UNSW Course Outline

ELEC3117 Electrical Engineering Design - 2024

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General Course Information

Course Code : ELEC3117
Year : 2024
Term : Term 2
Teaching Period : T2
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Electrical Engineering & Telecommunications
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate, Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Design is one of the critical foundations of engineering, requiring complex technical skills, creativity, project management, teamwork, as well as knowledge of professional ethical standards in design.

This design course caters for electrical engineering students. Students are required to design and build an electrical engineering project. This process will include producing specifications, detailed design, prototype production, and testing. The design will be pitched in a presentation that includes a needs assessment, requirements analysis, proposed design, business case and development plans. The design of the final prototype and working of the functional prototype will be demonstrated in a presentation while a formal technical report will be produced to document the final design details, product specifications, performance assessment and safety considerations. A final examination will delve into the intellectual property landscape and standards applicable in electrical engineering design.

The course contents include Design methodologies (systematic design procedures, documentation, reporting); Design project management (scheduling, costing, marketing, patents, electronic manufacturing methods); Designing for quality, innovation, manufacture, maintenance, minimum life cycle cost, standards and safety compliance; Aspects of electronic design (component selection, tolerances, passive component characteristics, EMC, earthing, PCB layout principles); Engineering drawing and graphical communications (projections, dimensioning, drawing interpretation).

Course Aims

The course aimes to:

1. Expose students to the practical and technical challenges of serious Electrical Engineering design.

2. Develop teamwork and project management skills.

3. Provide a practical context for learning in other courses, so as to cement practical skills in electronic circuit design and reinforce the importance of disciplines such as control, signal processing, embedded systems, etc.

4. Impart an appreciation for the broader aspects of design, including consumer needs, marketing, product economics, manufacturing, standards, intellectual property and systems thinking.

5. Further develop written and oral technical communication skills.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Demonstrate a systematic approach including initiating, designing and managing an electronic design project
CLO2 : Demonstrate software skills with project management, circuit schematic, and PCB design software
CLO3 : Work in a small development team to present a product proposal and write a formal project report.
CLO4 : Recognise the conditions under which it is important to conduct patent searches, file patents, follow and/or contribute to standards
CLO5 : Apply knowledge of manufacturing processes, electromagnetic compatibility, safety, and other areas to the design of quality products

Course Learning Outcomes	Assessment Item
CLO1 : Demonstrate a systematic approach including initiating, designing and managing an electronic design project	• Project Development Proposal • Project Seminar and Demonstration • Final Project Report
CLO2 : Demonstrate software skills with project management, circuit schematic, and PCB design software	• Project Development Proposal • Project Seminar and Demonstration • Final Project Report
CLO3 : Work in a small development team to present a product proposal and write a formal project report.	• Project Development Proposal • Project Seminar and Demonstration • Final Project Report
CLO4 : Recognise the conditions under which it is important to conduct patent searches, file patents, follow and/or contribute to standards	• Final Examination • Final Project Report
CLO5 : Apply knowledge of manufacturing processes, electromagnetic compatibility, safety, and other areas to the design of quality products	• Final Examination • Final Project Report

Learning and Teaching Technologies

Moodle - Learning Management System | EdStem

Other Professional Outcomes

The Course Learning Outcomes (CLOs) contribute to the Engineers Australia (National Accreditation Body) Stage I competencies as outlined below

Engineers Australia (EA), Professional Engineer Stage 1 Competencies

PE1: Knowledge and Skill Base:

PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals: CLO 1, 2, 3, 4, 5

PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing: CLO 1, 2,3,4,5

PE1.3 In-depth understanding of specialist bodies of knowledge: CLO 1, 2, 3, 4

PE1.4 Discernment of knowledge development and research directions: n/a

PE1.5 Knowledge of engineering design practice: CLO 1, 2, 3, 5.

PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice: n/a

PE2: Engineering Application Ability:

PE2.1 Application of established engineering methods to complex problem solving: CLO 1, 3, 4, 5, 6

PE2.2 Fluent application of engineering techniques, tools and resources: CLO 1, 2,3, 4, 5, 6

PE2.3 Application of systematic engineering synthesis and design processes: n/a

PE2.4 Application of systematic approaches to the conduct and management of engineering projects: n/a

PE3: Professional and Personal Attributes:

PE3.1 Ethical conduct and professional accountability: n/a

PE3.2 Effective oral and written communication (professional and lay domains): CLO 5, 6

PE3.3 Creative, innovative and pro-active demeanour: CLO 6

PE3.4 Professional use and management of information: n/a

PE3.5 Orderly management of self, and professional conduct: n/a

PE3.6 Effective team membership and team leadership: n/a

Additional Course Information

Pre-requisites and Assumed Knowledge

The pre-requisite for this course is ELEC2133, Analogue Electronics. It is essential that you have a reasonable background in Electronic Circuits before this course is attempted. It is further assumed that students have some familiarity with microcontrollers, as would be gained from ELEC2142, Embedded System Design, or similar.

Following Courses

The course is a pre-requisite for under-taking ELEC4951, Thesis A.

The following course in the design stream is ELEC4123, Electrical Design Proficiency - this is a core, Level 4 course. For students wishing to develop further in the entrepreneurial and small-business aspects should consider ELEC4445, Entrepreneurial Engineering, offered as a fourth-year technical elective

Learning in this course

Students are expected to attend all lectures and labs in order to maximise learning. The design project is at the centre of the course, and it is expected that it will require a significant amount of your time beyond the face-to-face scheduled class time (recall that the expectation for a 6 UoC course is that it would occupy 15 hours of student time per week). In addition to the lecture videos and notes, you should read widely from a variety of relevant sources - the lectures do not cover the specific technical details pertaining to your specific project, and you are expected to develop the skills to be able to research technical concepts independently. Reading additional texts will further enhance your learning experience. Group learning is also encouraged. UNSW assumes that self-directed study of this kind is undertaken in addition to attending formal classes throughout the course.

Lectures

Lecture videos posted on Moodle cover technical aspects of detailed design, as well as broader aspects of design, including marketing and economics. All material covered in the lecture videos is examinable, not just that which directly relates to student projects. Lecture videos and notes will constitute the reading material for each topic. By and large, the lecture notes are carefully prepared written materials, designed to be read.

Project/Laboratory program

The project is the major component of the work in ELEC3117. It represents over half of the total marks for the subject. Therefore, to do well in this subject you must do well in your design project. Failure to do so may result in a UF (Unacceptable Fail), even if your overall final mark is greater than 50%. This project requires much more than just designing and constructing an electronic circuit. It requires the consideration of a broad range of engineering and strategic business issues, such as target market, competition, costing, timing etc.

All laboratory sessions will be conducted in the laboratories in EE&T or online for online sections.

In the laboratory sessions in weeks 1 - 4 (labs once a week), your focus will be on designing your project while in weeks 5 - 10 (labs twice a week) on building your project. In the lectures in Weeks 1 - 5, you will participate in activities to assist you in your project planning.

Laboratory Exemption

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 must take the 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.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Project Development Proposal Assessment Format: Group	25%	
Project Seminar and Demonstration Assessment Format: Group	25%	
Final Project Report Assessment Format: Group	25%	
Final Examination Assessment Format: Individual	25%	

Assessment Details

Project Development Proposal

Assessment Overview

Teams will need to work together on their project idea and implementation plan in weekly project planning tasks that will be submitted and marked individually. These design tasks will include a needs assessment, product and design concepts, market assessment and analysis, economic and cost estimates, and development plans. The teams will then use feedback received on these tasks to develop a project pitch which they will deliver as a team in a formal oral presentation followed by a Q&A session, up to 30 minutes in duration. The pitch will be assessed based on the quality of the presentation, the viability of the product, and the development plan addressed specified requirements. Verbal feedback will be given. As the pitch is a culmination of work done over the previous weeks, the team evaluation will be moderated individually based on

performance in the weekly tasks and records of in-lab participation.

Course Learning Outcomes

- CLO1 : Demonstrate a systematic approach including initiating, designing and managing an electronic design project
- CLO2 : Demonstrate software skills with project management, circuit schematic, and PCB design software
- CLO3 : Work in a small development team to present a product proposal and write a formal project report.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Project Seminar and Demonstration

Assessment Overview

Each project team will be asked to demonstrate the progress made on their prototype in a laboratory session during the term. At the end of the term, they will give a final design presentation where they will highlight the design novelty and technical challenges faced as well as a demonstration of their prototype working. The assessment duration will be up to 30 minutes. The assessment will be marked as a group based on the quality of the presentation, the product novelty, and the working of the prototype. Verbal feedback will be given.

Course Learning Outcomes

- CLO1 : Demonstrate a systematic approach including initiating, designing and managing an electronic design project
- CLO2 : Demonstrate software skills with project management, circuit schematic, and PCB design software
- CLO3 : Work in a small development team to present a product proposal and write a formal project report.

Assignment submission Turnitin type

This is not a Turnitin assignment

Final Project Report

Assessment Overview

This is a group report on the final product design. The focus in the report is on describing the detailed design, prototype performance and the subsequent manufacturing/further development plan as well as the business plan. The report will be assessed based on the report structure, level of detail, completeness of the content provided, technical quality of the content, and

effectiveness of the presentation. The report appendices will also include a contribution breakdown detailing which team member was responsible for which section of the report and if any sections were completed jointly, specifies what percentage of that section was covered by each student, as well as the team's weekly in-lab participation records. The compiled report shall not exceed the sum of 15 pages per student (excluding appendices). As the assessment is a culmination of work done in the lab over the term, the team evaluation of the report will be moderated individually based on performance in the individual sections each student was responsible for and weekly records of in-lab participation.

Course Learning Outcomes

- CLO1 : Demonstrate a systematic approach including initiating, designing and managing an electronic design project
- CLO2 : Demonstrate software skills with project management, circuit schematic, and PCB design software
- CLO3 : Work in a small development team to present a product proposal and write a formal project report.
- CLO4 : Recognise the conditions under which it is important to conduct patent searches, file patents, follow and/or contribute to standards
- CLO5 : Apply knowledge of manufacturing processes, electromagnetic compatibility, safety, and other areas to the design of quality products

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final Examination

Assessment Overview

The exam in this course will be a take-home open-book written examination. The examination focuses on the important aspects of the course curriculum that are difficult to cover through a student project – technical aspects such as electromagnetic compatibility and manufacturing limitations, as well as the important non-technical aspects of engineering design, such as patents, quality, safety, and standards. Marks will be assigned according to the correctness of the responses.

Course Learning Outcomes

- CLO4 : Recognise the conditions under which it is important to conduct patent searches, file patents, follow and/or contribute to standards
- CLO5 : Apply knowledge of manufacturing processes, electromagnetic compatibility, safety, and other areas to the design of quality products

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 20 May - 26 May	Activity	Select project partner and discuss project options.
Week 1 : 27 May - 2 June	Activity	Weekly activities related to market assessment
Week 2 : 3 June - 9 June	Activity	Weekly activities related to concept generation
Week 3 : 10 June - 16 June	Activity	Weekly activities related to high level technical design
Week 4 : 17 June - 23 June	Activity	Weekly activities related to business case and project planning
Week 5 : 24 June - 30 June	Presentation	Project pitch
Week 7 : 8 July - 14 July	Assessment	Design progress review
Week 10 : 29 July - 4 August	Assessment	Final project demonstration
Week 11 : 5 August - 11 August	Assessment	Final report

Attendance Requirements

You are required to attend all lectures and laboratories. Attendance WILL be kept, and you MUST attend at least 80% of the lectures and laboratory sessions.

Course Resources

Prescribed Resources

There are no required texts for this course. If there were one, it would be the first text from the following list of recommended books:

Recommended Resources

K.T. Ulrich and S.D. Eppinger, Product Design and Development, McGraw-Hill, 2000 (2nd edition). This book provides a good overview of the design process with a number of relevant case studies to illustrate the methods discussed. It includes sections on product costing and project management, as well as methodologies for market analysis and concept generation. This text is easy and enjoyable to read and may be purchased from the UNSW bookstore. However, it does not touch on the details of electronic design, or a number of other topics covered in the course.

This book covers key aspects of design at a high level, but with quite a few examples. Strong on user needs/requirements and high level design. Covers a variety of design approaches, project management, and costing issues. This text is easy to read and may be purchased from the UNSW bookstore. However, it does not touch on the details of electronic design, or a number of other topics covered in the course.

P. Horowitz and W. Hill, The Art of Electronics, Cambridge University Press, 1989 (2nd edition). This book is an excellent reference for electronic design issues that may be required to complete your project.

D. A. Norman, The Design of Everyday Things, Currency-Doubleday, 1990. A very interesting read. Ever wondered why you just walked into a door, or tried to pull a sliding door? This book discusses the design of the everyday objects that we take for granted.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Beena Ahmed		EE&T 444 or Teams	61293854026	Wednesday 1-3 pm	No	No
Demonstrator	Jayden Moor e		Teams			No	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;

- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

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.

Use of AI for assessments

Your work must be your own. If you use AI in the writing of your assessment, you must acknowledge this and your submission must be substantially your own work. More information can be found on this website.

Workplace Health & Safety (WHS)

WHS for students and staff is of utmost priority. Most courses involve laboratory work. You must follow the rules about conduct in the laboratory. About COVID-19, advice can be found on this website.

School Contact Information

Consultations: Lecturer consultation times will be advised during the first lecture. You are welcome to email the tutor or laboratory demonstrator, who can answer your questions on this course and can also provide you with consultation times. ALL email enquiries should be made from your student email address with ELEC/TELExxxx in the subject line; otherwise they will not be answered.

Keeping Informed: Announcements may be made during classes, via email (to your student email address) and/or via online learning and teaching platforms – in this course, we will use Moodle https://moodle.telt.unsw.edu.au/login/index.php. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Student Support Enquiries

For enrolment and progression enquiries please contact Student Services

Web

Electrical Engineering Homepage