

## Course Staff

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**Consultations:** You are encouraged to ask questions on the course material, after the lecture class times in the first instance, rather than via email. You can also post questions in the Moodle discussion forums. **ALL** email enquiries should be made from your student email address with "ELEC1111" in the subject line, otherwise they will not be answered.

Consultation times for the course will be announced in Week 1 via Moodle.

**Keeping Informed:** The main announcements regarding the course and its assignments will be made through Moodle <https://moodle.telt.unsw.edu.au/login/index.php>. Announcements may also be made during classes but everything will be formally announced in the "Course Announcements" forum of ELEC1111 in Moodle.

Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

## Course Summary

### Contact Hours

The course consists of:

- 3 hours of lecture each week.
- 2 hours of face-to-face tutorials every second week, starting Week 21.
- 1 hour of online tutorial each week.
- 2 hours of laboratory experiments each week, starting from Week 3.

Session	Day	Time	Location
Lectures	Tuesday	1pm-3pm	Sir John Clancy Auditorium
	Friday	11am-12pm	Sir John Clancy Auditorium
Tutorials	Weeks 2, 4, 6, 8, 10 and 12	See your timetables	See your timetables
Laboratories	Weeks 3 - 13	See your timetables	EE 113-114

## Context and Aims

The theory of Electric Circuits is fundamental for the understanding and building of further knowledge in the Electrical Engineering. ELEC1111 is an introductory course in Electrical Engineering, providing an introduction to electrical circuits and fundamental electrical elements as well as the technical skills to analyse such circuits. It is a course suitable for students pursuing further studies in Electrical Engineering such as Power & Energy, Telecommunications, Control, Instrumentation, etc as well as some other related Engineering disciplines including computer engineering. In the practical section, it provides hands-on experience in building and testing circuits. It is presented in such a way that students, having taken this course, can go away and build and analyse some practical, useful devices afterwards.

It is a pre-requisite for the subsequent course on Circuits and Signals.

The aims of the course are to:

- Provide students with practical design experience.
- Ensure the students' design skills are adequate and to the level desirable for a professional Engineer.
- Give the students the opportunity to improve their design skill base and engineering practice skills required by professional engineers.

## Lecture Schedule

In a typical semester, like Semester 1, 2017 one week corresponds to one topic.

Period	Summary of Lectures
Topic 1	Introduction, Circuit Basics Overview, Nodes & Meshes, Power & Energy
Topic 2	Ohm's Laws, Kirchoff's laws, Series & Parallel connection of elements
Topic 3	Nodal and Mesh Analysis
Topic 4	Circuit Theorems (Superposition, Thevenin, Norton, Source Transformation)
Topic 5	Capacitors and RC Circuits
Topic 6	Inductors and RL Circuits
Topic 7	Operational Amplifiers
Topic 8	AC Analysis I - Phasors and Impedance
Topic 9	AC Analysis II - Circuit Theorems
Topic 10	AC Power and AC OPAMPs
Topic 11	Transformers
Topic 12	Digital Logic

## Indicative Lab Schedule

Period	Summary of Lab Program
Lab 1	Familiarization with laboratory equipment
Lab 2	Series and parallel circuits
Lab 3	Circuit construction and Kirchoff's laws
Lab 4	Network theorems
Lab 5	RC & RL transients
Lab 6	Operational amplifiers
Lab 7	AC circuits and AC Power
Lab 8	Digital logic circuits

## Assessment

The following summative assessment tasks will give you your final mark for Semester 1, 2017.

It should be noted that because of changes in UNSW's Assessment policy the length of the final exam has been reduced to two hours.

Mid-term Exam (1 hour)	17.5%
Mid-term Exam Peer-Review	7.5%
Laboratory Reports	15%
Lab Exam	5%
Completion Badges	5%
Final Exam (2 hours)	50 %
Total	100%

- The Mid-Term exam is tentatively scheduled in Week 7 of the semester.
- The date of the Final Exam will be announced by the University.
- The Mid-Term exam peer-review will take place over the semester break and Week 8 of the course.
- The Lab Exams will take place in Weeks 11 and 12 of the semester.

# Course Details

## Credits

ELEC1111 is 6 UOC course. The expected average workload is approximately **12-15 hours per week** throughout the semester, including face-to-face contact hours and self-studying.

## Relationship to Other Courses

This course is an introduction to electrical engineering for both Electrical and Telecommunications Engineering students and engineers in general across the faculty. It is a pre-requisite for many other courses both in electrical and other engineering schools.

## Pre-requisites and Assumed Knowledge

There are no pre-requisites for this subject but it would be helpful to have a physics and mathematics background at high school level.

## Learning outcomes

After successful completion of this course, you should be able to:

- LO1: Systematically analyse ac and dc electric circuits by deriving and solving its equations using Kirchhoff's laws and circuit theorems.
- LO2: Obtain the steady state and transient behavior of a first order circuit.
- LO3: Demonstrate a basic understanding of phasors and phasor diagrams for ac circuit analysis.
- LO4: Apply sinusoidal steady state analysis to ac circuits and distinguish between ac power definitions.
- LO5: Apply concepts of circuit analysis in circuits with ideal operational amplifiers and ideal transformers.
- LO6: Demonstrate basic proficiency in building basic electric circuits, operate fundamental electrical engineering equipment, work in a laboratory environment and follow OHS regulations.
- LO7: Perform basic simulations of dc and ac circuits using appropriate software.

The course delivery methods and course content address a number of core UNSW graduate attributes; these include:

- The capacity for analytical and critical thinking and for creative problem solving.
- The ability to engage in independent and reflective learning.
- Information Literacy – the skills to locate evaluate and use relevant information.
- The capacity for enterprise, initiative and creativity.
- The skills of effective communication.

This course is designed to provide the above learning outcomes which arise from targeted graduate capabilities listed in **Appendix A**. The targeted graduate capabilities broadly support the UNSW and Faculty of Engineering graduate capabilities (**listed in Appendix B**). This course also addresses the Engineers Australia (National Accreditation Body) Stage I competency standard as outlined in **Appendix C**.

# Teaching Strategies

## Delivery Mode

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

1. Formal face-to-face lectures
2. Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material;
3. Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills;

## Lectures

Recorded video lectures will be made available to students to support the scheduled face-to-face lectures. Where possible, Echo360 will be used to record the actual classes, for revision purposes. Students should note that watching recordings is **no substitute** for actually attending the classes, where live questions can be asked. *In particular, note that having access to recorded lectures does not imply improved exam preparation, without significant and consistent additional self-directed study through the semester.*

## Tutorials

There are three different sets of Tutorials provided in ELEC1111.

1. **Solved Examples.** These are solved questions that complement the theory provided in the lectures. They are provided as a single pdf file each week of the semester.
2. **Online Video Tutorials.** These are pre-recorded solutions of typical tutorial questions that you can watch at your own time and pace. A document with the completed solutions is also provided for the video tutorials. It is strongly suggested that you attempt to solve the questions of the tutorials before watching the videos to observe the methods and theory used in each question.  
It should be also noted that the format of the videos is typically 3 - 5 minutes long which is a lot more concentrated compared to a normal tutorial class and it is important to do preparatory work before watching the solutions.
3. **Face-to-face Tutorials.** These tutorials function in a collaborative manner where in groups of 2 or 3 students, try to apply your knowledge from the theory and other tutorials to solve other tutorial questions, exam questions from previous semesters as well as design problems. Collaboration between students towards the solution of a problem is expected.

## Laboratories

Students are required to attend the laboratories as outlined in the Contact hours.

The laboratories are an integral part of learning in this course as they allow you to build circuits, measure and observe in real life the theory of the lectures. You are expected to attend all labs, and lab exam. You must prepare well for your laboratory classes and your lab work will be assessed. In addition to the lab work, you would have regular feedback sessions with your lecturer at the start of each new lab, for a face-to-face discussion.

Furthermore, you would have the option of attending an open laboratory session (in Week 7) should you need extra time familiarizing yourselves with laboratory equipment, practices and exercises.

There is no laboratory exemption for this course. Regardless of whether equivalent labs have been completed in previous courses, all students enrolled in this course for Semester 1, 2017 must attend all labs. If, for medical reasons, (note that a valid medical certificate must be provided) you are unable to attend a lab, you will need to apply for a catch-up lab during another lab time, as agreed by the laboratory coordinator.

## Assessment <sup>1</sup>

You are expected to view all lectures, and attend all tutorials, labs and quizzes, in order to maximize learning. It is important to prepare your tutorial questions in advance of attending the tutorial classes. You must prepare well for your laboratory classes, and will be tested on this preparation at the beginning of each lab exercise. In addition to the lecture notes, you should read relevant sections of the recommended text. Reading additional texts would further enhance your learning experience. *Group learning and collaboration throughout the course is strongly encouraged.*

### Mid-term Exam

There will be a 1 hour quiz during session as scheduled above. *Repeat students are NOT exempt from these tests.*

### Mid-term Exam Peer Review

Following the mid-term exam, you will be given one week to rework the questions of the mid-term exam and uploads solutions together with detailed explanations of the process and methods - laws you used in a Workshop exercise via Moodle.

At the completion of the submission stage, you will be given the answers to the questions and you will be asked to provide detailed feedback and comments to three submissions of your fellow students as well as your own submission.

The submission part of the mid-term peer-review accounts for 40% of the mark and the feedback part accounts of the remaining 60% of the mark.

### Lab Sessions

Students must upload the completed OHS form to the submission page in Moodle before attending the first practical laboratory component. If a student attends laboratory sessions without having submitted a signed safety form the marks for those labs will be zero.

The Lab sessions are split into three parts.

1. **The pre-lab that accounts for 20% of your lab mark.** These are questions that must be completed and answered before you attend each of the experiments.  
**Students without a completed pre-lab will not be allowed to participate in the experiment.**
2. **The Experimental part which accounts for 80% of your Lab Mark.** This includes your measurements, graphs, answers to lab questions completed in your lab manual. The experimental part **must** be completed within the allocated 2 hours of each session and will be marked throughout the experiment by your demonstrators.
3. **The post-lab questionnaire.** The post-lab questionnaire is not part of the total mark of the lab. **However,** failure to complete the post-lab within the week that you completed your lab exercise will incur a **50% penalty** on your total lab mark for that experiment. Also, unsatisfactory answers and lack of effort in the post-lab exercise will incur a **30% penalty** on your lab mark for that session.

### Laboratory Exam

In Weeks 11 and 12, after the first 7 lab experiments have been completed, a practical test will take place. You have to attend at least 7 of the 8 labs **AND** attain a pass assessment in the labs **AND** pass the lab test to pass the course.

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<sup>1</sup>For all class assessment tasks (i.e. Laboratories and mid-term, if the student is unable to attend for medical or other serious reasons, the student must present medical certificates and/or other documentation within 3 days of the assessment to the lecturer in charge. If this is not done within the required time period then no consideration will be given. In the case of missing a quiz/test for one of the reasons above, the assessment will be carried over to the final exam ie the final exam will become a higher % of the assessment.

A satisfactory performance in the laboratory component is a necessary requirement to pass this course. This means that even if you score 100% on the final written examination and on the quizzes, **you will not pass the course** if your laboratory assessment is not satisfactory.

In Summary to pass the laboratory component and therefore the course you **MUST** do all of the following:

- Upload the completed form.
- Attend all of the lab classes including the lab test (or have handed in medical certificates)
- Obtain a pass mark average for the laboratory experiments.
- Pass the Lab Exam.

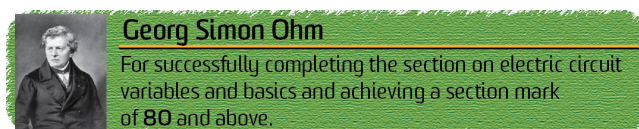
## Completion Badges

Each week starting from Week 2, there will be an online quiz related to the material covered in the previous week of the course. The quizzes must be completed within the defined timeline and will unlock a "Completion Badge".

Your mark for this part of the assessment will be the average of the 12 quizzes you have completed if:

1. You have successfully completed 11 out of the 12 quizzes AND
2. You have successfully unlocked 10 out of the 12 badges

A completion badge in Moodle will look like this (This is for Week 1):



## Final Exam

The final exam will be a closed book 2-hour exam for ELEC1111. In principle, the examination may cover any aspect of the course that has been presented in lectures, tutorials and/or laboratories.

Students **MUST** achieve a minimum of 40 marks in the final exam and an total passing mark in order to pass the course.

## Relationship of Assessment Methods to Learning Outcomes

	Learning Outcomes						
	L01	L02	L03	L04	L05	L06	L07
Mid-Term exam	✓	✓	✓	✓	✓		
Mid-Term Peer Review	✓	✓	✓	✓	✓		
Laboratory practical assessments	✓					✓	✓
Lab exam	✓					✓	
Mid-semester exam	✓	✓	✓	✓	✓		
Final exam	✓	✓	✓	✓	✓		

# Course Resources

## Prescribed textbook

The prescribed textbook for ELEC1111 course is

[1] *Fundamentals of Electric Circuits*, Alexander & Sadiku edition 6, McGraw Hill. (This is also the new text for 2nd year ELEC2134 course.)

## On-line resources

### Moodle

As a part of the teaching component, Moodle will also be used. Lab assessment marks will also be available via Moodle <https://moodle.telt.unsw.edu.au/login/index.php>. As the course progresses, students' marks from assessments such as labs and the quizzes are available for personal viewing on this website.

## Simulations

Although building and performing simulations is not an assessable part of the ELEC1111 course, students are **strongly encouraged to familiarize** themselves with building basic simulations and also measuring and interpreting results of simulations. Throughout the semester, some of the examples will also provided as simulation files.

### Online Simulations

The recommended resource for simulations in ELEC1111 is [www.falstad.com](http://www.falstad.com). It is a simple-to-use and easy-to-understand online application that allows you to simulate simple electric circuits. It is also very simple to share cases and simulations with others.

### Simulation Software

For those of you looking for a more detailed software to perform simulations, my suggestion is the *Quite Universal Circuit Simulator* <http://qucs.sourceforge.net/>

## Textbooks

### Further Text(s) and Reference(s)

[2] *Introduction to Electric Circuits*, R. Dorf and J. Svoboda

[3] *Basic Engineering Circuit Analysis*, J. Irwin, and R. Nelms



## Other Matters

### Academic Honesty and Plagiarism

Plagiarism is the unacknowledged use of other people's work, including the copying of assignment works and laboratory results from other students. Plagiarism is considered a form of academic misconduct, and the University has very strict rules that include some severe penalties. For UNSW policies, penalties and information to help you avoid plagiarism, see:

<https://student.unsw.edu.au/plagiarism>.

To find out if you understand plagiarism correctly, try this short quiz:

<https://student.unsw.edu.au/plagiarism-quiz>.

### Student Responsibilities and Conduct

Students are expected to be familiar with and adhere to all UNSW policies (see <https://student.unsw.edu.au/guide>), and particular attention is drawn to the following:

#### Workload

It is expected that you will spend at least sixteen to twenty hours per week studying a 6 UoC course over the summer semester, from Week 1 until the final assessment, including both face-to-face classes and independent, self-directed study. In periods where you need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a common source of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

#### General Conduct and Behaviour

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

#### Work Health and Safety

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

#### Special Consideration and Supplementary Examinations

You must submit all assignments and attend all examinations scheduled for your course. You should seek assistance early if you suffer illness or misadventure which affects your course progress. All applications for special consideration must be lodged online through myUNSW within 3 working days of the assessment, not to course or school staff. For more detail, consult:

<https://student.unsw.edu.au/special-consideration>.

#### Continual Course Improvement

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the Course and Teaching Evaluation and Improvement Process. You can also provide feedback to ELSOC who will raise your concerns at student focus group meetings. As a result of previous feedback obtained for this course and in our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

## Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrollment, rights, and general expectations of students, please refer to the School and UNSW policies:

<https://www.engineering.unsw.edu.au/electrical-engineering/resources/undergraduate-resources/policies-and-pro>

<https://student.unsw.edu.au/guide>

## Appendices

### Appendix A: Targeted Graduate Capabilities

Electrical Engineering and Telecommunications programs are designed to address the following targeted capabilities which were developed by the school in conjunction with the requirements of professional and industry bodies:

- The ability to apply knowledge of basic science and fundamental technologies;
- The skills to communicate effectively, not only with engineers but also with the wider community;
- The capability to undertake challenging analysis and design problems and find optimal solutions;
- Expertise in decomposing a problem into its constituent parts, and in defining the scope of each part;
- A working knowledge of how to locate required information and use information resources to their maximum advantage;
- Proficiency in developing and implementing project plans, investigating alternative solutions, and critically evaluating differing strategies;
- An understanding of the social, cultural and global responsibilities of the professional engineer;
- The ability to work effectively as an individual or in a team;
- An understanding of professional and ethical responsibilities;
- The ability to engage in lifelong independent and reflective learning.

### Appendix B: UNSW Graduate Capabilities

The course delivery methods and course content directly or indirectly addresses a number of core UNSW graduate capabilities, as follows <select those which apply (maybe 3-5) and adapt to suit course>:

- Developing scholars who have a deep understanding of their discipline, through lectures and solution of analytical problems in tutorials and assessed by assignments and written examinations.
- Developing rigorous analysis, critique, and reflection, and ability to apply knowledge and skills to solving problems. These will be achieved by the laboratory experiments and interactive checkpoint assessments and lab exams during the labs.
- Developing capable independent and collaborative enquiry, through a series of tutorials spanning the duration of the course.
- Developing digital and information literacy and lifelong learning skills through assignment work.
- Developing ethical practitioners who are collaborative and effective team workers, through group activities, seminars and tutorials.
- Developing independent, self-directed professionals who are enterprising, innovative, creative and responsive to change, through challenging design and project tasks.
- Developing citizens who can apply their discipline in other contexts, are culturally aware and environmentally responsible, through interdisciplinary tasks, seminars and group activities.

## Appendix C: Engineers Australia (EA) Professional Engineer Competency Standard

	<b>Program Intended Learning Outcomes</b>	
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals	✓
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing	✓
	PE1.3 In-depth understanding of specialist bodies of knowledge	✓
	PE1.4 Discernment of knowledge development and research directions	
	PE1.5 Knowledge of engineering design practice	
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice	
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving	✓
	PE2.2 Fluent application of engineering techniques, tools and resources	✓
	PE2.3 Application of systematic engineering synthesis and design processes	
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability	✓
	PE3.2 Effective oral and written communication (professional and lay domains)	✓
	PE3.3 Creative, innovative and pro-active demeanour	
	PE3.4 Professional use and management of information	
	PE3.5 Orderly management of self, and professional conduct	
	PE3.6 Effective team membership and team leadership	