



# ELEC9123 Design Proficiency

## COURSE STAFF

Course Convener: Dr. Ray Eaton, Dean's Unit, r.eaton@unsw.edu.au

**Consultations:** You are encouraged to ask questions on the course, after the 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 ELEC9123 in the subject line, otherwise they will not be answered.

Preliminary consultation times for the course are: **Tuesday 1:00 pm to 2:00 pm, meeting room 627, Engineering Dean's Unit, Level 6, Building K17 (CSE Building)**. On occasions, this consultation time will not be possible – in this event, an alternative time/location will be made available.

**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 relevant sections of 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 weekly three-hour laboratory classes. There will also be open lab hours that will allow you to work on your designs and prototypes. These will be announced in class and via Moodle.

Laboratory	Day	Time	Location
All weeks	Tuesday	2pm – 5pm	ElecEng G13, G14, 214
Open Labs	TBA	TBA	TBA

Advice will be obtained for the most suitable day and time for the open labs.

### Context and Aims

Although the theoretical skills that students acquire during their time at university form a strong foundation for their future career, companies have naturally been placing particular emphasis on the design skills of our graduates. The goal of this postgraduate course is to allow the students to demonstrate their ability to integrate the knowledge and concepts they have acquired so far and apply them to carry out practical design. In addition to assessing their design skills, this course gives the students the opportunity to identify and improve, with the help of the teaching staff, their design skills in individual streams being examined.

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.

### Indicative Learning Schedule

Period	Summary of Learning Program
Week 1	Introduction & Analogue and digital circuit design
Week 2	Analogue and digital circuit design
Week 3	Analogue and digital circuit design / <b>Design Task 1 Assessment</b>
Week 4	Familiarisation with data acquisition device and MATLAB environment.
Week 5	Telecommunications / Power systems
Week 6	Telecommunications / Power systems
Week 7	Telecommunications / Power systems
Week 8	Telecommunications / Power systems / <b>Design Task 2 Assessment</b>
Week 9	Signal Processing + Control Systems
Mid - semester break, 22 Sept - 1 Oct	
Week 10	Signal Processing + Control Systems
Week 11	Signal Processing + Control Systems / <b>Design Task 3 Assessment</b>
Week 12	Supplementary Lab
Week 13	Supplementary Lab

### Assessment

Assessment item	Assessment Weight
Design Task 1 -	30% (24% Design implementation; 6% Design log)
Design Task 2	30% (24% Design implementation; 6% Design log)
Design Task 3	30% (24% Design implementation; 6% Design log)
Online Engagement/Participation Activity	10%
<b>TOTAL</b>	<b>100%</b>

The assessment consists solely of the lab work and in-semester online activity - there is no final examination.

**Design Tasks** - Each of the three design tasks is equally weighted and worth 30% in total. A satisfactory (pass) mark must be obtained for each of them to pass the subject. A student may get one unsatisfactory (fail) design task mark only in the regular part of the course. In this case, the student will get a chance to undertake a supplementary lab in the final weeks of the semester (Weeks 12 & 13).

At the completion of the final week of each design task (Weeks 3, 8, and 11), the students are required to submit an **Experiment Design Log** (like a journal) via Moodle. In the design log, which is to be completed online in Moodle periodically, students will be able to self-reflect on their work and experiences with the design task. Students should provide a description of the research, design, experimentation, successful and failed attempts towards their final design for the course. In the same log, the students should also provide a detailed reference and online resource list that they used in order to complete the design task. The Experiment Design Log accounts for 20% (6 out of 30 marks) of the total mark of each design task. More detail on the log will be provided, including a template.

**Online Activity/Participation** – Students will be required to engage in online activity and participation throughout the duration of the course, on Moodle. This activity will be primarily via group-based discussion, centred on the design tasks. Meaningful contribution to these discussions will be required in order to gain a satisfactory participation score. Details of this assessment and the activities will be made available in Moodle in Week 2.

### **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 myExperience survey. 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.

Based on the feedback from the last two years, **for Semester 2, 2018** the following suggestions have been considered:

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1. To provide more, and clear, explanation of the design tasks to be implemented. It was felt that the specifications were too broad, meaning students struggled to focus on what was important in the time available.
2. To provide more open lab times, to allow the completion of the design tasks in a timely manner.

## **COURSE DETAILS**

### **Credits**

This is a 6 UoC course and the expected workload is 10–12 hours per week throughout the 13 week semester.

### **Pre-requisites and Assumed Knowledge**

This is a postgraduate course that draws on knowledge and practical skills gained in your undergraduate degree. This course does not focus on teaching the design process itself, nor the basic theories and concepts of any of the streams or disciplines. Instead, the combination of the students' theoretical knowledge and design skills in these areas will be assessed. Consequently, this course is quite significant in preparing the student for the step from university life to the professional environment.

### **Learning outcomes**

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

1. Have shown their capacity to successfully harness their technical knowledge to carry out meaningful design tasks in each of the competency streams.
2. Have identified, documented and improved any issues related to their knowledge base.
3. Be able to identify and document the design requirements and the relevant concepts and resources in order to successfully reach the design goals.
4. Have the ability to combine various streams of electrical engineering to develop a solution to a design problem.

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.

## Syllabus

This course consists of design tasks in the areas of analogue and digital circuits, digital signal processing, control systems, and one of telecommunications/power system.

## TEACHING STRATEGIES

### Delivery Mode

The laboratories will form the primary method of instruction for this course. Students are expected to prepare for each of the design lab sessions (except for Week 1) prior to arriving at the laboratory. During the lab session, students will be guided and supported by the lab demonstrators. However, as this is an assessment exercise, the staff will provide careful guidance such that the fundamental contribution to the design task remains that of the student. Essentially, this means emulating a realistic work environment where the engineer must have the fundamental knowledge and design skills, but is able to solicit general guidance. The teaching methods adopted are optimised to ensure the aims and learning outcomes of the course are achieved.

These include:

- Design tasks that are formulated to enable the students to combine their theoretical knowledge acquired from technical subjects.
- Assessments targeted at evaluating the students' abilities and identifying areas for improvement in their skill base.
- A laboratory organisation that in addition to the evaluation of the design process, provides the opportunity for students to improve their presentation and communications skills, as well as their sense of working in an engineering community.
- Consultation to allow the students to seek assistance should the formal teaching methods prove insufficient.

### Learning in this course

The laboratories will form the primary method of learning for this course. 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 will have feedback sessions with your lecturer at the start of each new lab design. Furthermore, you will have the option of attending an open laboratory session should you need extra time to complete your laboratory tasks.

## ASSESSMENT DETAILS

Although each design task will be assessed in the final week of that component, marks will not be released during the semester. Instead, feedback will be given at the beginning of each new design task in the form of grades according to Table 1. A student must pass each of the design tasks individually to pass the subject (that is no grade of poor can be obtained on any task). However, it is important to note that the subject has a built-in

supplementary. If a student fails a single design task, they will repeat it during the supplementary. If they pass it, they will pass the subject. The final mark of a student repeating a design task will be capped at 50% for that task. A student with a failed design task at the end of the semester may be granted a supplementary at the discretion of the course convenor. Finally, a student receiving two or three grades of poor for the individual design tasks will fail the subject and the final course mark will be the highest individual design task mark less than 50%.

Table 1: Course and Lab Grading

Marks Range	Grade
<50%	Poor
50 – 64%	Average
65 – 74%	Good
75 – 84%	Very Good
≥ 85%	Excellent

Students will undertake each design task in groups of two. In assessing each design task, the group will be assessed together, however each member of the group will need to demonstrate their own proficiency and understanding of the design. In addition, individual assessment will be gained through the use of peer assessment and a statement of individual contribution.

At the completion of the final week of each design task, the students are required to submit a **Experiment Design Log** via Moodle. In the design log, which is to be documented each week, students will have a chance to self-reflect on their experiences within the lab design task. Students should also provide a description of the research - design - experimentation successful and failed attempts towards their final design for the course. In the same log, the students should finally provide a detailed reference and online resource list that they used in order to complete the design task. The Experiment Design Log accounts for 20% of the total mark of each design task. Note that although design tasks are completed in groups of two, the design log **MUST** be individual and private.

### Final Exam

The course does not have a final exam.

### Submission of Assessment Tasks

Assessment tasks will be submitted via the Moodle page of the course.

### Relationship of Assessment Methods to Learning Outcomes

Assessment	Learning outcomes			
	1	2	3	4
Laboratory practical assessments	✓	✓	✓	✓
Design Log		✓	✓	
Online Participation		✓	✓	

## COURSE RESOURCES

### Prescribed textbook

This course has no specific recommended text. As it heavily relies on the technical knowledge of other courses, the textbooks of those subjects and their course notes are recommended resources for the students.

### 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>.

#### Mailing list

Announcements concerning course information will be given in the lectures and/or on Moodle and/or via email (which will be sent to your student email address).

## 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:

<http://www.lc.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://my.unsw.edu.au/student/atoz/ABC.html>), and particular attention is drawn to the following:

### Workload

It is expected that you will spend at least ten to twelve hours per week studying a 6 UoC course, from Week 1 until the final assessment, including both face-to-face classes and independent, self-directed study. In periods where you need to 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.

### Attendance

Attendance at all Design Task Assessment days (Week 3, 8, 11) is mandatory, and it is expected that you attend at least 80% of all other lab times. If you are unable to attend any of the Design Task Assessment days, you are required to notify the course convener and submit an application for special consideration no later than 3 working days after the date.

### 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://my.unsw.edu.au/student/atoz/SpecialConsideration.html>.

## **Administrative Matters**

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

<http://www.engineering.unsw.edu.au/electrical-engineering/policies-and-procedures>

<https://my.unsw.edu.au/student/atoz/ABC.html>

# **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:

- 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>	
<b>PE1: Knowledge and Skill Base</b>	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	
<b>PE2: Engineering Application Ability</b>	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	
<b>PE3: Professional and Personal Attributes</b>	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	✓