ELEC/TELE/PHTN4123
Design Proficiency
Course Outline – Semester 1, 2015

Never Stand Still | Faculty of Engineering | School of Electrical Engineering and Telecommunications

Course Staff

Course Convener: Dr. Elias Aboutanios Room 308 elias@unsw.edu.au
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Consultations: You are encouraged to ask questions on the course material. The lectures, tutorials and labs are the primary avenues of contact between the teaching staff and the students. In particular the lectures and tutorials will provide adequate opportunity for discussion. You are also encouraged to take advantage of the discussion fora that will be provided to you on Moodle. Therefore, no regular consultation hour will be allocated. If these channels prove inadequate for your concern, further consultations could be arranged by appointment. Students should then contact the lecturer via email to set up an appointment. ALL email enquiries should be made from your student email address with ELEC/TELE/PHTN4123 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.

Being Engaged: Discussion fora will be set up on Moodle and you are strongly encouraged to take full advantage of them. They will allow you to discuss topics relevant to the course, share ideas and enhance your experience of the subject. Additionally, you are strongly encouraged to ask questions and contribute to discussions on Moodle. You will then benefit from the contributions of others just as other benefit from your contributions.

Course Summary

Contact Hours

The contact hours for this course comprise a three-week cycle that repeats for each design task. Apart from the initial introductory lecture, course consists of 1 hour of lectures, a 1-hour tutorial, and a 2-hour laboratory session each week.

	Days	**Time**	**Location**
Lectures	Monday	1 - 2pm	CLB7
Tutorials	Monday	1 - 2pm	CLB7
Labs	Wednesday	9am - 12 noon	ElecEng Rooms 101, 102, 113, 114, 125

Context and Aims

Although the theoretical skills and knowledge base that students acquire during their time at university form a strong foundation for their future careers, companies have naturally been placing particular emphasis on the design skills of our graduates. The goal of this subject is to allow

students to demonstrate their ability to integrate the various concepts (the theoretical foundations) they have acquired during the first three years of their degree and apply them to carry out practical design. In addition to assessing their design skills, this course gives students the opportunity to identify, with the help of the teaching staff, weak points they might have in the streams being examined and provides them with a chance to mend those shortcomings. The aims of the course are:

1. Provide students with a realistic design experience.
2. Ensure students' problem solving and design skills are adequate and to the level desirable for a graduate engineer.
3. Give students the opportunity to address weaknesses in their design skill base and to advance this skill base.
4. Prepare students for the transition from the learning environment to the professional setting where these design skills are essential.

Indicative Lecture Schedule

Week	**Date**	**Activity**
Week 1	Mon, 2 March	Introductory Lecture
Week 2	Wed, 11 March	Lab 1 - Preliminary Lab
Week 3	Mon, 16 March Wed, 18 March	Tutorial 1 Lab 1 - Open Lab
Week 4	Wed, 25 March	Lab 1 - Open Lab
Week 5	Wed, 1 April	Lab 1 - Assessment Lab
Break		
Week 6	Mon, 13 April Wed, 15 April	Feedback Lecture 1 Lab 2 - Preliminary Lab
Week 7	Mon, 20 April Wed, 22 April	Tutorial 2 Lab 2 - Open Lab
Week 8	Wed, 29 April	Lab 2 - Assessment Lab
Week 9	Mon, 4 May Wed, 6 May	Feedback Lecture 2 Lab 3 - Preliminary Lab
Week 10	Mon, 11 May Wed, 13 May	Tutorial 3 Lab 3 - Open Lab
Week 11	Wed, 20 May	Lab 3 - Assessment Lab
Week 12	Mon, 25 May Wed, 27 May	Feedback Lecture 3 Supplementary Lab - Preliminary Lab
Week 13	Mon, 1 June Wed, 3 June	Tutorial (Supp) Supplementary Lab - Assessment Lab

Course Details

Credits

This is a 6 UoC course and the expected workload is 10–12 hours per week throughout the 13 week semester. The University defines a UoC as requiring 25 hours of total learning effort per semester (spread over lectures, tutorials, labs, and the student's own study time.) Therefore, it is expected that 150 hours will be allocated to this course. Counting the laboratories (approx. 44 hours per semester), tutorials (4 hours), Lectures (4 hours) gives a total of approximately 50 formal contact hours. The students should then allocate around 8 additional hours per week to the subject. This is in line with the expectation of 2 hours of study for every hour of formal contact.

It is important to put the effort required into its proper context. Unlike other subjects, the work for this subject is essentially concentrated over 3 labs, and hence over 6 weeks. There is no final exam and satisfying the pass criteria for the four labs means the student has completed the course. Therefore, while the course may seem to require significant effort on the part of the student, it is still on par with other courses in terms of the total effort over the entire semester.

Relationship to Other Courses

This is a fourth year core subject that has all of the third year core subjects as pre-requisites. Coming into the course, students should already have had significant experience in design from the first year ENG1000 subject and third year course ELEC/TELE/PHTN 3117. This course is not concerned with teaching the design process itself, nor the basic theories and concepts of any of the streams listed above. Instead, the combination of the student's theoretical knowledge in these areas and their design skills will be assessed. Consequently, this course is quite significant in preparing the student for the step from university life to the professional environment. Furthermore, this course is different from the thesis as each design task has a narrow scope, and is targeted at specific areas of proficiency that will have high relevance to the Electrical Engineering profession.

It is important to note that students will be required to go beyond their existing knowledge in solving problems. Thus, they must be able to extend their knowledge base through adequate research to pick up new areas as may be necessary in order to tackle the design tasks.

Pre-requisites and Assumed Knowledge

The pre-requisites for this course include all of the third year ELEC and TELE subjects. The course tests students on combinations of topics from a list of six different sub-disciplines of ELectrical Engineering. These are: Electronics, Signal Processing, Control, Power, Communciations, and Networking. The course does not make any explicit attempt at teaching students these topics. Instead students will be tested on their ability to understand design requirements, identify gaps in their knowledge, carry out the necessary research to fill those gaps, devise a suitable solution that meets the requirements, and implement and test it. Therefore, the basics of the topics listed above are assumed to be prior knowledge.

Learning outcomes

As previously explained, this course is designed to test students' design skills. Upon the successful completion of the subject, students will

1. Have shown their capacity to successfully harness their technical knowledge to carry out meaningful design tasks in a subset or all of the competency streams listed above.

2. Have identified and corrected any issues or failings that were identified in their knowledge base.
3. Be able to identify the design requirements and the relevant concepts and resources in order to successfully reach the design goals.
4. Be in a position to make a positive contribution to the workforce as a professional Electrical engineer.

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. In particular, the teaching methods and learning outcomes are designed to strengthen the following graduate attributes:

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

Teaching Strategies

Delivery Mode

The laboratories will form the primary method of instruction for this course. These will be supported by tutorials and lectures as needed. During the lab session, students will be guided and supported by the lab demonstrators (but only to the extent of maximising the benefit from the teaching activities and not in developing the design solution). 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 that a realistic work environment where the engineer must have the fundamental knowledge and design skills but is able to solicit general guidance will be emulated.

The teaching methods adopted are optimised to ensure the aims and learning outcomes of the course are achieved. These include:

1. Design tasks that are formulated to enable students to combine their theoretical knowledge acquired from the technical subjects with their design skills obtained from ENG1000 and ELEC/TELE3117.
2. Assessment targetted at evaluating the students' abilities and identifying weaknesses in their skill base.
3. A schedule that gives students the opportunity to address those weaknesses and attempt the assessment a second time.
4. A laboratory organisation that in addition to the evaluation of the design process, permits students to improve their presentation and communications skills as well as their sense of working in an engineering community.
5. Tutorial classes aimed at assisting students in the design tasks.
6. Lectures to give feedback on the completed design task.

7. Various channels (such as fora on Moodle, and face to face consultation by appointment) that allow students to seek assistance should the formal teaching methods prove insufficient.

Learning in this Course

You are expected to attend all lectures, tutorials, labs, and mid-semester exams in order to maximise learning. You must prepare well for your laboratory classes and your lab work constitutes the assessment for this course. You are expected in this course to be self-reliant and to undertake your own study and research in order to successfully undertake the design tasks. Group learning is also encouraged. UNSW assumes that self-directed study of this kind is undertaken in addition to attending face-to-face classes throughout the course.

Assessment

The assessment consists solely of the lab exams and there is no final examination. The three labs are of equal value and together add up to the total of 100% for the subject. Although each lab is marked out of 100, marks will not be released for the labs during the semester. Instead, feedback will be given in the form of grades according to table 1. A student must pass each of the labs individually to pass the subject (that is no grade of poor can be obtained on any lab.) However, it is important to note that the subject has a built-in supplementary. If a student fails a single lab, they will repeat it during the supplementary. If they pass it, they will pass the subject. The final mark of a student repeating a lab will be capped at 65% for that lab. A student with a failed lab at the end of the semester may be granted a supplementary lab at the lecturer's discretion. Finally, a student receiving two grades of poor (or more) for the individual labs will fail the subject regardless of the final mark (a UF will be awarded to the student).

Table 1: Course and Lab Grading

Marks Range	Grade
$<$50%	Poor
50-64%	Average
65-74%	Good
75-84%	Very Good
$\geq$85%	Excellent

Relationship of Assessment Methods to Learning Outcomes

	Learning Outcomes			
Assessment	**1**	**2**	**3**	**4**
Main Laboratory Assessments	✓	✓	✓	✓
Supplementary Laboratory Assessments		✓	✓	✓

Course Resources

On-line resources

Moodle

As a part of the teaching component, Moodle will be used to disseminate teaching materials, host forums and occasionally quizzes. Assessment marks will also be made 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: 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://my.unsw.edu.au/student/atoz/ABC.html), and particular attention is drawn to the following:

Workload

For a standard course, 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 (which equates to about 150 hours in total for the course). 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.

This course, however, is unique in that there is no final exam and the workload is concentrated over a few weeks of the semester. To put it in perspective, there are three labs, and the bulk of the work takes place in the two weeks spanning each task (the first lab is spread over three weeks). Therefore, a lab is one third of the course, around 40 hours should be allocated to it. Taking the 12 hours of lab sessions and 2 hours of classes (1 tutorial and 1 feedback), leaves 26 hours of work that you should do on your own per lab. This is 13 hours per week per lab for the labs that span two weeks. This is a high load that is concentrated, which means that you should plan properly to avoid it impacting on your other courses.

Attendance

Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes they may be refused final assessment.

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. <You should insert here changes made to the current version of the course in response to previous feedback>

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: <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.

<more detail: https://my.unsw.edu.au/student/atoz/GraduateAttributes.html – please consult this particularly if your course develops skills in team work, leadership, design (innovation and creativity), ethics or communication skills>

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

	Program Intended Learning Outcomes	
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	✓