website under quick links. It may take up to two weeks before the card is activated.

You can use the same card until your studies are complete; however, it needs to be renewed at the beginning of every year. Applications for renewal can be done online following the same process as above.

Access cards are not transferable under any circumstances. Please report a loss/theft to the Security Office on extension 85000. A replacement card can be purchased at a cost of $25, once the loss is reported.

Field trips

As part of your course, you may be required to go on field trips to study engineering plants and works. The requirements of such plant visits will be specified each year, and details will be provided as soon as available. Where field trips are specified by the department as compulsory, these form part of the requirements for obtaining a degree.

For example:

- **Chemical and Materials Engineering** Part III students may be required to attend three or four field trips of half-day duration. Part IV students will have three one-day or one three-day out of town plant visit(s).
- **Civil and Environmental Engineering** students may be required to attend field trips that complement relevant lecture material.
- **Engineering Science and Biomedical Engineering** Part II students will participate in a compulsory two to three-day field trip provisionally planned for early in Semester One. Visits are made to industries in the upper half of the North Island.
- **Mechanical Engineering** Part III students may be required to attend day trips to engineering and manufacturing companies to demonstrate the variety and scope of engineering activities in New Zealand industry.

Departmental fees

Students may be charged a fee to cover the cost of copied course readers and/or field trip transport costs.

Field trip charges apply for the following courses:

- CHEMMAT 322 $30 + GST
- CHEMMAT 750 approx. $200
- MECHENG 352 $50 + GST
- MECHENG 371 $50 + GST

Additional fees apply for design pads used for the following courses:

- MECHENG 235 Design and Manufacture 1 $8
- MECHENG 236 Design and Manufacture 2 $8
- MECHENG 334 Engineering Design 3M $8
- MECHENG 706 Mechatronics Design $8
- MECHENG 731 Engineering Design 4M $8.

Second-hand textbooks

If you are interested in buying or selling second-hand books check the notice boards. There are several outlets, including the University Book Shop, that sell second-hand textbooks.

Text book grants

The AUSA and UBS text book grants are intended to assist AUSA members who have shown significant on-going commitment to academic study, despite facing adverse personal circumstances beyond their control. Application forms and further information can be found on the AUSA website.

Hardship grants

If you need help with food, accommodation, travel or medical costs you can apply for an AUSA Hardship Financial Assistance Grant. The Welfare Officer also provides emergency food parcels for students in need.

Email: welfare@ausa.org.nz

Parents' space

There is a dedicated kitchen and study area for you to use, with or without your children, at AUSA House, 4 Alfred Street. Resources available include: port-a-cot, high chair, change table, TV/stereo, computer and printer, children's toys and books, kitchen facilities, study spaces and lounge chairs.

Email: parentspace@ausa.org.nz

Lockers

Lockers are available in the Faculty of Engineering building for your use. Please contact the Auckland University Engineering Society (AUES) office on Level 3 (Room 402-306) for information on hiring a locker.

Central Administrative Services

The ClockTower Building is the location for the University's central student administrative centres (otherwise known as "Academic Services"). Here you can find:

- Admissions and Enrolment Office
- Cashiers

- Disability Services
- Examinations Office
- Graduation Office
- ID Card Centre
- Scholarships and Financial Support
- Student Financials and Tuition Fees Office
- Student Information Centre
- Student Records
- University Careers Services

If you have a general enquiry, you can visit the Student Information Centre or Student Central.

Student Information Centre
Room 112, ClockTower
22 Princes Street
Phone: 0800 61 62 63
Email: studentinfo@auckland.ac.nz
Open: Monday to Friday 8am–6pm, Saturday 9am-12 noon

Student Central
Main Quad
32 Princes Street
Phone: 0800 61 62 63
Email: studentinfo@auckland.ac.nz
Open: Monday to Friday 9am-5pm

Study abroad

The University's 360° Auckland Abroad programme offers you the opportunity to complete part of your degree overseas, with a choice of more than 100 universities in 24 countries.

As a University of Auckland student, you may be able to study at an overseas partner university of equal standing for a semester and enjoy the benefits of the exchange agreement - you'll pay tuition only to Auckland, be eligible to apply for scholarships, and bring credits you've earned home to your BE(Hons).

- Participation is dependent upon a 5.0 GPA in your last 120 points of study and must be approved by the faculty.
- Unless enrolled in a conjoint degree, BE(Hons) students will usually complete only a single semester of study abroad in Parts II or III of their degree. Study abroad is not permitted during Part IV of a BE(Hons).

- As courses taken on exchange are ungraded, they cannot contribute to your Honours GPA. Further details regarding Honours calculation for students who choose to study abroad can be found on page 103.

For more information see our staff at the Engineering Student Centre or visit:
www.engineering.auckland.ac.nz/student-exchange

The Auckland Abroad Resource Centre
iSpace, Level 4
Kate Edgar Information Commons
Email: aucklandabroad@auckland.ac.nz
www.auckland.ac.nz/360

Personal safety, incidents and emergencies
In the event of a fire, crime or serious accident, phone the NZ emergency services on the free number 111.
If you witness, or are involved in, an on-campus incident, Unisafe Officers will be on-site to provide an immediate response. You can contact Unisafe on +64 9 373 7599 ext 85000 (we recommend you save this number to your mobile), or via emergency telephones around the campus. There is an emergency telephone located in the main atrium of the Faculty of Engineering, opposite the Student Centre.
If you experience any other incident or bereavement that might affect your studies, please contact a member of the Student Development and Engagement team or the Student Centre Manager (see page 114 for contact details).

Facilities

Laboratories

Part IV project students may use only those laboratories in which they have been given specific authority to work by their supervisor. No other student may use the laboratories, except in the course of carrying out any undergraduate laboratory programme for which the student is enrolled.

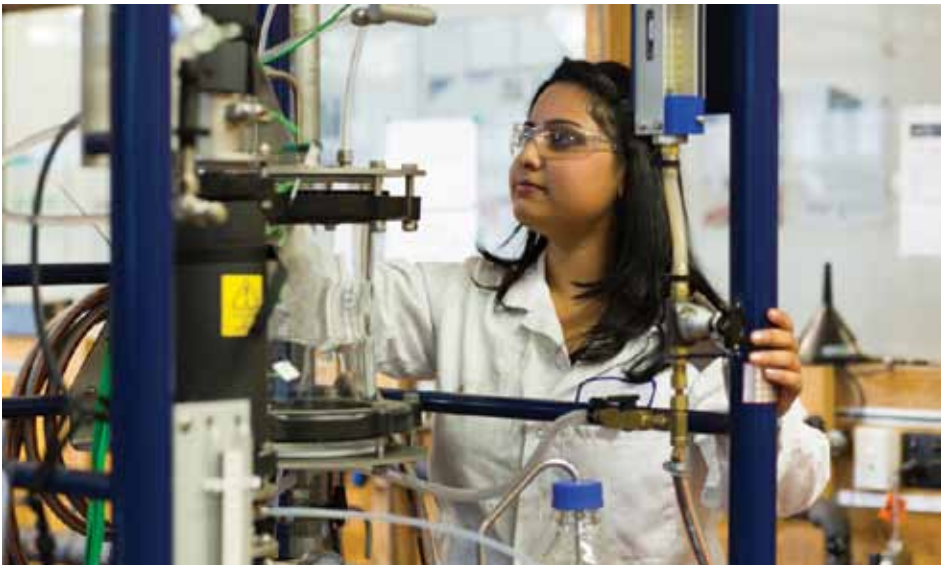
Chemical and Materials Engineering students will be required to wear a protective laboratory coat (boiler suit/overall or similar protective clothing are also acceptable) for all their laboratory classes.

As there are safety hazards in the laboratories and because the laboratories contain a great deal of valuable equipment, rules for their use are necessary:

1. Laboratory work carried out when a person is alone in a room must be restricted to operations with which the individual is familiar and are not hazardous. Hazardous operations include (but are not limited to):

    - Handling or mixing chemicals.
    - Wiring up electrical equipment.
    - Using machine tools other than battery powered ones.
    - Using equipment designated by the technicians in charge of the laboratory as hazardous.
    - Using welding or oxy-acetylene equipment.

2. Upon leaving the laboratory, students and staff are responsible for ensuring that all equipment and services are in a safe condition. This means, for example, turning off electricity, gas and water which have been used.



Engineering Library

The Engineering Library is the largest university engineering library in New Zealand. It includes a computer training room, group study rooms, an audio-visual room and creativity centre. Four subject librarians are always available to help students.

- The online catalogue provides access to materials held by all University of Auckland libraries.
- Most books may be borrowed upon presentation of a University ID card for a month at a time.
- Textbooks can often be found in the short loan collection; these may be borrowed for two hours at a time or, if issued two hours before the library closes, they may be kept overnight.
- Fines apply for any items returned late.
- If an item is recalled for another reader, it must be returned by the new time specified.
- Many books and most serials are now available electronically; if applicable, this feature will be evident in the catalogue.
- Items not held in the University of Auckland Library system may be obtained from another library, usually with no charge, via the Library homepage.
- Familiarise yourself with electronic databases which index journal articles that may be relevant for engineering research. These can be accessed through the library homepage at **www.library.auckland.ac.nz**.

Engineering Library
Level 4, Block 402
20 Symonds Street
Lending desk phone: +64 9 373 7599 ext 87368
General enquiries phone: +64 9 373 7599 ext 88130
www.library.auckland.ac.nz/engineering

Computing and IT

Details of all IT services, together with answers to many common questions, can be found on the faculty website, in the 'Current students' section under 'IT essentials'.

Computer labs

There are six general computing labs in the main Engineering building with a combined total of 155 computers, including:

- Four teaching labs (401-307, 401-311, 401-312 and 403-409) available for students when classes are not running.
- Two student drop-in work areas (401-301 and 401-306)

Please note that we have provided a limited number of extra power sockets in the labs and ask that you do not unplug any of our devices in order to plug in personal ones. Please also remember that the University's computing facilities are provided exclusively for educational and study purposes.

Opening hours

- Student work areas are open 8am-7pm Monday to Friday during semesters (except public holidays) and 8am-5pm at other times.
- Teaching labs are open 8.30am-5pm Monday to Friday.
- Swipe card access is required after hours for all lab areas.
- Teaching labs are unavailable for general student use when classes are scheduled.

Internet

All students have free access to the internet while logged into our systems. The Undergraduate Plan provides unlimited high-speed access to all University websites and online library resources. It also provides high-speed access to all non-University websites, with a 10GB monthly data allowance.

There is broad wireless coverage in all areas of the faculty, providing network connectivity for laptop and other mobile users. This includes the main lecture theatres, atrium, cafe, Leech study area and the Engineering library.

Saving documents to the network

As a student you are allocated a limited amount of network disk space for the storage of coursework-related material and software configuration files. This is referred to as H drive (or Home Directory) and is backed up and separate for each user. IT recommends that you save documents to your H drive rather than a USB flash-memory storage device. USB devices are not reliable and are known for failing at critical times. It is strongly recommended that students make a back-up of their network H drive at the end of each year.

Printing, copying and scanning

Printing is provided through the University's Copy and Print Service (CAPS). Students enrolled in Engineering courses will be given CAPS credit which can be used to photocopy or print on any CAPS printers located within the faculty, University libraries or Information Commons. Additional credit can be purchased from the Information Commons Helpdesk or from terminals in the library. Scanning is free, although the system will only allow access if you have a positive CAPS balance.

University IT Policy

To use any University IT equipment you must comply with the University IT Policy, details of which can be found in the 'Computer security' section of the 'IT essentials' faculty webpage. A breach of this policy exposes both yourself and the University to a serious risk of legal action by rights owners for copyright infringement. Additionally, it presents a serious IT/IP security threat to both the University and yourself. Those involved may face disciplinary action for the inappropriate use of University computer resources in breach of our statutory obligations and our policies. In particular, please ensure you are aware of the ICT Statute, Policies and Standards which are referred to on the previously mentioned website.

Further information and IT Help

In the first instance, please refer to the IT essentials faculty webpage for answers to frequently asked questions.

If you cannot find the answer you're looking for and need assistance, requests for help should be directed through our AskIT incident and change request system. Calls can be logged by clicking on the AskIT button on every faculty desktop or under 'Quick Links' on faculty websites.

Health and safety

Please read the following health and safety information carefully. The information is intended for all staff and students working within the Faculty of Engineering. This information is not intended to be a complete guide on safety matters but is meant to detail safety themes and practices that should be adopted to ensure the health and safety of all staff, students and visitors in the Faculty of Engineering.

It outlines your responsibilities regarding health and safety, provides useful hints and tips to help you work safely and details some of the more common procedures used to manage health and safety in the faculty.

The University of Auckland and Faculty of Engineering policies and guidelines with regard to health and safety are available through the faculty website **www.engineering.auckland.ac.nz/safety**.

Alternatively the University of Auckland and Faculty of Engineering Policies and Guidelines on Safety may also be viewed by contacting the Director of Faculty Operations or any departmental manager within the faculty.

Responsibility and accountability

The Vice-Chancellor has overall responsibility for health and safety at the University of Auckland.

The Dean of Engineering is responsible for health and safety in the Faculty of Engineering.

The Head of Department is responsible for health and safety in each department.

You are responsible for your health and safety, and the health and safety of those around you.

The Faculty of Engineering has a Safety Committee. The chair of the committee reports to the Dean of Engineering on matters of policy, and the committee also discusses matters of safety that arise within the faculty.

The staff within each department elect representatives onto the committee. Representatives are listed on the website. You can contact your department office, or the Engineering Student Centre to obtain an up-to-date list of representatives on the committee.

Each department operates an Injury/ Illness Prevention Programme (IIPP) – a University-wide initiative to manage health and safety risks. The IIPP folder contains a complete list of hazards within the department, and is reviewed at least annually. Statistics generated by this programme are used to detect trends across the University, and may be useful in reducing the number of accidents or incidents within the faculty.

Facts

All policies and guidelines for health and safety are based on the following facts. By acknowledging these facts, you will be more aware of your surroundings, and you will be less likely to be injured as you work within the faculty:

1. You are responsible for your own health and safety.

2. You are responsible for the health and safety of those around you.

3. You are responsible for the security and the safe use of equipment and facilities that you have been authorised to use.

Rules

In order to manage risks, we need to limit access to equipment, labs and workshops. Prior to authorising you to use equipment, labs or workshops, the person responsible will provide information about possible hazards and associated controls you may encounter when using equipment, labs or workshops.

Note: Having swipecard or key access does NOT mean you are authorised to access a facility. To be authorised, you MUST have hazards and control measures explained by the person responsible.

- You must not enter a laboratory, workshop or storeroom unless you have been specifically authorised, unless you are in the presence of an authorised person. In either case, you should seek advice about any hazards you may encounter.

- You should not attempt to operate equipment or apparatus unless you are specifically authorised to use that equipment, and you have been advised of any hazards you may encounter.

- Do not attempt to modify or repair any equipment or apparatus unless you have been authorised to do so. Any repairs or modifications must comply with the University of Auckland policy for equipment modification and repair, and any relevant legislation.

- Keep your work area clean and tidy. When you have finished for the day, make sure all tools and equipment are returned to their proper storage, and equipment is shut down.

- If you create a hazard, you must also control it. It is important to involve your supervisor and the person responsible for the area where the hazard is located.

- Where access to a facility is restricted, such as by swipecard or lock, you are NOT authorised to allow entry to people who do not have access to that facility. This means that you are NOT allowed to unlock the facility for someone else. See the responsible person for advice.

- Consumption of food and drink in teaching areas and laboratories is prohibited.

- Suitable clothing and enclosed footwear must be worn in laboratories and workshops. Staff will not allow access for those people who do not have suitable clothing and footwear. As this may affect the completion of papers, it is your responsibility to ensure you meet any requirements.

- The University of Auckland is smoke free, with smoking banned in all campuses, outdoor spaces and buildings.

Before starting work

Before starting work in any area you should ask (and answer) the following questions:

- How do I get out in the event of an evacuation?
- Where is the nearest telephone / first aid box / fire alarm?
- Where are the isolation controls for the equipment I am going to use?
- What protective or safety equipment do I need to work safely?
- What if something goes wrong? Do I know what to do?
- Who is responsible for the area I am going to be working in?
- What other work is being performed nearby? Will it interfere with my work?

What to do if you suspect that something is unsafe

- If it looks unsafe it is likely to be unsafe.
- Make sure that you are safe.
  - Rule 1 - You are responsible for your own health and safety.
- Make it known that you think something is unsafe.
  - Rule 2 - You are responsible for the health and safety of those around you.
- If you can safely do so, eliminate/isolate/minimise the hazard (eg, switch off the power supply or fuel, clean up a spill, move people out of the area).
  - Rule 3 - You are responsible for the security and the safe use of equipment and facilities you have been authorised to use.
- Advise your supervisor or the person responsible for the area where the hazard is located. They are required to take all practicable steps to ensure the hazard is eliminated, isolated or minimised. They can also undertake or arrange for formal hazard identification and risk assessments to be undertaken.
  - Rule 4 - If you are not satisfied with the outcome, contact a representative on the Safety Committee for your department, or the Head of Department.
  - Rule 5 - If you are not satisfied with the response from the department, then contact the Chair of the Faculty of Engineering Safety Committee, the Director of Faculty Operations or the Dean.
  - Rule 6 - If you are still not satisfied, then you should contact the University of Auckland Health and Safety Adviser, who is part of the Human Resources Registry.

What to do if an accident/incident ALMOST happens

- A “near-miss incident” is something that, under slightly different circumstances, could have caused an accident.
- Near-miss incidents need to be reported as though an accident occurred, using the accident/incident reporting form. Make sure that it is marked “near-miss incident”.

Near-miss incidents are the best kind of incident to report, as no one has been injured (yet), and it may give us the chance to fix the problem before anyone gets hurt.

Hazard control options: eliminate/isolate/minimise

The following list details the three options for controlling hazards.

Eliminate the hazard

- Eliminating the hazard means the hazard no longer exists.
- Control procedures may need to be developed to ensure the hazard does not return.

Isolate the hazard

- Isolated hazards are still hazards, but you are a lot safer because you cannot come into contact with the hazard.
- Control procedures must be developed to ensure the hazard remains isolated.

Minimise the hazard

- An identified hazard that cannot be eliminated or isolated must be minimised.
- Reduce the level of harm that can be caused by the hazard.
- Reduce the probability that harm will be caused by the hazard.

Note: "Ignore the hazard" is NOT AN OPTION, and may be treated as a disciplinary matter by the University. Please report instances to representatives on the Faculty of Engineering Safety Committee or to your Head of Department for corrective action.

Further information

For Faculty of Engineering key links on safety go to Safety under Quick Links on the Engineering homepage, or visit:

www.engineering.auckland.ac.nz/safety

This will show you the following information:

- Personal safety and emergency contacts
- Reporting accidents, incidents or injuries
- First aid officers
- Registered electrical licence holders
- Evacuation wardens register
- Faculty Safety Committee

- Faculty Safety Committee minutes
- University of Auckland policies

If you wish to obtain further information on any of the above policies you should contact the Engineering Student Centre located on Level 4 of 20 Symonds Street.

Students and staff are expected to read and understand the University's policy on personal safety and emergency contacts. To view this, go to Safety under Quick Links on the Engineering homepage, **www.engineering.auckland.ac.nz** and follow the link Personal safety and emergency contacts.

Key staff within the faculty in the area of safety are:

Name	Ext	Position	Email
M. McCarthy	88713	First Aid Officer	ma.mccarthy@auckland.ac.nz
J. St George	88195	Chair of Safety Committee	j.stgeorge@auckland.ac.nz
Hayley Schnell	89261	Director of Faculty Operations	h.schnell@auckland.ac.nz

Staff responsible for labs:

The names of staff responsible for specific laboratories within the Faculty of Engineering may be obtained from the Group Services Coordinator of the Department concerned:

Department	Ext	Email
Chemical and Materials	88135	chemmat-enquiries@auckland.ac.nz
Civil and Environmental	81403	cee-enquiries@auckland.ac.nz
Electrical and Computer	88158	ece-info@auckland.ac.nz
Engineering Science	87911	info-engsci@auckland.ac.nz
Mechanical	85840	mech-enquiries@auckland.ac.nz

Academic information

Course details and requirements

In the first lecture of any course, you can expect to receive a hand-out that details the material that will be covered during the course, how the course will be assessed and the due dates for these assessments. Be sure to put these dates in your diary.

Note also that there is no fixed relationship between marks and grades. Scaling may occur, particularly with courses that are 100% on-course assessed. In these cases, a 50% (unscaled) course mark may not equate to a pass.

Student Services Stall

All departments have different methods of collecting and returning assignments. Lecturers will advise students of their course requirements at the beginning of the semester. Some departments use the Student Services Stall on Level 3 to both collect and return assignments and departmental material. Students need to produce their ID cards before they collect assignments. Those assignments which are not collected within two weeks will be boxed and destroyed at the end of each semester.

Calculators

There are specific regulations regarding the type of calculator you are permitted to use during tests and exams.

- Your calculator must comply with the general calculator requirements in the *University of Auckland Calendar*.
- No alphanumeric calculators. Your calculator must not have the full alphabet on/available from the keyboard.
- No graphing ability
- Your calculator must not have wireless/wired communication capability to another calculator or computer.
- Your department may have further requirement for calculator specifications.
- A typical complying calculator is the Casio FX82 or equivalent.

If in doubt, check with your department course adviser well in advance of exams. If you bring a suspect or non-complying calculator into a test or exam, it will be removed and held for checking and your name will be recorded in case further action is necessary.

Scholarships and prizes

More than 40 scholarships ranging from $1,000 to $7,500 are gifted annually by individuals, societies, businesses and industry to promising undergraduate engineering students.

The Faculty of Engineering also offers up to 26 Kick Start scholarships specifically for school-leavers applying to Part I of BE(Hons). These scholarships are a one-year award of $2,000 aimed at assisting students with "set up" costs for their first year at the University of Auckland.

The closing date for all 2015 Kick Start scholarships is 5 January 2015.

To find out more about undergraduate engineering scholarships and awards visit:
www.engineering.auckland.ac.nz/scholarships

For further assistance, contact the Scholarships Office:

Scholarships Office
Phone: +64 9 373 7599 ext 87494
Email: scholarships@auckland.ac.nz
www.auckland.ac.nz/scholarships

Practical Work (ENGGEN 499)

Part of your BE(Hons) degree requires you to complete a programme of practical work experience. This component complements your formal studies and contributes to your professional training, providing you with trade and sub professional skills relevant to your engineering specialisation.

As it is a formal requirement of your degree, strict assessment criteria apply. Detailed information on what is expected of you can be found online at **www.engineering.auckland.ac.nz/practical-work**.

Important points to note:

- **What:** To meet the requirements for the award of the BE or BE(Hons) degree, you must complete 800 hours of practical work (minimum 200 hours in general and sub professional work respectively) AND write practical work reports that critically appraise your experiences.
- **When:** Practical work experience will usually be undertaken during the study summer breaks following Parts II and III (400 hours in each).
- **Types of work:** Appropriate types of practical work are outlined in the section that follows. Non-engineering work will not be accepted. Concerns about the suitability of a particular type of work should be discussed with your department representative on the Practical Work Committee (names on page 100).
- **Employers:** Except for work associated with scholarships or internships, each work experience period should be with a different employer.
- **Summer scholarships:** If you participate in a project for a University Summer Research Scholarship, you may count up to 400 hours of this towards your practical work experience.

- **Registration:** You must register your practical work employment online prior to, or during the first week of employment. Login to register at: **foeonline.auckland.ac.nz/practicalwork**
- **Certification:** A Practical Work Certificate covering each work period must be completed, signed by your employer and included with your report. Photocopies or scanned certificates will not be accepted.
- **Report:** A practical work report of up to 25 pages detailing each work period must be submitted. Details of the report requirements can be found on page 99.
- **Due dates:** Practical work reports are to be handed in to the Engineering Student Centre.
  - If you wish to participate in the September 2015 graduation ceremony, your final report should be submitted on or before **Monday 9 March 2015**.
  - If you wish to participate in the May 2016 graduation ceremony, your final report should be submitted on or before **Monday 3 August 2015**.
  - Accelerated Pathway students are required to submit their reports by **Tuesday 10 February** at the very latest.
- **Prize:** Three prizes of $1,500 are offered by the Association of Consulting Engineers New Zealand for the best practical report by a Part IV engineering student. If you undertake employment with a company that is an ACENZ member and you wish to apply for a prize, pick up the entry form from the Engineering Student Centre and include this in the front of the report, to be handed in by 9 March 2015.
- **Exemptions:** If you are a direct-entry student into Part III (from another tertiary institution, for example) or you have had substantial relevant work experience prior to entering the faculty, you may be required to complete only 400 hours of practical work experience. Any exemptions or exceptions to any of the aforementioned requirements are to be approved by the appropriate departmental representative of the Practical Work Committee or the Faculty Chair.

Types of practical work suitable for each department

Although most students will complete 400 hours during each of two summers for a 400 + 400 hour split, other hour splits are acceptable. A minimum of 200 hours in either of the following two categories (800 hours total) is required:

- **General engineering:** the first practical work period should allow you to become familiar with engineering processes and trade skills, particularly those appropriate to your specialisation.
- **Sub-professional engineering:** the second practical work period is to be of a sub-professional nature. This work is as a junior engineer with responsibilities, work level, and technical expertise which takes advantage of the academic training gained from earlier years in your engineering degree.

The following are meant as guidelines for classes of acceptable work; other classes may be acceptable. If in doubt, check with your departmental representative.

Specialisation	Type of work	Examples
Biomedical Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople or technicians, such as laboratory work, mechanical installation, equipment maintenance, data gathering or analysis, and assistance in software or website development.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, medical professionals, or medical researchers, involving product or instrument design, development and testing, medical imaging technology, CAD draughting, software development, database design or inventory control.
Chemical and Materials Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving machining, structures, building construction, design, welding, quality control, production assembly or electronics.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving plant or laboratory operations in metals, materials, chemicals, fertilisers, paints, soaps, foods, petrochemical, pulp and paper, dairy, water treatment, environmental or pollution control industries.
Civil and Environmental Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving trade skills in the construction, earthmoving, mining, water and wastewater treatment, surveying, road, traffic and transportation, asset condition, minerals and resources, and environmental monitoring industries.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, including surveying, contract documentation, design and/or draughting, bore hole logging, construction supervision, engineering associated with buildings, structures, geotechnical, earthworks, construction, mining, road, traffic and transportation, water/wastewater, hydrology/ hydraulics, and environmental engineering.

Computer Systems	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving the fabrication, manufacture, installation, maintenance and configuration of mechanical, electrical and computer systems.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving the installation, design, fabrication and testing of computer-based components; development, maintenance and support of software packages; application of computer-based systems to embedded and/or real-time problems, communication systems; installation and configuration of networks.
Electrical and Electronic Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving the use of hand tools and machine tools associated with the fabrication, manufacture and/or maintenance of electrical instruments, components or equipment.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving the installation of lines, trunking systems, switchboards and machines; design, fabrication and testing of electrical components; electrical draughting, computing; application of wiring regulations and electrical safety.
Engineering Science	General engineering (min. 200 hours)	Work associated with skilled tradespeople, including laboratory work, mechanical installation or maintenance, computer or instrumentation maintenance or testing, data gathering or analysis, assistance in software or website development, surveying or construction site work.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving product design, systems/applications analysis, analysis of optimisation and simulation models, or software development.
Mechanical Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople such as mechanical tradesmen and/or machine tool operators, involving the fabrication, manufacture, maintenance and repair of mechanical components or equipment.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving design, draughting, inventory control, production planning, administrative/managerial processes, or coordinating labour.

Mechatronics Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving hand tools and machine tools for metal cutting and forming; manufacturing and assembly of mechanical components or equipment; fabrication, manufacture and/or maintenance of electrical components or equipment; installation, maintenance and configuration of computer systems.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, including mechanical design, draughting, inventory control, production planning, administrative/managerial processes, design, implementation and testing of electrical, computer or software systems.
Software Engineering	General engineering (min. 200 hours)	Work associated with skilled tradespeople, involving the fabrication, manufacture, installation, maintenance and configuration of mechanical, electrical and computer systems.
	Sub-professional engineering (min. 200 hours)	Work associated with professional engineers, involving the installation of software systems; design, implementation and testing of software systems; helpdesk, backup and system support; network configuration; computer security services; information system support; web services.

Practical work reports

The practical work component of your degree requires you to:

1. Complete 800 hours of practical work experience.
2. Write and submit a practical work report for each period of employment.

Specifications of practical work reports are as follows:

- A separate report must be submitted for each period of practical work.
- Reports must be no more than 25 pages in length.
- All reports MUST contain the following:
  - **Title page:** including your name, department, the name and address of your employer, dates of the work period, date of the report.
  - **Summary:** a brief summary of the whole report. No more than 300 words that includes the nature of the organisation, type of work done, skills learned, conclusions drawn.
  - **Acknowledgements:** to thank the people who have given you help in your work.

- **Table of Contents:** section headings with corresponding page numbers. May include a list of figures and a list of tables, with corresponding page numbers.
- **Introduction:** outline of the nature of the enterprise and/or products of the employer.
- **Early sections:** these sections could include information on the layout of works or plant, staff organisation structure, number of employees engaged in various work, general comments on buildings, plant layout, technical facilities and amenities for staff.
- **Central sections:** in these sections you should provide a full description of the work undertaken and any other activities observed.
- **Reflective appraisal:** in this section you should critically appraise or evaluate your learning/knowledge gained within the practical work period. This could include your impressions about the organisation and its performance. It would also be appropriate to comment on the skills you have developed and the lessons learnt in relation to professional engineering practice.
- **Conclusions:** summary list of conclusions drawn and skills learned.
- **Bibliography:** if needed.
- **Appendices:** if needed.

The Practical Work Committee for 2015

Practical Work Committee Chair
Dr Doug Wilson
Email: dj.wilson@auckland.ac.nz

Biomedical Engineering
Dr Iain Anderson
Email: i.anderson@auckland.ac.nz

Chemical and Materials Engineering
Dr Zaid Saleh
Email: z.saleh@auckland.ac.nz

Civil and Environmental Engineering
Dr Vicente Gonzalez
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Computer Systems Engineering
Dr Nitish Patel
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Engineering Science
Mr Jim Greenslade
Email: j.greenslade@auckland.ac.nz

Mechanical Engineering
Mr Stephen Elder
Email: st.elder@auckland.ac.nz

Mechatronics Engineering
Mr Stephen Elder
Email: st.elder@auckland.ac.nz

Software Engineering
Dr Nitish Patel
Email: nd.patel@auckland.ac.nz

(ex officio)
Employer Liaison Manager (Kevin Healey)
Student and Academic Services Manager (Elizabeth Chandy)

Assessment

Examinations take place twice per year: at the end of Semester One, in June, and at the end of Semester Two, in October/November. Students can access their examination timetable on Student Services Online. Results are made available on Student Services Online following the respective examination period.

Missing an examination

If you are absent from an examination due to temporary illness or misfortunate, you may be eligible for an aegrotat pass or compassionate consideration, provided that you:

1. Attempted the examination(s) if at all possible.

2. Suffered illness or other misfortune which affected examination preparation or performance.

3. Saw a medical practitioner on the day of the examination, or, if preparation was impaired, within the fortnight before the examination, and you obtained a medical certificate providing full details of your condition. For compassionate consideration, please see the counsellor at the University Health and Counselling Service.

4. Complete the appropriate application form available from the University Health and Counselling Service and submit it within one week of your last affected examination.

An aegrotat or compassionate pass may be awarded if medical or other evidence makes it clear that you were either unable to attend the examination(s) or your performance was affected at the time of the examination(s). Your academic performance throughout the course may also be taken into consideration.

Note: The final decision on the award of the aegrotat depends on the University Senate.

Students who discover they have missed an examination through their own mistake must contact the Examinations Office immediately.

Examinations Office
Room 134 (street level)
The ClockTower
22 Princes Street
www.auckland.ac.nz/exams

Missing a test

Tests that contribute to your final grade and are held under examination conditions are subject to the same rules for aegrotat and compassionate consideration as examinations. If you miss a test, you should complete Form AS46, available from the Student Information Centre in the ClockTower building. This must be submitted within seven days of the test.

Missing on-course assessment

For on-course assessment other than a test, you should first attempt to obtain an extension of the due date from the Course Organiser. If this extension is not given, or considered inappropriate by the Course Organiser, you may use the Faculty of Engineering "Application for Exemption from On-course Assessment" to request an exemption. This form can be obtained from the Engineering Student Centre

and must be submitted within seven days of the due date of the assessment affected. You must have been prevented from presenting the assessment or consider your performance seriously impaired because of illness, injury or other misfortune beyond your control.

Conceded passes

If you fail a course, you may be eligible for a conceded pass. You cannot apply for a conceded pass; eligible students will be automatically considered and conceded passes will be confirmed at the end of each year. If granted, you will see a 'CP' on your academic record. You will only be considered for a conceded pass if:

- The award of the conceded pass allows you to complete a Part, or all courses enrolled for in that year.
- You have a D+ grade in the failed course(s). Note: "Withdraw", "Did Not Complete" and "Did Not Sit" constitute failures and are not considered for conceded passes.
- Your overall GPA (grade point average) for the year, including the failed courses, is 2 .5 or greater (C = 2, C+ = 3).
- The failed course(s) belong to Parts I, II or III of the BE(Hons) degree.
- The total points conceded per Part or academic year is not above 20 points.

Academic misconduct, cheating and plagiarism

The University of Auckland and the Faculty of Engineering view cheating as a serious offence. Cheating is defined in the Examination Regulations of the University Calendar and penalties are administered by the Discipline Committee of the Senate. Penalties may include suspension or expulsion from the University. Cheating in on-course work is usually handled within the faculty or department, and may result in the assigned being marked as zero or a course being failed. The name of the offending student and details of the case may be added to the University's Register of Academic Misconduct.

You will learn more about how to avoid the various forms of cheating in the compulsory Academic Integrity course in Part I. The University of Auckland's full guidelines on procedures and penalties for academic dishonesty are available at **www.auckland.ac.nz/academic_honesty**.

Grading and Honours

For each Part of the BE(Hons) degree, your Grade Point Average (GPA) is calculated using the following formula:

$$\text{GPA} = \sum_i g_i * p_i \Big/ \sum_i p_i$$

Where p_i is the points for course i and g_i is the numerical value of the grade awarded in course i. The numerical values for the grades are A+ : 9, A : 8, A- : 7, B+ : 6, B : 5, B- : 4, C+ : 3, C : 2, C- : 1 and fail : 0. It should be noted that failing grades as well as grades for repeated courses are included in the GPA. If all courses are worth 15 points, the GPA can be calculated easily as the average of the grade values for all courses (including failed courses).

For Accelerated Pathway (AP) students, the GPA for the Part does NOT include the extra courses that are being taken to cover Part I courses. The courses that count towards the 120 points of the Part must be signed off by the AP Coordinator at the beginning of each semester.

Calculation of the Honours GPA (HGPA)

The award of Honours is dependent on the value of your Honours GPA. This is calculated using the formula below and then rounded to one decimal place.

HGPA = 0 .1*Part II GPA + 0 .3*Part III GPA + 0 .6*Part IV GPA

Were you enrolled in Part II prior to 2010?

If so, your Honours GPA will be calculated using only your GPAs from Parts III and IV, as per the following formula:

HGPA = 0 .4*Part III GPA + 0 .6*Part IV GPA

Award of Honours

Honours is awarded in three classes: First Class, Second Class (First Division) and Second Class (Second Division). Your class of Honours will depend upon you achieving the following GPA:

First Class Honours: $7.0 \leq$ HGPA

Second Class Honours (First Division): $5.5 \leq$ HGPA < 7.0

Second Class Honours (Second Division): $4.0 \leq$ HGPA < 5.5

It should be noted that a GPA of 4.0 is equivalent to a B- and a GPA of 7.0 is equivalent to an A- so First Class Honours can be recognised as being in the A grade range while Second Class honours can be recognised as being in the B grade range.

Students with HGPA < 4.0 will be awarded the BE degree without Honours.

Study Abroad and Honours

Courses taken by students who undertake study abroad are not awarded a grade by the University of Auckland but are recorded on the Student Transcript as "credit". As no grades are awarded for these courses, they cannot contribute to your Honours GPA.

In calculating the Honours GPA, the faculty is prepared to sanction the omission of a maximum of 60 points from the GPA in Part II and a maximum of 60 points from the GPA of Part III for an approved academic programme overseas.

The faculty is unwilling to sanction the omission of any points from the GPA at Part IV and will not support requests for study abroad during the final year of the BE(Hons).

For more information on Study Abroad programmes, please refer to page 82.

Graduation

Most students complete a BE(Hons) degree after four academic years (eight semesters) in the Faculty of Engineering.

To be eligible to graduate you must have completed the practical work requirements, workshop practice and the English language competency requirements, in addition to the academic requirements of your chosen specialisation.

You can then decide whether you wish to attend the graduation ceremony and receive your degree in person, or have your degree conferred in absentia.

Qualification as a professional engineer

To be a fully-qualified professional engineer, two separate requirements must be met. One of these relates to academic qualifications and the other to subsequent work experience.

Satisfying the academic requirements normally means holding a degree which has been approved by The Institution of Professional Engineers New Zealand (IPENZ), such as the University of Auckland BE(Hons) degree. After graduation you must demonstrate your competence as a practising engineer through work experience. This experience must be of an appropriate type and duration to enable you to apply for professional membership with IPENZ. Typically this membership requires a minimum of three years' experience in the workforce, including field, plant and design experience, and at least one year in a responsible position.

For further information, visit **www.ipenz.org.nz**.

Help and advice

The Faculty of Engineering has a tradition of relaxed staff-student communication. If matters arise that affect your study, you should feel confident discussing them with the relevant lecturer, Course Organiser or Course Coordinator. You may also like to speak with the relevant Course Adviser and/or the Deputy Head of Department (Academic). If matters are not dealt with to your satisfaction, these may then be referred to your Head of Department.

For matters of a more general nature, or if ever there is an occasion when you wish to dispute how a matter has been handled by a department, you may bring these to the attention of the Associate Dean (Undergraduate), Associate Dean (Students) or the Associate Dean (Teaching and Learning):

Dr Michael Hodgson
Associate Dean - Undergraduate
Room 401-803, 20 Symonds Street
Phone: +64 9 923 8218
Email: ma.hodgson@auckland.ac.nz

Dr Keri Moyle
Associate Dean - Students
Room 439-413, 70 Symonds Street
Phone: +64 9 923 4672
Email: k.moyle@auckland.ac.nz

Dr Gerard Rowe
Associate Dean – Teaching and Learning
Room 303-147, 38 Princes Street
Phone: +64 9 923 2009
Email: gb.rowe@auckland.ac.nz

In the first instance, visit the online AskAuckland portal for a range of information and frequently asked questions: **www.askauckland.ac.nz**.

For undergraduate advice, staff at the Engineering Student Centre may be of assistance. You can drop by the Centre on Level 4 of the Faculty of Engineering Building, or email foe-enquiries@auckland.ac.nz.

AUSA Student Advice Hub

AUSA Student Advice Hub provides free, confidential and quality advice to students who encounter problems both within and outside the university setting. We can help you with academic grievances, enrolment issues, assessments and compassionate consideration, employment disputes, financial issues, allegations of misconduct, tenancy/rent issues, bullying and more.

AUSA Student Advice Hub
Rooms G08, G09, G15, Old Choral Hall
Phone: +64 9 373 7599 ext 87299
Email: cityhub@ausa.org.nz
www.ausa.org.nz/support/student-advice-hub

Career Development and Employment Services (CDES)

CDES has a designated Engineering Career Development Consultant who provides specialised services tailored to meet the career development needs of engineering students. These services are designed to provide support as you transition into life and work following the completion of your studies. In addition, we hold workshops and special events, such as careers expos. At CDES online there are career tools, workshops, events, a job board and personalised services to help you identify opportunities available to you. You will find out about the knowledge, understanding and skills you need to become a competitive member of the 'world of work'.

For more information, visit **www.cdes.auckland.ac.nz**.

Faculty Staff-Student Consultative Committee

The Faculty Staff-Student Consultative Committee (SSCC) is comprised of two student representatives nominated from each department's SSCC, representatives from major student groups, administrative staff and academics. The Faculty SSCC addresses faculty-wide issues affecting academic life, resources and services. The Chair of the Faculty SSCC serves as a liaison between the students and the faculty.

Two meetings are usually held per semester, but urgent issues may be brought to the attention of the Chair at any time. You are encouraged to talk to your class representatives to bring matters to the attention of the SSCC.

Harassment and disputes

In the large and complex society of the University it is possible that you may encounter problems with the behaviour of staff or fellow students. If this behaviour is unwanted, unacceptable or offensive it may be harassment. University policy is that harassment on any grounds – including, but not restricted to, sexual, racial, religious and academic – is totally unacceptable. For informal and confidential assistance in dealing with harassment problems, you may approach any member of the Resolve Network (a list of their names can be found on posters displayed around campus) or the University Proctor, in Room G40, Old Choral Hall.

The University Proctor also provides a dispute resolution service for both staff disputes and staff-student disputes.

Kaiarahi Māori

The faculty provides pastoral and academic support for Māori and Pacific students. The Kaiarahi offers a tutorial programme, a mentoring programme, pre-exam study wānanga, whanau and pastoral care.

Dennis Matene
Kaiarahi Māori
Room 402-401, 20 Symonds Street
Phone: +64 9 923 3251
Email: d.matene@auckland.ac.nz

University Counselling Service

The University Counselling Service, located in the Kate Edger Information Commons, is free and confidential for any member of the University community. Anyone using the service (including

prospective students) may discuss without fear of judgment or criticism, or pressure to adopt any particular course of action, any issue of a personal, social, or academic nature. Personal counselling is provided, as well as a variety of group activities.

Student Development and Engagement team

Academic and pastoral support is available to all students from the Student Development and Engagement team. Support is available from Orientation through to employment. Initiatives that are provided include, but are not limited to, Orientation, Part 1 Assistance Centre, Women in Engineering Network (WEN), Tuākana for Māori and Pacific students, and evenings with prospective employers. Other groups supported by the team are Lesbian, Gay, Bisexual, Transgender and Intersex (LGBTI), students with disabilities, refugee students and international students.

Catherine Dunphy
Student Development and Engagement Manager
Room 402-403, 20 Symonds Street
Phone: +64 9 923 7881
Email: c.dunphy@auckland.ac.nz

Employer Liaison Manager

The Faculty of Engineering has an Employer Liaison Manager to facilitate employer networking and foster industry relationships. For help and advice on all aspects of student practical work experience and graduate job applications, you are encouraged to contact:

Kevin Healey
Employer Liaison Manager
Room 402-410, 20 Symonds Street
Phone: +64 9 923 9521
Email: k.healey@auckland.ac.nz

Women in Engineering Adviser

The Faculty of Engineering is committed to improving the participation, retention and success rates of women in Engineering. To help achieve this, the Women in Engineering Adviser provides advice and support, both academic and personal, to all female students in the Faculty of Engineering.

Amanda Clinton
Women in Engineering Adviser
Room 402-414, 20 Symonds Street
Phone: +64 9 923 8606
Email: a.clinton@auckland.ac.nz

Student Experience Adviser

The Student Experience Adviser provides a range of development and engagement activities for all students. They work closely with Campus Life and the faculty's student clubs.

Chris McClymont
Student Experience Adviser
Room 402-402, 20 Symonds Street
Phone: +64 9 923 2927
Email: c.mcclymont@auckland.ac.nz

Student Support Advisers

The Student Support Advisers are available to support all students through wellbeing, pastoral care and learning support. The Student Support Advisers have particular portfolios but are available for all students.

Tessa Sillifant
Student Support Adviser – International
Room 402-412, 20 Symonds Street
Phone: +64 9 923 2990
Email: t.sillifant@auckland.ac.nz

Steve Roberts
Student Support Adviser – Māori and Pacific
Room 402-404, 20 Symonds Street
Phone: +64 9 923 4538
Email: s.roberts@auckland.ac.nz

The Student Support Adviser (Māori and Pacific) organises the Tuākana Mentoring Programme, an initiative targeted at first-year Māori and Pacific students. Tuākana mentors are trained senior Māori and Pacific Engineering students who meet weekly with students (teina) to discuss any problems or issues the new student may have. Students enrolled under MAPTES are automatically signed up. Teina will meet their tuākana at Orientation.

Academic support

Part I Assistance Centre

The faculty employs current, high-achieving Part II and III students to provide academic assistance to Part I students. The Part I Assistance Mentors receive formal training from the University's Centre for Learning and Research in Higher Education (CLeaR) and maintain close contact throughout the Semester with the Course Coordinators for all Part I courses.

The Part I Assistance Mentors are located in the John Leech Study Area from 12-4pm, Monday to Thursday and 12-3pm Friday, every teaching week during Semester One and Two. The service is also provided at O'Rorke Hall for Engineering students living there. For any information on the Part I Assistance Centre, contact:

Tessa Sillifant
Room 402-412, 20 Symonds Street
Phone: +64 9 923 2990
Email: t.sillifant@auckland.ac.nz

Tuākana Tutorial Programme

The faculty employs high-achieving Part II and Part III students to provide targeted tutorials and academic support programmes for Māori and Pacific Engineering students. Tutorials will start in the second week of semester. You will be notified of the tutorial timetable by email and it will be posted in the SPIES Room (403.518).

All core Part I engineering courses will have Tuākana tutorials: Mathematical Modelling, Mechanics, Design, Biology and Chemistry, Materials Science, Computation and Software, and Electrical.

MAPTES students organise their timetables around these tutorials, while General Entry Māori and Pacific students can just turn up when needed.

For further information, please contact Dennis Matene (Kairahi Māori) or Steve Roberts (Student Support Adviser – Māori and Pacific) as per the details above.

English Language Enrichment (ELE)

If you find you are lacking in confidence when it comes to language, or if your DELNA diagnosis indicates you need some assistance, ELE offers a number of language skill development programmes. These services are free to all students enrolled at the University of Auckland. Visit ELE on campus for advice, resources or to join language learning groups, or visit the ELE website to find useful online tools.

English Language Enrichment
Level 1, Kate Edger Information Commons
Phone: +64 9 373 7599 ext 82134
Email: ele.sls@auckland.ac.nz
www.library.auckland.ac.nz/ele

Student Learning Services (Tā te Ākonga)

Tā te Ākonga caters for the learning needs of all students, facilitating successful transitions into university, and on to postgraduate studies and research. Workshop and individual tutoring topics include thinking, learning and writing skills, self-management skills, exam preparation, using computers, maths and statistics, strategies for learning disabilities, thesis writing and more.

Student Learning (Tā te Ākonga)
Level 3, Kate Edger Information Commons
Phone: +64 9 373 7599 ext 88850
Email: slc@auckland.ac.nz
www.library.auckland.ac.nz/student-learning

The University of Auckland English Language Academy (ELA)

The University's English Language Academy (ELA) offers direct entry university pathway programmes and is an accredited IELTS testing centre, offering IELTS preparation courses and IELTS examinations. If you do not meet the University's English language requirements for acceptance into the BE(Hons), the ELA offers two suitable direct entry pathway programmes: the Foundation Certificate in English for Academic Purposes (FCertEAP) and the English Pathway for Undergraduate Studies (EPUS). For more information on these programmes, please contact:

The University of Auckland English Language Academy
Level 5, SAP Building, 67 Symonds Street
Phone: +64 9 919 7695
Email: ela@auckland.ac.nz
www.ela.auckland.ac.nz

Clubs and associations

Architects and Civil Engineers (ACE)

ACE is a student-run organisation that brings Civil Engineering and Architecture students together so they are better prepared to work together in the industry. We organise seminars, social gatherings, practical projects with industry partners and opportunities for networking. To learn more visit **www.aceuoa.org.nz**.

Auckland University Engineers' Association (AUEA)

The mission of the AUEA is to develop and maintain strong relationships with all alumni of the Faculty of Engineering through a range of social and networking events and to maintain strong linkages between the faculty and industry. The AUEA also promotes and supports a culture of philanthropy amongst alumni to provide scholarships for undergraduate and postgraduate students. For more information, visit **www.engineering.auckland.ac.nz/auea**.

Auckland University Engineering Society (AUES)

AUES is an independent student body representing students of the Faculty of Engineering. While largely a social body, the society also provides an important link between engineering students and our professional body, IPENZ. Look out for AUES events throughout the year. For more information, visit our Facebook page.

Auckland University Robotics Association (AURA)

AURA is a student-run club that seeks to foster robotics at the University of Auckland. Members meet regularly to work on a variety of projects, and have the opportunity to compete in a number of robotics competitions throughout the year. To find out more, visit **www.aura.org.nz**.

Auckland University Students' Association (AUSA)

AUSA caters to students and the wider University community. It is free to join. AUSA provides an advocacy/welfare service, lost property service, events, a bookshop, 1400 lockers for hire, Parentspace, Womenspace, 95bFM, Shadows (student bar), Thursday Market Days, and Craccum (the student magazine). For more information, check out **www.ausa.org.nz** or visit us at AUSA House, 4 Alfred Street (opposite the General Library).

Engineering Revue

The Engineering Revue is a comedic show compiled of sketches, songs and dances that is staged every year by the Engineering faculty. All aspects of the revue are undertaken solely by students, and participation is a great way to broaden your skills and University experience. To get involved, visit our Facebook page or email engrevue@gmail.com.

Engineers Without Borders

Engineers Without Borders is a group of professional and student engineers throughout New Zealand who use their technical skills and expertise to assist developing communities in improving their quality of life. To join the Auckland Students Chapter, email auckland.students@ewb.org.nz or visit **www.ewb.org.nz**.

The University of Auckland Formula SAE Team Inc

The Formula SAE (FSAE) Team is a group of approximately 40 engineering and business students who set out each year to build a formula-style race car to compete in the Formula SAE competition. Participants are exposed to all aspects of the automotive design process, including research, design, manufacturing, testing, marketing, management, and finances. For more information, visit **www.fsae.co.nz**.

The Institute of Electrical and Electronics Engineers (IEEE)

IEEE (read I triple E) is the world's largest technical association, with more than 400,000 members in over 160 countries. One of the main events the University of Auckland IEEE Student Branch (UoAIEEESB) organises is the Practice Interviews, where industry representatives provide students with mock interviews as if for real employment. For further details, please visit **ieeesb.auckland.ac.nz**.

Institution of Professional Engineers New Zealand (IPENZ)

IPENZ is the professional body representing engineers in New Zealand. You are invited to join IPENZ as a Student Member; membership is free while you are studying towards a BE(Hons) degree. Membership enables you to learn about IPENZ, engage with professional engineers and stay informed about the industry. To apply for Student Membership, visit **www.ipenz.org.nz**.

Software Engineering Students' Association (SESA)

SESA organises social and professional events for all Software Engineering (SE) students, including industry seminars, LAN parties and movie nights. Where necessary, we also act as a liaison between the department and SE students. We like to keep you in the loop about employment opportunities via announcements on Facebook and our website, to help get you ready to step out into the industry. For more information, visit **www.sesa.org.nz**.

South Pacific Indigenous Engineering Students (SPIES)

SPIES is the support group for Māori and Pacific students at Engineering. SPIES has a study and recreation space in the Engineering faculty, holds annual retreats for its members and is fully involved in the mentoring and tutoring of the MAPTES programme. The SPIES Study Room is on Level 5 of the Faculty of Engineering building (Room 403-518). For more information email spies@auckland.ac.nz.

Women in Engineering Network (WEN)

WEN is a support forum for female students in the Faculty of Engineering. In the past, we've gone snowboarding together, helped out at events, arranged cocktail evenings and eaten lots of pizza. Members have also helped Part I students decide on specialisations, run tutorial groups in "sticky" subjects and helped publicise the fact in schools that "yes – engineering is for girls". For more information, visit **www.engineering.auckland.ac.nz/wie**.

Staff directory

Contact	Location	Phone	Email
All enquiries			
Engineering Student Centre	Faculty of Engineering, 20 Symonds Street	+64 9 923 8120 0800 61 62 63	foe-enquiries@auckland.ac.nz
Associate Dean Undergraduate			
Dr Michael Hodgson	Room 401-803, 20 Symonds Street	+64 9 923 8218	ma.hodgson@auckland.ac.nz
Student and Academic Services			
Student and Academic Services Manager Elizabeth Chandy	Faculty of Engineering, 20 Symonds Street	+64 9 923 8120	foe-enquiries@auckland.ac.nz
Student Centre Manager Jamie Protheroe	Faculty of Engineering, 20 Symonds Street	+64 9 923 8120	foe-enquiries@auckland.ac.nz
Student Academic Advisers Agnes Kwan Alcione Fagundes Bella He Dorothy Tolentino Natasha Jethender	Faculty of Engineering, 20 Symonds Street	+64 9 923 8120	foe-enquiries@auckland.ac.nz
Academic Services Coordinators Christine Salter Ferdinand Ramos Noletta Baatjes	Faculty of Engineering, 20 Symonds Street	+64 9 923 8120	foe-enquiries@auckland.ac.nz
Student Development and Engagement			
Student Development and Engagement Manager Catherine Dunphy	Room 402-403, 20 Symonds Street	+64 9 923 7881	c.dunphy@auckland.ac.nz
Employer Liaison Manager Kevin Healey	Room 402-410, 20 Symonds Street	+64 9 923 9521	k.healey@auckland.ac.nz
Student Experience Adviser Chris McClymont	Room 402-402, 20 Symonds Street	+64 9 923 2927	c.mcclymont@auckland.ac.nz
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Student Support Adviser - Māori and Pacific Steve Roberts	Room 402-404, 20 Symonds Street	+64 9 923 4538	s.roberts@auckland.ac.nz
Women in Engineering Adviser Amanda Clinton	Room 402-414, 20 Symonds Street	+64 9 923 8606	a.clinton@auckland.ac.nz
Undergraduate Course Advisers			
Biomedical Engineering Dr Vinod Suresh	Room 439-711, 70 Symonds Street	+64 9 923 9746	bme-undergrad-adviser @auckland.ac.nz
Chemical and Materials Engineering Dr Peng Cao	Room 401-816, 20 Symonds Street	+64 9 923 6924	p.cao@auckland.ac.nz
Professor John Chen	Room 401-807, 20 Symonds Street	+64 9 923 8137	j.chen@auckland.ac.nz
Civil and Environmental Engineering **Part II:** Dr James Lim	Room 401-1012, 20 Symonds Street	+64 9 923 8138	james.lim@auckland.ac.nz
Part III: Dr Rick Henry	Room 404-616, 20 Symonds Street	+64 9 923 9280	rs.henry@auckland.ac.nz
Part IV: Dr Gary Raftery	Room 404-620, 20 Symonds Street	+64 9 923 8536	g.raftery@auckland.ac.nz
Conjoints/student exchange: Dr Quincy Ma	Room 401-711, 20 Symonds Street	+64 9 923 8766	q.ma@auckland.ac.nz
Computer Systems Engineering Dr Partha Roop	Room 303-152, 38 Princes Street	+64 9 923 5583	p.roop@auckland.ac.nz
Electrical and Electronic Engineering Dr Patrick (Aiguo) Hu	Room 303-159, 38 Princes Street	+64 9 923 4535	a.hu@auckland.ac.nz
Engineering Science Dr John Cater	Room 439-341, 70 Symonds Street	+64 9 923 7050	engsci-undergrad-adviser @auckland.ac.nz
Mechanical Engineering Parts I/II, II and II/III: Dr Raj Das	Room 401-915, 20 Symonds Street	+64 9 923 5094	r.das@auckland.ac.nz
Parts III, III/IV and IV: Dr Stuart Norris	Room 401-905, 20 Symonds Street	+64 9 923 9652	s.norris@auckland.ac.nz
Conjoint/Accelerated Pathway: Dr Karl Stol	Room 401-905, 20 Symonds Street	+64 9 923 9671	k.stol@auckland.ac.nz
Mechatronics Engineering Dr Yusuke Hioka	Room 401-714, 20 Symonds Street	+64 9 923 1421	y.hioka@auckland.ac.nz
Software Engineering Dr Oliver Sinnen	Room 303-156, 38 Princes Street	+64 9 923 8285	o.sinnen@auckland.ac.nz

THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING

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