The University of Queensland

Electrically Based Engineering Student Society

2017 SUBJECT GUIDE

THE UNIVERSITY OF QUEENSLAND
St. Lucia

ebess ELECTRICALLY BASED ENGINEERING STUDENT SOCIETY

Contents

About this guide

The 2017 EBESS subject guide has been created to help all EBESS members make informed decisions about their subject choices. It is a comprehensive guide to the core courses that electrical engineering students are required to take in their undergraduate degree.

As the **Electrically Based Engineering** Student Society, EBESS caters to not just Electrical engineering students, but to all student engineers studying in similar fields; this includes Electrical & Biomedical, Electrical & Computer, Software and Mechatronic majors, as well as our friends doing similar degrees such as computer science and I.T.

This guide is divided into three main sections:

Part I: Compulsory Courses Overview contains a condensed outline of the compulsory courses that must be completed by students completing the BE in Electrical Engineering as a single major.

Part II: Course Reviews contains detailed reviews of all compulsory courses required for students completing the BE (Hons) in Electrical Engineering as a single major. Due to the sheer number of different courses offered in the other electrical-related majors, this guide focuses solely on the courses for the Electrical Single Major – our most popular program.

The subjects listed in this category have been assigned an overall rating (out of a maximum of 5) that reflects the overall enjoyment, difficulty and organisation of the course. These ratings have been gathered in consultation with past students, and only reflect personal experiences of the courses – your mileage may vary!

Also included in this section is key course information, assessment pieces and reviews collated from past students and 2017 course profiles. Again, these reviews are based on the personal experiences of previous students so don't be *shocked* if you find a less-than-favourable review of your favourite subject!

Part III: Electives Contains a full list of Advanced Electives (AE) and Coverage Electives (CE) available to Electrical majors, as well as guidelines to which ones you can choose depending on your program.

About EBESS

The **Electrically Based Engineering Student Society (EBESS)** is the premier student club in Queensland for students studying electrical engineering and all its related majors. The club specifically caters to students who study Electrical, Software, Electrical & Biomedical, Electrical & Computer and Mechatronic engineering – although anyone is welcome to join!

EBESS was founded back in 2011 amidst a renewal of the **Engineering Undergraduate Society (EUS).** EBESS and the other affiliated engineering clubs are all subsidiary clubs of EUS, which is an umbrella club that caters to all engineering students. A young, dynamic and rapidly growing club, EBESS's membership grew to a record 950 students in 2016, a whopping 250% increase over the previous year. The club's outstanding achievements resulted in us being crowned **2016 Engineering Club of the Year** by UQ Union, reflecting the outstanding events, services and merchandise that EBESS offers to our members.

EBESS prides itself on providing high-quality social, technical and industry-specific events throughout the year to ensure that your university experience is as fun and educational as possible. If you'd like to make new friends, learn new skills and find new work opportunities in 2017, then don't hesitate to join EBESS!

2017 EBESS Executive

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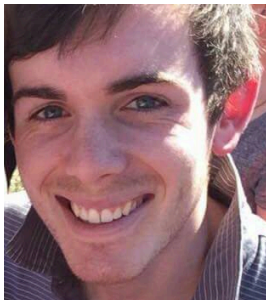
Treasurer Ben Huth		treasurer@uqebess.com
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The EBESS Committee

For those looking to get involved in the running of EBESS, an easy way to do so is to join the **EBESS Committee.** The Committee is a group of EBESS members who voluntarily assist the Executive in a number of ways, including helping to run fundraising BBQs, liaising with staff and industry contacts, and developing new ideas for EBESS to offer.

As a Committee member, you can do as much or as little as you feel comfortable with, whilst gaining valuable insight into how an engineering student society like EBESS operates and what the roles of the Executive involve.

It provides a great way to enrich your social life and gain valuable organisational skills, as well as a pathway to potential Executive roles in the future (although it's definitely not a prerequisite!). It shows potential employers that you have the initiative and confidence to get involved in campus life, and most importantly, it enriches your university experience far beyond the confines of the classroom.

If you're keen to get involved, email our friendly execs at contact@uqebess.com.

ebess ELECTRICALLY BASED ENGINEERING STUDENT SOCIETY

2017 Events Calendar

While professional development is key in any engineering degree, taking time out to unwind outside of the lecture theatre or lab is equally as important. In 2016, EBESS kick-started Semester 1 with a BBQ for new members and a joint launch The subsequent weeks saw useful tutorials and seminars to get you up to speed in the new year.

In Semester 2 our trivia night and 6-a-side soccer tournament kept the fun going, whilst our industry events provided valuable networking opportunities. The year was finished by our fabulous Pandora Ball, whilst SWOTVAC exam tutoring held in both semesters helped our members achieve the results they wanted.

Check out our 2017 events calendar below, and be sure to follow us on Facebook and Snapchat to keep up to date with all things EBESS. 2017 is going to be an exciting year for all of us, and the executive team aim to provide you all with **#thEBESSt** university experience all year around!

Semester 1		Semester 2
BBQ for New Members Incoming Members are able to meet their peers and the EBESS executive team in a relaxed setting.	**Week 1**	
		Vacation Work Seminar Penultimate-year students have the opportunity to hear from companies recruiting for vacation programs.
Launch Party Students have a chance to enjoy the company of their peers before the grind of University semester begins.	**Week 2**	
LaTeX Tutorial Dr. Joel Fenwick delivers his popular tutorial on the powerful and widely used typesetting program.	**Week 4**	**Trivia Night** Hosted in conjunction with the UQ Computing Society, many laughs are had at the annual trivia night.
Lunch & Learn (Part 1 of 4) Students connect with academics and learn about current research and thesis topics.	**Week 5**	
Grad Work Seminar Final year students connect with graduate employers and receive advice for preparing their job applications.	**Week 6**	**Super 6's Soccer Tournament** Our annual social soccer tournament sees teams from all across EBESS vie for the glory of lifting a small plastic trophy.
Careers & Beers Evening Students meet, socialize and network with multiple industry representatives in a relaxed atmosphere.	**Week 8**	
	Week 12	**Annual Ball** Hosted last year as the Pandora Ball with NAMSA and UQ Irish Society among others, this is the highlight of the EBESS social calendar.
SWOTVAC Tutoring Students can seek help from tutors for their final exams.	**Week 14**	**SWOTVAC Tutoring** Students can seek help from tutors for their final exams.
	Mid December	**Graduation Dinner** The graduating cohort, their family and friends gather for a formal evening in the week prior to graduation ceremonies.

+ many more!

Membership

By joining EBESS in 2017, you'll gain access to all our events, tutoring, and in an engineering club first, access to our very own project kit! This electronics project kit is aimed towards all members who want an opportunity to hone their soldering, circuit theory and signal processing skills. EBESS members are able to purchase a development kit with a PCB and components, then build and test their circuit with guidance from the EBESS team. For more information, just email one of our friendly execs (or talk to them in person!).

Membership is broken into two parts:

1. **EUS Membership: $10**
2. **EBESS Membership: $5**

If you're a **1st year student**, you have access to an even better deal. You can pick up an **EUS 1st Year Membership** for **$10,** which gains you membership to all the affiliated engineering clubs, including EBESS!

See us at Market Day to sign up and secure your membership. Should you miss us on Market Day, you'll be able to sign-up online at www.uqeus.com.au, or send us an email at contact@uqebess.com

Industry Supporters

Enormous thanks must go to the generous support of EBESS's official industry supporters for 2017; Cochlear, EM Solutions, Bain & Company and Accenture. Keep an eye out for these companies on campus at industry events throughout the year.

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Part I: Compulsory Courses Overview

A quick summary of ALL the compulsory courses required to be completed in years 2, 3 and 4. This plan is for 2nd year students commencing the **BE (Hons) Electrical** single major in 2017.

NOTE: If you're enrolled (or planning to enrol) in one of the other majors, you will only take some of the courses below – make sure to consult your relevant course list by going to uq.edu.au/study and following the links.

2nd Year Compulsory Courses

Semester 1	Semester 2
PHYS1002 Electromagnetism & Modern Physics	**CSSE2310** Computer Systems Principles & Programming
CSSE2010 Intro to Computer Systems	**ELEC2004** Circuits, Signals & Systems
ELEC2003 Electromechanics & Electronics	**ENGG2800** Team Project 1
MATH2001 Advanced Calculus & Linear Algebra II	**MATH2010/STAT2202** Analysis of Ordinary Differential Equations / Probability Models for Engineering & Science

3rd Year Compulsory Courses

Semester 1	Semester 2
CSSE3010 Embedded Systems Design & Interfacing	**ELEC3100** Fundamentals of Electromagnetic Fields & Waves
ELEC3004 Signals, Systems & Control	**ELEC3300** Electrical Energy Conversion & Utilisation
ELEC3400 Electronic Circuits	**ENGG3800** Team Project II
Advanced/Coverage Elective	**Advanced/Coverage Elective**

4th Year Compulsory Courses

Semester 1	Semester 2
ENGG4801/2/5 Thesis Project	**ENGG4801/2/5** Thesis Project
	ENGG4900 Professional Practice and the Business Environment
Advanced/Coverage Elective	**Advanced/Coverage Elective**
Advanced/Coverage Elective	**Advanced/Coverage Elective**

Part II: Course Reviews

2nd Year Compulsory Courses

Start your second year in electrical engineering with PHYS1002 which takes you on a journey of *relative* proportions.

This then *discretely* leads into STAT2202 to finish off another year of electrical engineering!

PHYS1002 – Electromagnetism and Modern Physics

Course rating: 

Pre-requisites: MATH1050; PHYS1171 or Year 12 Physics
Recommended Companions: MATH1051 and MATH1052
Contact Hours: 3 L, 1 T, <3 P
Course Co-ordinator: Associate Professor Tim McIntyre (mcintyre@physics.uq.edu.au)
Course Description: PHYS1002 provides an introduction to 20th and 21st century physics. The first two thirds of the course introduce you to electricity, then magnetism, and then the unification of the two phenomena as electromagnetism. The final third introduces general relativity and quantum theory.

Assessment Type	Weight	Description
1. Mid-Semester Exam	**10%**	A multiple choice exam testing concepts in Electricity and magnetism.
2. End of Semester Exam	**50%**	A two hour written exam during exam block.
3. Lab report and experimental proposals	**15%**	Two written proposals and two full lab reports based on completed experiments.
4. Assignments	**20%**	Three Assignments based on past exams.
5. Mastering Physics quizzes	**5%**	Tests the familiarity with the weekly readings through online quizzes.
6. Lab Participation	**Hurdle**	Attendance and participation in labs.

Overall Review:
The content for this course forms the fundamental basis for the rest of electrical engineering, and it is delivered in an extremely fast-paced, yet engaging manner. The amount of time and effort required for this course is higher than most, and it forces you to keep up with your textbook readings.
The weekly online quizzes will require you to understand the content thoroughly and you will need to pass them all to pass the course. The assignments are conceptually complex, but are not especially difficult mathematically; both they and the lab reports require you to conform to certain physics-specific standards of communication, so ask your tutor(s) plenty of questions to maximise your marks. All in all, this course has a lot of interesting content, but is tempered by a high workload and stringent communication standards.

How to prepare:

- Make sure you keep on top of weekly readings; Try to conceptually understand the content since the reasoning behind how things happen is what tutors/lecturers look for when marking your work.
- Record every piece of data you can get during lab sessions. They are designed to make you explain the physics behind the experiment.

CSSE2010 - Introduction to Computer Systems

Course rating: 

Recommended Companions: CSSE1001
Prerequisites: There are no official pre-requisites required for this course but some programming experience is expected.
Incompatible: COMP1300; COMP2303; CSSE1000; CSSE7035; CSSE7201; ELEC2002
Contact Hours: 2 L, 2 T, 2 P
Course Co-ordinator: Associate Professor Peter Sutton (p.sutton@itee.uq.edu.au)
Course Description: CSSE2010 provides a ground-up introduction to how modern computers work. The course starts with binary logic and logic gates, before progressing to computer memory, systems organisation and architecture, interfaces/communication, and finally microcontroller programming in C.

Assessment Type	Weight	Description
1. Mid-Semester Exam	**10% or 20%**	A mid-semester exam (**open book multiple choice**) held at the end of weeks six, eight or nine.
2. Participation	**5%**	Students are expected to participate in class for participation marks.
3. Online Quizzes	**10%**	11 Weekly online quizzes due at 8am Monday.
4. Practical Exam	**Pass/Fail**	An exam covering material and ideas from practical activities in weeks 1 to 4. Held in week 5.
5. Project	**20%**	A project undertaken by students where they develop a program for the AVR microcontroller.
6. End of Semester Exam	**55% or 45%**	A two hour **open book** final examination held in exam block.

Overall Review:
CSSE2010 is an extremely well-organised course which offers you a challenging yet rewarding introduction to the fundamentals of programming and computer science. By starting at binary logic and steadily building your knowledge, the course provides you with a deep understanding of how computers are constructed and how software interacts with hardware. The final project puts all of this theory into practice as you are asked to add software features to a game which runs on a small microcontroller.

The course introduces a large amount of challenging new content, but the multiple small pieces of assessment allow you to keep up fairly easily if you put in the work. Overall, CSSE2010 is an excellent course, and will likely be one of the most enjoyable ones you take in your undergraduate degree.

How to prepare:

- Do the online quizzes each week to keep up with the content
- Use the prac classes wisely to practice your circuit-building and programming
- Start the final project ASAP, try to do a little bit every day, and ask for help!

ELEC2003 - Electromechanics and Electronics

Course rating: 

Companions: MATH2001; PHYS1002 recommended
Prerequisites: ELEC1300
Contact Hours: 2 L, 2 T, 1 P
Course Co-ordinator: Dr Olav Krause (o.krause@uq.edu.au)
Course Description: ELEC2003 introduces AC circuit theories including real and reactive power concepts, electromagnetic fields and their applications in electrical machines. It includes basic principles of a solar PV system, physical models of semiconductor devices, and common electronic circuits using discrete semiconductor devices.

Assessment Type	Weight	Description
1. Practical Lab Work	**15%**	Pracs are marked using attendance, participation and performance in labs. A lab workbook maintained by students may be used for marking by tutors.
2. Tutorial Exercise	**15%**	The best **five** out of six overall tutorials are used for this assessment piece.
3. End of Semester Exam	**70%**	A final end of semester exam will test all material covered in the course.

Overall Review:
This course is divided into two parts. The first part focuses on honing your skills in circuit analysis and is essentially an extension of ENGG1300. The second part focuses on discrete semiconductor components like transistors and diodes. Both are equally interesting and conceptually easy to understand, since the lecturers and tutors go over many detailed examples. The practical sessions are designed to put into practice what you cover in lectures during the semester.

Everything comes together near the end of the course when you understand WHY you were soldering a transistor on the given PCBs and understand HOW it all fits in with the theory. The most interesting part of the course is definitely the photo-voltaic practical session. The tutor who runs this section of the practical is very well informed and always encourages students to contribute. The downsides to this course is that the lectures are set in a two-hour stream – so be prepared to listen to your lecturer from start to finish… or re-watch the lecture online!

How to prepare:
- Make sure you attend your tutorial sessions! Honing your skills in circuit analysis is key for this course and the tutors are always there to help.

- Professor Tapan Saha runs the first part of this course and is notorious for his trick questions in his section of the exam. Always double check the question!
- The textbook for this course is very helpful and is also found online.

MATH2001 – Advanced Calculus and linear Algebra

Course rating: 

Prerequisites: MATH1051 and MATH1052.
Incompatible: MATH2000 or MATH7000
Contact Hours: 3 L, 1 T, 1 C
Course Co-ordinator: A/Prof Tony Roberts (apr@maths.uq.edu.au)
Course Description: MATH2001 begins with calculus concepts including second order differential equations, variation of parameters, multi-dimensional calculus, surface & volume integrals and Stoke's & Green's theorems. The second part focuses on linear algebra, including diagonalization, matrix transformations and quadratic forms. Contact classes introduce vector spaces and inner products, maxima and minima points in N-dimensions, and method of least squares for functions.

Assessment Type	Weight	Description
1. Assignments	**15%**	A total of five assignments worth 3% each that are released as the course progresses.
2. Mid-Semester Exam	**15%**	A 40 minute mid-semester exam that tests the students' understanding of the initial material presented in the course.
3. End of Semester Exam	**70%**	A final examination at the end of the semester which spans the entire course content.

Overall Review:

The difficulty of MATH2001 is akin to the difficulty of previous mathematics courses like MATH1051/1052, upon which it continues to build. Like these previous courses, MATH2001 devotes the first half to calculus concepts and the second to linear algebra; it also has a weekly contact class in which the more difficult and abstract content is taught – this content is the difference between MATH2000 and MATH2001.

Like most maths courses, the course workbook is simply worked through in lectures, making progress easy to follow. Assignments marking is handled well and marks are posted on blackboard for students to access. The downside of this course is that the contact class content is delivered without slides or a workbook, which forces students to quickly copy down the proofs covered in the allotted time. That said, this course is like most maths courses at UQ: well-structured, straightforward, conceptually challenging but easy to do well in if you put in consistent effort.

How to prepare:

- The mid-semester and final exams have varied in difficulty in the past few years so you'll have a wide selection of past papers to use in your study for the course.
- Even though each assignment is only worth 3% each, make sure you get the most marks from all of them – you'll need to bank marks before the heavily-weighted final exam.

CSSE2310 – Computer Systems Principals and Programming

Course rating: 

Prerequisites: CSSE1001 + CSSE2010
Incompatible: COMP2303, COMP7306, CSSE7231
Contact Hours: 3 L, 1 P, 1 C
Course Co-ordinator: Dr Joel Fenwick (joelfenwick@uq.edu.au)
Course Description: CSSE2310 is an introduction to UNIX, the principles of computer systems (networks and operating systems) and systems programming in C. It covers operating systems principles, memory management, basics of machine organization, file systems, processes & threads and interprocess communication. The course also covers computer networks principles, including topologies & models of computer networks, protocols, network programming, and network applications.

Assessment Type	Weight	Description
1. Assignment one	**25% of total assignment mark**	Requires the completion of one or more C programming exercises.
2. Assignment two	**25% of total assignment mark**	A debugging assignment that focusses on reverse engineering a solution.
3. Mid-Semester exam	**15% or 30% of total exam mark**	An **open book** mid semester exam held during lecture times.
4. Assignment three	**25% of total assignment mark**	Requires development of an application which interacts with a UNIX file system using processes and threads.
5. Assignment four	**25% of total assignment mark**	Requires writing of a network application.
6. End of Semester Exam	**85% or 70% of exam mark**	An **open book** final exam.

Overall Review:
This course is designed to help boost your knowledge in the principals of modern computer systems. The lecture material isn't hard to understand and the lecturer, Joel Fenwick, tries to make sure that all students are on the same page.
This course has a well-deserved reputation for being difficult, which is almost entirely due to the programming assignments. They force you to code efficiently and this is where the real learning happens. Thankfully, the exams are a lot easier than assignments since they are predictable. CSSE2310 is somewhat of a trial by fire: the assignments are very challenging, but you will learn a lot and come out the other side with your coding skills significantly enhanced.

How to prepare:
- Attend all lectures since they are not recorded.
- Doing well in the first two assignments helps you overall near the end when assignment get considerably harder.

ELEC2004 – Circuits, Signals and Systems

Course rating: 

Prerequisites: ELEC1300
Companions: MATH2000 + MATH2010
Contact Hours: 3 L, 1 T, 1 P
Course Co-ordinator: Dr Rahul Sharma (rahul.sharma@uq.edu.au)
Course Description: Mathematical models of electrical components, circuits & systems. Time & frequency response of AC circuits. Building complex systems from subsystems, including feedback. Signal theory & filter design. Theoretical investigations, substantial case studies & laboratory experiments.

Assessment Type	Weight	Description
1. Problem Journal I	5%	Solved solutions of tutorial questions that are released weekly are to be handed in during the first half of the course.
2. Mid-Semester practical exam	10%	A 45 minute exam requiring students to reproduce and explain a key result from previous practical session.
3. Mid-Semester theory exam	20%	A **closed book** theory examination.
4. Problem Journal II	5%	Solved solutions of tutorial questions that are released weekly are to be handed in during the second half of the course.
5. Design Challenge Report	20%	A **15 page** report on the solution to the design challenge. Done in **conjunction** with a practical partner.
6. End of Semester Exam	40%	A **closed book** final examination.

Overall Review:
This course is divided into two main parts. The first half, circuits, concentrates on what is essentially revision from previous courses (ENGG1300 and ELEC2003) and is assessed in the mid-semester exam. The second part of the course (signals and systems) is new content which provides practical applications for the Laplace transform and Fourier series covered in courses such as MATH2010. The design challenge requires you to work in pairs and runs over the course of three short practical sessions, which is a significant test of your time management skills. The exams are not overly difficult and the format is consistent from year to year. Overall, the course requires plenty of work to become good at solving circuit problems, but is not too hard conceptually.

How to prepare:

- Be sure to participate in your weekly tutes! Worked examples help a lot in this course since they reinforce the theory.

- During the design challenge, utilise practical time with tutors wisely, since this is limited. Time management is key.

ENGG2800 – Team Project I

Course rating: 

Prerequisites: CSSE2010 + ENGG1300 + CSSE1001
Incompatible: METR2800
Required Background Knowledge: Fundamental electrical knowledge, basic digital and analogue electronics, software & computer systems engineering knowledge.
Contact Hours: 1 L, 4 C
Course Co-ordinator: Associate Professor Stephen Wilson (wilson@itee.uq.edu.au)
Course Description: Small teams of 4 or fewer students undertake design, implementation, testing, evaluation & presentation of specific project.

Assessment Type	Weight	Description
1. Peer Assessment	**Incorporated in product mark**	A peer assessment factor that is used to calculate individual marks similar to ENGG1100.
2. Schematic and PCB	**5% Pass/Fail**	Completion of a working circuit element from a supplied design specification.
3. Report	**5%**	A detailed document that includes design specifications/project timelines/ job allocations etc.
4. Team Meeting I	**5%**	Team performance assessed by tutor.
5. Progress Seminar I	**5%**	A 10 minute presentation that involves all group members that is due in week 7.
6. Progress Seminar II	**10%**	A similar 10 minute presentation that is due in week 10.
7. Product Demo	**65%**	Teams are required to demonstrate the product based on specifications.
8. Final Report & Reflection	**5%**	A brief restatement of the roles of members and an **individual** summary of the background, methods and results of work.

Overall review:
This is a very demanding course by itself and is made more difficult when coupled with CSSE2310. It is structured so that your team is required to deliver multiple seminars and asks you to build a complex device with a randomly allocated team of 3-4 students. If you put in the effort, this will be an extremely rewarding course, and the knowledge that it gives you can and will be invaluable. The major downside to this course is that the quality of you group can largely determines your experience (and final grade).

How to prepare:

- Tutors are especially helpful but do not solely rely on their help.

- Adhering to the budget is also equally important since going a single dollar over can cap your mark to a 4.
- Time management is KEY for this course. Learn to do this effectively early on.

MATH2010 – Analysis of advanced Ordinary Differential Equations

Course rating: 

Prerequisites: MATH1052
Recommended Companions: MATH2000
Incompatible: MATH2100
Contact Hours: 2 L, <1 T
Course Co-ordinator: Prof Mark Gould (m.gould1@uq.edu.au)
Course Description: ODE's and Laplace Transforms. Variation of constants, fundamental matrix. Laplace transform, transform for systems, transfer function. Stability, asymptotic stability; phase plane analysis.

Assessment Type	Weight	Description
1. Assignments	**30%**	A total of five written math assignments worth 6% each.
2. Final Exam	**70%**	A written exam held during the final exam period.

Overall Review:
The course content of MATH2010 is relatively trivial to understand when compared to other math courses such as MATH2000. ODE's once again are prevalent in this course and having a sound knowledge of MATH2000 definitely helps. The concept of Laplace transforms will be introduced here, which form the foundation of upcoming electrical engineering courses such as ELEC2004 and ELEC3004. Cathy Holmes really brings life to this course with her sheer enthusiasm for mathematics.

The upside of this course is that it runs for only the first half of the semester; the downside is that the final exam is at the end of the semester, meaning you'll tend to neglect studying – especially if you are taking ENGG2800 and CSSE2310 concurrently. Neglecting this course because it is only a 1-unit course is definitely NOT a good idea – that said, the familiarity of the concepts and relatively light workload will make it one of the easier courses you'll take.

How to prepare:
- Put in plenty of effort into the assignments to bank maximum marks
- Make sure you revise regularly during the second half of the semester in preparation for the final
- If you plan on taking this alongside ENGG2800 and CSSE2310, invest in a solid study plan. This will be your hardest semester yet.
- Tutorial questions are usually harder than the final exam questions – they and past exam papers are both great study resources.

STAT2202 – Probability Models for Engineering and Science

Course rating: 

Prerequisites: MATH1051
Incompatible: STAT2003, STAT2001
Contact Hours: <2 L, 1 T
Course Staff: Dr Ian Wood (i.wood1@uq.edu.au)
Course Description: Probability models & applications in engineering & science, including basic probability theory, distributions & their properties, transform methods, construction of probability models, reliability, joint distributions, random processes: queues, Markov processes, Gaussian processes & weakly stationary processes.

Assessment Type	Weight	Description
1. Problem Solution *Quizzes*	**10%**	A short quiz held every week in tutorials.
2. Assignments	**20%**	A total of five assignments worth 4% each
3. Final Exam	**70%**	A written exam held during the final exam block.

Overall Review:
This course can easily overwhelm you if you don't invest the right amount of time in it. During the first few weeks, the course seems trivial enough but as it progresses, the concepts become more challenging to grasp and equally as hard to apply to questions. The formula sheet that is available on Blackboard/Dropbox is the heart and soul of this course; It contains everything that you need and memorising where which particular formula is will save you precious minutes during the final exam.

Staying on top of the weekly quizzes in tutorials is very helpful: most tutors who conduct the weekly quizzes go over a question that is reasonably similar to the weekly quiz. At the end of the day, having a conceptual understanding of the course content is KEY to this course. Going over past exam papers simply will not be able to get you through the final exam.

How to prepare:

- The assignment questions are fairly tedious at times but can be done within a couple of hours. Getting them done early gives you time to work on ENGG2800.
- Make sure you understand the content covered every week. Most of the content builds on itself and leads onto more complicated concepts.
- The tutorials help reinforce the lectures and the tutors are always there to help. If you end up missing your tutorial, you can always attend another one during the week. Don't rely on tutorials being empty however, as tutors do have to reject students who aren't registered in their timeslot if it gets too full.

3nd Year Compulsory Courses

Start off your 3rd Year by *embedding* yourself in front of a computer working on CSSE3010!

Following this, ELEC3100 will introduce you to Aleksandar whose *magnetizing* performance will bring back the fondest memories of PHYS1002!

CSSE3010 – Embedded Systems Design & Interfacing

Course rating: 

Prerequisites: (CSSE2310 or COMP2303) + ELE2004
Incompatible: CSSE4001, CSSE7003, CSSE7301
Required Background Knowledge:
Basic microcontroller C programming (CSSE2010); advanced skills in C programming (CSSE2310); Working knowledge of operating systems and networking basics (CSSE2310); Working knowledge of frequency domain analysis (ELEC2004)
Contact Hours: 2 L, 3 P
Course Staff: Dr Matthew D'Souza (m.dsouza@uq.edu.au)
Course Description: Microcontroller system hardware and software. C programming for embedded microcontroller and peripheral devices. Principles and practice of using Embedded RTOS (Real Time Operating System) and peripheral devices such as sensors and actuators to build a small embedded system. Peripheral interfacing methods and standards. Analog-digital conversion methods and interfacing. Basics of digital communication signals, modulation schemes and error correction methods. Data compression, formats for audio, image and video coding.

Assessment Type	Weight	Description
1. Project stage sessions	**Embedded in project assessment**	**Individual** weekly project development that is continually assessed.
2. Project 1	**25%**	A project that follows the specifications set out on Blackboard and is assessed in week 6 labs.
3. Project 2 milestone	**15%**	Similar to previous piece of assessment; due in week 10.
4. Project 2 demo	**25%**	A practical demonstration of the second project that is assessed in week 13.
5. Final Exam	**35%**	A written exam that assesses the theoretical parts of the course.

Overall Review:
This is an intense course, but one of the best courses you will ever do. The course treats you not as a student, but as an embedded systems engineer. This therefore means that your programming needs to be at an intermediate to an advanced level. Spending the holidays brushing up on your skills is highly recommended if you aren't feeling confident for this course. It is predominantly a design course, consisting of three main programming assignments; these are difficult to complete, but very interesting and you will have a lot of fun developing them. Falling behind on these projects is something that you don't want to do, so use your TP1 skills to keep on top!

How to prepare:
- The first few assignments are used in the later parts of the course, so make sure you start well to prepare yourself!

ELEC3004 – Signals, Systems & Control

Course rating: 

Prerequisites: ELEC2004 + STAT2202
Incompatible: ELEC3600, ELEC7312, ELEC7601
Required Background Knowledge: Essential that ELEC2004 has been completed and mastered. STAT2202 and MATH2000 need to well understood as well.
Contact Hours: 2 L, 2 T, 2 P
Course Co-ordinator: Dr Surya Singh (spns@uq.edu.au)
Course Description: Discrete-time signals & systems, system properties (linearity, time-invariance, memory, causality, stability), sampling & reconstruction, A/D and D/A converters, DFT/FFT, z transform, stochastic processes, frequency-selective filters, effect of feedback, introduction to control.

Assessment Type	Weight	Description
1. Challenge Practice Problems	**Extra Credit**	A set of problems that offer up to 15 points of extra credit towards an assignment.
2. Lab Practicals	**Extra Credit**	Lab 1 & 2 are worth up to 10 points of extra credit. Labs 3 &4 are worth up to +15 points of extra credit.
3. Problem Sets	**60%**	A total of five problem sets worth 12% each.
4. Final Exam	**40%**	A written final exam done during exam block.

Overall Review:
The content from this course is far more abstract and concept-heavy compared to most of the electrical engineering courses offered at UQ. Past students have described Dr Singh's teaching style as very American, in that he provides you with large amounts of content in lectures which you will have to keep on top of. That said, the lecturer is very dedicated to students, having made a separate website with much-improved access to course materials. Assignments in the past have been conceptually driven, are not too challenging mathematically; if you make a good attempt at the assignments, you can do very well in this course.

The downside of the course is that since it is concept-heavy, past exam papers are not similar and you do not know what to expect on the exam. Assignments must be written in LaTeX, and are submitted using an online system called Platypus. Whilst this is time-consuming initially, it is eventually beneficial since LaTeX is a useful and widely-used document editing system. The best way to approach ELEC3004 is to try very hard in all the assignments. This sets you up for a 5 or higher!

How to prepare:
- You can get bonus marks from the optional lab sessions. Free marks!
- Practice your LaTeX skills in the holidays to prepare for the assignments

ELEC3400 – Electronic Circuits

Course rating: 

Prerequisites: ELEC2003 + (ELEC2004 or MATH2001)
Incompatible: ELEC7401
Contact Hours: 3 L, 1 T, 2 P
Course Co-ordinator: Dr Philip Terrill (p.terrill@itee.uq.edu.au)
Course Description: Detailed examination of electrical & electronic circuit analysis & synthesis tools & techniques such as the Laplace transform, nodal analysis & two port network theory. Examples of use in analysis & design of amplifiers, filters, oscillators & other circuits.

Assessment Type	Weight	Description
1. Mid Semester Exam	**20%**	A 90 minute mid semester exam held during class time. A **one sided** A4 sheet of notes is allowed.
2. Final Exam	**40%**	A three hour long final examination. A **double sided** A4 sheet of notes is allowed.
3. Lab sessions	**Pass/Fail**	A total of 6 lab sessions running the course of the semester. It is made up of **2 – 3** students but is marked **individually**.
4. End of Semester Project Demonstration	**12.5%**	A team project based on an analogue electronics design project.
5. Electronics Design Project Report	**12.5%**	A report based on the end of semester project demonstration.
6. Peer Assessment	**Used to calculate final mark**	Similar to previous engineering projects, a PAF is utilized to ensure that efforts by individual members are reflected accordingly to their marks.

Overall Review:

ELEC3400 has a reputation for being one the hardest courses to complete, but also one of the most interesting and rewarding you will ever take – much like CSSE2010. The content is delivered in a very relevant and industry-focused way, and is well taught by the lecturer, Dr Phil Terrill, and the tutors. This course puts all of your skills from previous years into practice, so you will need a solid understanding of AC and DC circuit analysis, circuit construction and electronics from previous courses.

Dr Terrill recommends students commit at least 10 – 12 hours per week towards this course, due largely to the lab sessions which take up most of your time. These lab sessions are great for enhancing theoretical knowledge delivered in lectures, and equipping you with the skills you need for your team design project due at the end of the semester. Getting started on the project early is essential, as is paying attention to content in lectures and tutes and incorporating this into your work.

How to prepare:

- The tutorials are all worked out and solutions are provided.
- Be sure to use the tutors during lab sessions to the fullest extent.

ELEC3300 – Electrical Energy Conversion & Utilisation

Course rating: 

Prerequisites: ELEC2003
Incompatible: ELEC7302
Contact Hours: 3 L, 2 T, 1 P
Course Co-ordinator: Dr Mithulan Nandarajah (mithulan@itee.uq.edu.au)
Course Description: ELEC3300 covers electricity generation and energy conversion issues including AC machines, DC machines, transformers, three phase analysis, demand side management and recent development in electric power engineering such as renewables and distributed generation.

Assessment Type	Weight	Description
1. In class discussion	**5%**	A group based assessment piece that runs throughout the semester. Requires groups to work to put together a 10-minute presentation at the end of the semester. Marked **individually**.
2. Lab practical assessment	**10%**	A practical assessment of the course content divided into four lab sessions.
3. Tutorial Assessment	**15%**	A total of eight tutorials testing student understanding of the material covered in lectures.
4. Mid-Semester exam	**20%**	In class mid semester exam that covers the first half of course material.
5. Final exam	**50%**	Overall assessment of **entire** course material.

Overall Review:
This course reinforces content covered in ELEC2003 by revising transformers, harmonics, and steady state analysis of AC circuits. Synchronous & induction machines and modern motor control systems are some of the 'newer' topics. The first third of the course is mostly revision, with transformers covered in great detail. The next two-thirds of the course is completely new material and Mithulan covers them fairly quickly. The final exam is typically quite repetitive so past papers are a must when studying.

The downside of this course it can be hard for students to follow the lecturer at times. Students who learn better through practical applications and hands on learning will find themselves doing more individual research, as there is very limited lab work. The lecturer covers all topics in the lectures but it is done lightly, so students will have to try to pay attention to his every word – very specific definition based questions often get assessed in the mid-semester and final exams.

How to prepare:

- Many of the tutorials questions are readily available online and this reinforces learning
- The lecturer is always happy to answer any questions

ELEC3100 – Fundamentals of Electronic Fields & Waves

Course rating: 

Prerequisites: ELEC2003 + MATH2001
Incompatible: ELEC7101
Contact Hours: 2 L, 2 T, 1 P
Course Co-ordinator: A/Prof Aleksandar Rakic (rakic@itee.uq.edu.au)
Course Description: Fundamentals of electromagnetics including transmission lines, time varying fields, plane waves, radiation, waveguides & basic antennas, radar fundamentals. Applications in area of satellite communications & radar sensors.

Assessment Type	Weight	Description
1. Problem Demonstration	**10%**	An oral presentation of a problem selected from the tutorial for a particular session. A total of ten 'sign-offs' are required for this piece of assessment.
2. Mid-Semester Exam	**30%**	A written exam during a tutorial session which covers only the transmission line part of the course. Smith charts are provided.
3. Final Exam	**60%**	A 3-hour final contains a mix of short answer questions and analytical questions. It covers all the material from the course but with emphasis on material **after** the mid semester.

Overall Review:

ELEC3100 is an introduction to communications engineering. It is taught in a very theoretical fashion, with no practical component to the course, meaning it is highly mathematical and calculations based. Tutorial sheets are released each week, and these are the best way to study for the course. They are accompanied by very thorough solutions, and are very similar to the types of questions that appear in exams. The course is generally well organised, and Aleks is extremely friendly and approachable. He regularly invites feedback on how students are finding the course.

The major disadvantage of ELEC3100 is that there is no practical content. Due to the highly abstract content, this means that some concepts may take longer to sink in. It also means you'll definitely need to keep on top of the lecture and tutorial content.

How to prepare:

- The Notaros textbook is a good resource for the course, as it is the source of many tutorial/exam questions, and lectures are structured based on it.
- Make sure you attend all workshop sessions, as this will give you an easy 10% of the course grades.
- Exam papers tend to remain very similar from year to year, so past papers are a must when it comes to studying for the final.
- Practice makes perfect – because the course is so calculation intensive, the more you practice with tutorial sheets, the better you will do.

4th Year Compulsory Courses

This is it! Your last year studying at UQ! Make it a great year by choosing an interesting thesis topic (possibly with your favourite lecturer), and by taking some electives on topics you've always been excited to learn about.

ENGG4810 – Team Project II

Course rating: 

Prerequisites: ENGG2800; CSSE3010 or CSSE2002 recommended
Incompatible: ENGG3800, METR3800, METR4810
Contact Hours: 1 L, 4 C
Course Co-ordinator: Dr Peter O'Shea (p.oshea1@uq.edu.au)
Course Description: Small teams of students undertake design, implementation, testing, evaluation & presentation of a complete product.

Assessment Type	Weight	Description
1. Peer Assessment	**Incorporated into final mark**	A PAF taken into consideration when calculating final marks.
2. Completion of OH&S	**Pass/Fail**	A risk assessment that is completed by **ALL** students.
3. Group work management	**Pass/Fail**	A group assignment that outlines how group members will conduct themselves over the semester.
4. Preliminary Report	**5%**	A brief **individual** report outlining the team roles and responsibilities.
5. Team Meetings	**15%**	Two separate team meetings worth 7.5% each assessed by tutors or the lecturer.
6. Seminar	**10%**	Each team presents a progress seminar approx. 10 – 12 minutes long in week 8.
7. Product Demo	**65%**	This demo mark will be based mainly on functionality and performance of the product.
8. Final Report	**5%**	An **individual** report to be submitted by in week 13.

Overall Review:
Like all team projects, what you get out of this subject depends on what you put in. TP2 is a more advanced version of TP1, so the same advice applies: start ASAP and consistently put in time and effort. This is a difficult course, due to its largely self-taught nature and the amount of physical construction and testing you will have to do, but is immensely rewarding at the end once you've created a final product.
The amount of effort made by all the team members ultimately governs what you as a team, and especially you as an individual, get out at the end. At the end of the day like ENGG2800, it's luck of the draw with team members, so just try your best to do your work well and be a good team member. The course has been specifically designed to challenge final year students, so start the work early!

How to prepare:
- Like all team projects, start work as early as possible.
- Ask plenty of questions of your tutors
- Keep communication open and frequent between members of your group

ENGG4900 – Professional Practice and the Business Environment

Course rating: 

Recommended Pre-requisites: N.A.
Incompatible: N.A.
Contact Hours: 2 L, 2 T
Course Co-ordinator: Prof Chris Grieg (chris.grieg@uq.edu.au)
Course Description: ENGG4900 is designed to give students the knowledge needed to effect change and implement design solutions in the real world. The course teaches you cost-benefit analyses; risk and uncertainty; the economic, social, environmental and ethical drivers for investment decision-making relevant to engineering projects; and the factors acting as barriers to technology uptake.

Assessment Type	Weight	Description
1. Tutorial Exercise	**20&**	A total of 9 tutorials and workshops held during weeks 1 – 9.
2. Draft Case Study Report	**10%**	Prior to the mid-semester break, teams of 4 -6 students carry out major case studies in various topics.
3. Presentation	**15%**	A presentation of the case study presented by students on week 13.
4. Final Case Study Report	**50% weighted using PAF**	This final case study report consists of a report on the study conducted by students previously. It is due on the first week of revision week.
5. Peer Assessment	**5%**	Each student peer assess two other case studies from the cohort.

Overall Review:
ENGG4900 is a less technical course which is designed to teach you the business and project management skills required in professional engineering environment. Previous feedback paints this course as a combination of great guest lecturers and poorly designed assessment tasks. The group work in the course requires students to work together on case study topics that are given out by the lecturer. These case studies range from researching new biofuels, to off-grid power options for a regional hospital, and are essentially large, time-consuming reports.
The biggest downside of this course would be the lack of clear communication regarding assessment and criteria, which is key in any course that requires group work. That said, if you put in plenty of work and make an effort to co-operate with your group members – much like in the real world – it's possible to do quite well.
How to prepare:

- Past students have observed blackboard misbehaving in regards to assignment submissions. Avoid this and simply email assignments to the relevant tutors/lecturer.
- When emailing assignments, make it clear to the person involved that you were either submitting for your entire group or just for yourself.

ENGG4801/2 – Thesis Project

Course rating: 

Restrictions: Restricted to final year students.
Incompatible: COMP4801 or COMP4802 or COMP4807 or COMP4808 or ELEC4801 or ELEC4802 or 3E400 or 3E401 or 3E491 or 3E492
Relevant Background: The required academic background knowledge is usually specified in the various project descriptions.
Course Co-ordinator: Dr Larissa Meinicke (l.meinicke@uq.edu.au)
Course Description: Thesis on subject selected or approved by Head of School.

Assessment Type	Weight	Description
1. Online Quiz	**Pass/Fail**	An online academic integrity tutorial.
2. Project Proposal	**10%**	A clear15 page project proposal which defines the thesis topic and presents a review of relevant background material and such.
3. Progress Seminar	**15%**	An oral presentation of the key content of the research and progress of work conducted.
4. Seminar Attendance	**Pass/Fail**	A total of 5 other progress seminars must be attended by the student.
5. Poster and Demonstration	**25%**	A verbal and visual presentation of results of the research conducted.
6. Thesis	**50%**	A report that should facilitate assessment by persons other than the supervisor.

Overall Review:
The purpose of ENGG4801 is to develop your research and problem solving skills. The course involves the specification, development and evaluation of an individual research project on a specific topic or problem within the broad fields of electrical, computer systems, software and mechatronics engineering.
As a year-long, individual project, your thesis is essentially what you make of it. This means systematically planning and managing your project, and clearly presenting your work and its significance in the context of the current literature and prior art. It's a great opportunity to create something in an area that you're truly interested in, but requires a large amount of time and effort to produce something worthwhile.
How to prepare:

- Before writing the thesis proposal, make sure you do most of the coursework and do an extensive literature review.
- You should also have a solid understanding on the background materials AND previous research done by other researchers in the same field.
- Develop two/three topics first and finally focus on a topic to further develop.
- Write a thesis that you can manage within your present resource and timeframe since it is the beginning of scholarly work.
- Set aside drafts every few weeks that you can run by your supervisor.

ENGG4805 – Thesis Project

Course rating: 

Restrictions: Restricted to final year students.
Incompatible: ENGG4801 or ENGG4802
Course Description: Thesis on subject selected or approved by Head of School. Students completing in one semester enrol in ENGG4805. This code is intended for special cases including CEED projects. Usually, students commencing thesis in Semester 1 enrol in ENGG4801 for semester 1 and semester 2; students commencing in Semester 2 enrol in ENGG4802 for semester 2 and the following semester 1.
Relevant Background: The required academic background knowledge is usually specified in the various project descriptions.
Course Co-ordinator: Prof Peter Lindsay (p.lindsay@uq.edu.au)

Assessment Type	Weight	Description
1. Online Quiz	**Pass/Fail**	An online academic integrity tutorial.
2. Project Proposal	**20%**	A clear15 page project proposal which defines the thesis topic and presents a review of relevant background material and such.
3. Final Presentation	**30%**	
4. Thesis	**50%**	A report that should facilitate assessment by persons other than the supervisor.

Overall Review:
See ENGG4801/2.

How to prepare:

- Preparation for this course is VERY much similar to the preparation for ENGG4801/2

Part III: Advanced and Coverage Electives

For students doing a single major in the Bachelor of Engineering, electives are divided into two areas. Firstly, students must take a minimum of **3 courses** (6 units) from the Part B: Advanced Electives (AE) list, which is comprised of advanced electrical engineering courses.

Students must then take a total of **6 courses** (12 units) from free electives. These electives can be any courses that UQ offers (including any Advanced Electives and Coverage Electives on the Electrical course list), but there are some restrictions:

- A **minimum** of **2 courses** (4 units) must be on the BE program list (i.e. engineering courses, in any discipline);
- Also, a **maximum** of **2 courses** (4 units) can be level 1 courses, which are course codes starting with 1 such as ECON1010;
- No courses which are incompatible with compulsory/elective courses in your major.

Otherwise, feel free to broaden your horizons and take some courses in other areas such as economics, commerce and more!

If you are enrolled in an extended major (e.g. Mechatronics) or dual major (e.g. Electrical & Computer), the rules are slightly different due to the greater number of compulsory courses.

Students in both of these programs generally only have **2 courses** (4 units) available for free electives; most courses are compulsory courses or Advanced/Coverage electives, the exact combination of which depends on your major. Mechatronics students, for example, have **5 courses** (10 units) of Advanced electives, whilst Electrical & Biomedical students have just **4 courses.**

Advanced Electives (AE)

Course Code	Units	Course Title
• COMS4103	2	Photonics
• COMS4104	2	Microwave Engineering
• COMS4105	2	Communication Systems
• CSSE4010	2	Digital System Design
• ELEC4300	2	Power Systems Analysis
• ELEC4400	2	Advanced Electronic & Power Electronics Design
• ELEC4620	2	Digital Signal Processing
• ELEC4630	2	Image Processing and Computer Vision
• METR4201	2	Introduction to Control Systems
• METR4202	2	Advanced Control & Robotics

Coverage Electives (CE)

Course Code	Units	Course Title
• COMP4702	2	Machine Learning
• COMS3200	2	Computer Networks I
• COMS4200	2	Computer Networks II
• CSSE2002	2	Programming in the Large
• CSSE4011	2	Advanced Embedded Systems
• ELEC4000	2	Special Topics in Electrical Engineering 4A
• ELEC4001	2	Special Topics in Electrical Engineering 4B
• ELEC4302	2	Power System Protection
• ELEC4320	2	Modern Asset Management and Condition Monitoring in Power System
• ELEC4403	2	Medical & Industrial Instrumentation
• ELEC4601	2	Medical Imaging
• ENGG4000	2	Introduction to Systems Engineering
• ENGG4800	2	Project Management