



ELEC4150

Electronic Design Proficiency

Session 2, In person-scheduled-weekday, North Ryde 2022

School of Engineering

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General Information

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Tutor

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Credit points

10

Prerequisites

(ELEC324 or ELEC3024) and (ELEC342 or MECH362 or ELEC3042) or Admission to MEngElecEng

Corequisites

Co-badged status

ELEC8150

Unit description

This unit aims to put in practice various design techniques students have been exposed to throughout the Electronics Engineering degree program and assess their design proficiency. The unit consists of three main design domain topics covering Electronic Circuits, Signals and Systems, and Embedded/Control Systems. Students are given design challenges to complete from each of the three design domains, which they must complete and demonstrate over several weeks.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.

ULO2: Demonstrate design proficiency through completing projects drawn from Electronic Circuits, Signals and Systems, and Embedded/Control Systems domain topics.

ULO3: Critically appraise, design to a specification and prototype electronic systems.

ULO4: Work within the constraints imposed by the availability of components, hardware and software tools to produce designs that meet user requirements.

ULO5: Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

General Assessment Information

Overall you are expected to spend 150 hours or work and study in this unit. This will include time spent in the practical labs, but importantly a substantial amount of self-directed time working on electronics design tasks. The 'estimated time on task' for each assessment item is an estimate of the additional time needed to complete each assessment outside of all scheduled learning activities and non-scheduled self-directed learning. These estimates assume that you actively engage with the scheduled learning activities, as well as time spent on self-directed design development.

Grading and Passing Requirement

The assessment consists solely of the lab and design work and in-semester online activity - there is no final examination in this unit. In order for students to pass this unit, they must obtain a mark accumulated across all assessments of 50% or greater.

For further details about grading, please refer below in the policies and procedures section.

DESIGN TASKS (3 x 30%; estimate time on task = 36 hours)

- **Demonstration and Oral Defence (3 x 22%)**
- **Reflective Journal (3 x 8%)**

Each of the three design tasks is equally weighted and worth 30% in total. On the completion of the design tasks, students will provide an individual demonstration and oral defence of their design work. The Demonstration and Oral Defence accounts for 22% for each design task. **For each design task, the demonstration and defence will be undertaken in the practical class time and take approximately 15 minutes.** In the case of receiving an unsatisfactory (fail) grade for a design task, students will get a chance to undertake a supplementary lab in the final week

of the semester, Week 13. In this supplementary lab, students will get a chance to improve on only one failed design task, and the grade for that task will be capped at 50%.

During weeks when the design tasks are due, students are required to submit a written Experiment Design Log (like a journal). In the design log, which is to be completed periodically during the semester, 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, and 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 8% (8 out of 30 marks for each task) of the total mark of each design task. **The length of the experimental log/journal will vary, however entries to the log should be made regularly and each time you carry out work on the design task.**

At the conclusion and assessment of each design task, letter grades will be reported in iLearn and feedback will be provided on an individual basis. Note that although constructive collaboration with student colleagues is acceptable, **students MUST prepare their own design and reflective experimental log.**

More detail on the oral defence and log will be provided, including a template and rubrics.

GROUP-BASED ONLINE ACTIVITY/PARTICIPATION (10%; estimate time on task = 6 hours)

Students will be required to engage in online activity and participation throughout the duration of the unit via iLearn. This activity will be primarily via group-based discussion, centred and reflecting on the design tasks and professional engineering attributes. 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 iLearn.

Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

Resubmission of work is not allowed.

Assessments where Late Submissions will be accepted

In this unit, late submissions will accepted as follows:

Design Task Journals – YES, Standard Late Penalty applies;

Defence & Demonstration, Group-based Online Discussion - NO, unless Special Consideration is Granted.

Assessment Tasks

Name	Weighting	Hurdle	Due
Design Task 1 journal	8%	No	Week 5
Defence and Demonstration 1	22%	No	Week 5
Design Task 2 journal	8%	No	Week 8
Defence and Demonstration 2	22%	No	Week 8
Design Task 3 journal	8%	No	Week 12
Defence and Demonstration 3	22%	No	Week 12
Small group-based online discussion	10%	No	Week 13

Design Task 1 journal

Assessment Type ¹: Reflective Writing

Indicative Time on Task ²: 4 hours

Due: **Week 5**

Weighting: **8%**

Reflective journal on Design Task 1, logging and reflecting on the design process.

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Critically appraise, design to a specification and prototype electronic systems.
- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

Defence and Demonstration 1

Assessment Type ¹: Viva/oral examination

Indicative Time on Task ²: 8 hours

Due: **Week 5**

Weighting: **22%**

Demonstration of design task 1

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Demonstrate design proficiency through completing projects drawn from Electronic Circuits, Signals and Systems, and Embedded/Control Systems domain topics.
- Critically appraise, design to a specification and prototype electronic systems.
- Work within the constraints imposed by the availability of components, hardware and software tools to produce designs that meet user requirements.
- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

Design Task 2 journal

Assessment Type ¹: Reflective Writing

Indicative Time on Task ²: 4 hours

Due: **Week 8**

Weighting: **8%**

Reflective journal on Design Task 2, logging and reflecting on the design process.

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Critically appraise, design to a specification and prototype electronic systems.
- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

Defence and Demonstration 2

Assessment Type ¹: Viva/oral examination

Indicative Time on Task ²: 8 hours

Due: **Week 8**

Weighting: **22%**

Demonstration of design task 2

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Demonstrate design proficiency through completing projects drawn from Electronic Circuits, Signals and Systems, and Embedded/Control Systems domain topics.
- Critically appraise, design to a specification and prototype electronic systems.
- Work within the constraints imposed by the availability of components, hardware and software tools to produce designs that meet user requirements.
- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

Design Task 3 journal

Assessment Type ¹: Reflective Writing

Indicative Time on Task ²: 4 hours

Due: **Week 12**

Weighting: **8%**

Reflective journal on Design Task 3, logging and reflecting on the design process.

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Critically appraise, design to a specification and prototype electronic systems.
- Prepare design documents, communicate and explain design decisions, and critically

reflect on personal and professional development

Defence and Demonstration 3

Assessment Type ¹: Viva/oral examination

Indicative Time on Task ²: 8 hours

Due: **Week 12**

Weighting: **22%**

Demonstration of design task 3

On successful completion you will be able to:

- Propose, design and demonstrate working solutions to given engineering problems, applying knowledge drawn from topics in Electronic Circuits, Signals and Systems, and Embedded/Control Systems.
- Demonstrate design proficiency through completing projects drawn from Electronic Circuits, Signals and Systems, and Embedded/Control Systems domain topics.
- Critically appraise, design to a specification and prototype electronic systems.
- Work within the constraints imposed by the availability of components, hardware and software tools to produce designs that meet user requirements.
- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

Small group-based online discussion

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 6 hours

Due: **Week 13**

Weighting: **10%**

Small group-based online discussion about professional engineering design

On successful completion you will be able to:

- Prepare design documents, communicate and explain design decisions, and critically reflect on personal and professional development

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Context and Aims

Although the theoretical skills that students acquire during their time at university form a strong foundation for their future career, industry naturally place particular importance on the design skills of our graduates. The aim of this unit is to allow the students to demonstrate their ability to integrate the knowledge and concepts they have acquired so far throughout the Electronics Engineering degree program and apply them to carry out practical design.

Assumed Knowledge

This is a unit that draws on knowledge and practical skills gained in your prior engineering studies in electronic and electrical engineering. This unit does not focus on teaching the design process itself, nor the basic concepts of any of the discipline areas. Instead, the combination of the students' theoretical knowledge and design skills in these areas will be assessed.

Delivery Mode

This unit consists mainly of practical classes in the laboratory on-campus. You will carry out the development and testing of your designs, with the electronics equipment in place and with support available for guidance. **Students are required to attend all the practical sessions on campus, including Week 1.** Please contact the convenor immediately if you are unable to get back to campus in time.

During the lab session, students will be guided and supported by the tutor. 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. These include: i) Design tasks that are formulated to enable the students to combine their theoretical knowledge acquired from technical subjects; ii) Assessments targeted at evaluating the students' abilities and identifying areas for improvement in their skill base; iii) 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; iv) Consultation to allow the students to seek assistance.

Technology and Equipment

Students should have access to their own breadboard to carry out designs in this unit. The

designs will also make use of software including MATLAB and CAD packages such as SPICE for circuit simulation. Access to student versions of these packages will be necessary in order to be able to carry out the self-directed design development work at home.

Keeping Informed

Assignment instructions, study materials and all announcements for this unit will be made available through iLearn at <http://ilearn.mq.edu.au>. Please refer to it frequently. Announcements may also be made during classes but everything will be formally announced in the relevant sections of iLearn. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Asking for Help

You are encouraged to ask questions on the unit, after the class times and by posting questions in iLearn discussion forums, in the first instance. All email enquiries should be made to the unit convenor and come from your student email address with ELEC4150 in the subject line; otherwise they will not be answered.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released

directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

There are no changes from the previous offering except that all activities are now in person and back on campus.

Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO1, ULO2, ULO3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO1, ULO2, ULO3
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1, ULO2, ULO3
	1.4 Discernment of knowledge development and research directions	ULO1, ULO2, ULO3
	1.5 Knowledge of engineering design practice	ULO1, ULO2, ULO3
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO1, ULO2, ULO3, ULO4, ULO5
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1, ULO2, ULO3, ULO4, ULO5
	2.3 Application of systematic engineering synthesis and design processes.	ULO1, ULO2, ULO3, ULO4, ULO5
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	ULO1, ULO2, ULO3, ULO4, ULO5
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	

	3.2 Effective oral and written communication in professional and lay domains.	ULO5
	3.3 Creative, innovative and pro-active demeanour.	ULO1, ULO2, ULO3, ULO4
	3.4 Professional use and management of information.	ULO5
	3.5 Orderly management of self, and professional conduct.	ULO4, ULO5
	3.6 Effective team membership and team leadership	