UNSW AUSTRALIA

ELEC 9123
Design Proficiency
Course Outline – Semester 2, 2016

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

Course Staff

Course Convener: Dr. Georgios Konstantinou
Lecturer
School of Electrical Engineering and Telecommunications &
Australian Energy Research Institute
Room 325, Tyree Energy Technologies Building (H6)
e-mail: g.konstantinou@unsw.edu.au

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 ELEC9123 in the subject line, otherwise they will not be answered.

Preliminary consultation times for the course are: **Monday and Wednesday, 10:00 am to 11:00 am.**

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 lecture/laboratory. 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.

Lectures	Day	Time	Location
All weeks	Tuesday	2pm - 5pm	ElecEng 101-102-125
Open Labs	TBA	TBA	TBA

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 Lecture Schedule

Period	Summary of Lecture Program
Week 1	Introduction & Analogue and digital circuit design
Week 2	Analogue and digital circuit design
Week 3	Analogue and digital circuit design
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
Week 9	Signal Processing + Control Systems
Mid - semester break, 26 Sept - 3 Oct	
Week 10	Signal Processing + Control Systems
Week 11	Signal Processing + Control Systems
Week 12	Laboratory Design Exam
Week 13	Catch-up or repeat design

Assessment

Pre-requisites to pass the course

The assessment consists solely of the lab work and there is no final examination. Each of the three labs is worth 25% and a pass mark (12.5%) must be obtained for each of them for the student to pass the subject. A student is allowed to fail only one lab in the regular part of the course. In this case, the student will get a chance to undertake a supplementary lab in the last week of the semester (on Week 13). If the student then performs satisfactorily, he will get a mark of 12.5%. Therefore, for the failed lab, the student's maximum attainable mark reduces by 12.5%.

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, 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% of the total mark of each design task.

Laboratory Practical Experiments and Experiment Log	75%
Lab Exam	25%

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. 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:

LO1: Have shown their capacity to successfully harness their technical knowledge to carry out meaningful design tasks in each of the competency streams.
LO2: Have identified and improved any issues related to their knowledge base.
LO3: Be able to identify the design requirements and the relevant concepts and resources in order to successfully reach the design goals.
LO4: 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

Delivery Mode.

The laboratories will form the primary method of instruction for this course. The students are expected to prepare for each of the design lab sessions prior to arriving at the laboratory. During the lab session, they 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 the 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.
- Lectures/demonstrations to provide feedback on the completed design task.
- 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 would have regular feedback sessions with your lecturer at the start of each new lab design, for a face-to-face discussion. Furthermore, you would have the option of attending an open laboratory session should you need extra time to complete your laboratory's task.

Assessment

The assessment consists solely of the lab work and there is no final examination. Each of the three labs is worth 25% and a pass mark (12.5%) must be obtained for each of them for the student to pass the subject. A student is allowed to fail only one lab in the regular part of the course. In this case, the student will get a chance to undertake a supplementary lab in the last week of the semester (on Week 13). If the student then performs satisfactorily, he will get a mark of 12.5%. Therefore, for the failed lab, the student's maximum attainable mark reduces by 12.5%.

Laboratory Exam

To check that you have achieved the practical learning outcomes for the course, you will be examined in the laboratory. Laboratory Exam is a practical exam that includes your knowledge of previous designs and

analytical calculations. The exam questions will be based on what you have learned in your laboratory classes and lectures, and marks will be awarded for the correct understanding of practical and relevant theoretical concepts, correct operation of laboratory equipment, and correct interpretation of measured results.

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

	Learning Outcomes			
Assessment	**LO1**	**LO2**	**LO3**	**LO4**
Laboratory practical assessments	✓	✓	✓	✓
Lab exam	✓	✓		

Course Resources

Textbooks

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 of the six seminars expected. However, if you are unable to attend part or a whole seminar due to scheduling conflicts or work, you should notify (preferably via e-mail) the course convener ahead of time and discuss how to address these issues.

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.

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.

Based on the feedback from the last two years,**for Semester 1, 2016** the following changes have been implemented:

1. The face-to-face lectures have been increased from three to six.
2. The presentation session for the reports of Assessment Task 4 has been reintroduced.

3. The number of reports during the semester has been reduced from five to three and their weight on the mark has increased from 7% to 10%. This change is also reflected in the requirements for the report.
4. Suggested video material has been introduced for the course. This is not a recording of the lectures but presentations from experts on the various topics of the smart grid.
5. The choice of topics for Assessment Task 5 has been removed and all will be working on a common topic, the Smart Grid, Smart City report.

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.

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	✓