School of Electrical Engineering and Telecommunications

Term 2, 2020
Course Outline

ELEC4952
Research Thesis B

COURSE STAFF

Project supervisor:	To be nominated by the student (together with thesis topic)
Project coordinator:	Dr. Aron Michael, EE 316, a.michael@unsw.edu.au

Consultations: About the Project work, technical inquiries should be directed to the Project supervisor whereas general administrative inquiries should be directed to the Project coordinator. All email enquiries should be made from your student email address with ELEC4952 in the subject line; otherwise they will not be answered.

Keeping Informed: Announcements may be made 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. The Moodle name of this course is: ELEC 4952/9452 Research Thesis/Master Project B T2/2020.

COURSE SUMMARY

Contact Hours

The Project consists of regular online meetings with the supervisor, typically about 30 minutes weekly. In addition, the Project usually involves experimental work and thus requires laboratory assistance from the supervisor and/or technical staff.

Context and Aims

This course is normally undertaken in the second term of the last year of the ME (BE-ME) degree program. Its purpose is for students to undertake directed laboratory and research work on an approved topic under the guidance of an academic supervisor.
The Project provides an opportunity for the student to bring together engineering principles learned over their previous years of study and apply these principles to innovatively solve problems such as the development of a specific design, process and/or the investigation of a hypothesis. Thesis projects must be complex, open-ended problems that provide room for student creativity, and the acquisition, analysis and interpretation of results. There must be multiple possible solutions or conclusions at the outset and sufficient complexity which requires a high degree of project planning from the student. The Project requires students to formulate problems in engineering terms, manage engineering projects and find solutions by applying engineering methods. Students also develop skills to work in a research and developmental environment
The Project provides a good introduction to work in industry and research and serves as an important indicator of how well students can utilize and integrate the knowledge and skills they have learnt throughout their program.

Schedules

Period	Activity
	▪ Student will continue working on the same Project topic as in Project A with the same supervisor ▪ Weekly online meetings during the term with supervisor for technical guidance on Project work ▪ Laboratory work during the term subject to arrangement with technical staff
Week 1	▪ Online meeting with supervisor to discuss plan and update progress
Week 1-4 (Week 1-2)*	▪ Provide Project details for each assessment via Moodle course page 'ELEC4952/9452 Research Thesis/Master Project B T2/2020' o For start, provide general Project topic, your name and supervisor's name. Project topic has already been finalised in Project A. o The details should be provided for each assessment. In this course, the assessments are PART B REPORT ASSESSMENT and PART B PARTICIPATION EFFORT o To provide the details for PART B REPORT ASSESSMENT, follow the steps below ▪ Go to Project B REPORT (click to expand the section) ▪ Click on PART B REPORT ASSESSMENT o To provide the details for PART B PARTICIPATION EFFORT, follow the steps below ▪ Go to Project B Report (click to expand the section) ▪ Click on PART B PARTICIPATION EFFORT
Week 5 (Week 3) *	▪ Submit progress report by Thursday 5pm – July 02, 2020 (June 18, 2020) *
Week 6-10	▪ Meet with supervisor and keep meeting log sheet
Week 10	▪ Submit a three-page report on your progress since submitting progress report including the online meeting log sheet by Thursday 5pm – August 06, 2020. To submit, follow the steps below ▪ Go to Project B Report (click to expand the section) ▪ Click on PART B PARTICIPATION EFFORT

*for those doing B and C together

Assessments

1. Progress report 50% weighting
2. Participation effort 50% weighting

COURSE DETAILS

Credits

This is a 4 UOC, level 4 course. It is important to note that in the WAM (Weighted Average Mark) calculation for awarding Honours degree, the weighting applied makes it equivalent to 1.8 UOC, level 4. The expected workload is 10 hours per week throughout the 10-week term.

Relationship to Other Courses

This is a postgraduate core course for students following a ME or BE ME in Electrical or Telecommunications program in the EE&T School and other combined degree programs. This course constitutes the second part (Project B) of the three-part project work (Project A, B and C). It involves completing preliminary work, producing initial results from the execution of the main task, acquiring high level of skills in using software and hardware (tools or equipment) relevant to the project, and revising research plan in the context of preliminary work. This prepares the student for the detailed project work that will be undertaken in Project C in the following subsequent term.

Pre-requisites and Assumed knowledge

The pre-requisite for this course is ELEC9451.

Following Courses

The course can be a pre-requisite or a co-requisite for ELEC9453. When it is a pre-requisite, ELEC9453 must be taken in the immediately following term. When it is also a co-requisite, ELEC9453 will be taken in the same term.

Learning outcomes

At the conclusion of this course, students should be able to:

1. Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.
2. Critically reflect and acquire the required skills on the chosen topic area as the basis for demonstrating a clear understanding of the engineering problem that they are trying to solve and thus developing their own design or process as a possible solution to the problem.
3. Apply scientific and engineering methods to solve an engineering problem. Complete preliminary work, propose solution, and produce initial results, e.g preliminary design
4. Analyse data objectively using quantitative and mathematical methods.
5. Demonstrate written communication in professional and lay domains through a progress report on their research topic outlining the acquired skills, selected methodology or solution and detailed plan that will be used in Project Part C.

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

On completion of Project A, students will have gained detailed background knowledge of the chosen topic area, acquired preliminary skills, proposed solution and formulated initial plan. These initial research tasks will be used as a basis for further developing their skill, refining their solution, and revising their research plan in Project B. The course will also allow students to reflect on their progress including their research experience in Project A. Students will produce a mid-term progress report to outline their progress and demonstrate their development. In addition to completing preliminary work required for the research task, students are also expected to begin working on the execution of the main task in this course. As a way of demonstrating their progress in this regard, student's participation effort will be key and assessed in the form of regular weekly online meetings with supervisor and regular weekly submissions of a three-page update report.

Teaching Strategies

Delivery Mode

- Regular weekly online meetings between supervisor and student – to discuss and advise on the Project work.
- Laboratory access throughout the semester – for students to carry out practical design and development work with some assistance from technical staff

Learning in this course

The project gives you the opportunity to take on a project on your own, to produce a self-contained and rounded piece of work and write it up for others to assess and use. While the project is yours alone, you will need to obtain advice, information and assistance from others, for example your supervisor, technical officers responsible for laboratories, or computing and workshop staff.

While a majority of the design and synthesis tasks will be carried out in the third term (Project C), it is important that you take full advantage of time in the second term to complete preliminary works, refine your solution, formulate detailed plan, and begin the design and synthesis tasks.

Regular online meetings with your supervisor are important not only because one of the assessments in this course is participation effort but also to check what you are doing is indeed what is required. If you want to contact your supervisor outside a regular online meeting time, leave a message arranging a time to meet. Pre-arranged consultations are often more effective, check contact details on the School website.

Having completed Project Part A, at this stage you should have preliminary idea what you are going to do, and what tasks have got to be performed on the way to achieving your goal. In this Project part B, you will further develop the preliminary idea into a clear idea and refine the research tasks to set achievable milestones and solid plan towards accomplishing your objectives. Moreover, you will be expected to begin executing the main task of the project in this Project part B.

Once the research tasks are refined, careful and detailed planning is an important task in this course. The time duration of each task should be carefully checked to ensure if it is realistic and, in particular, allows sufficient time for tasks that are critical for the success of the project. For example, ordering components or equipment construction by the workshop, access to state-of-the art research facilities may have particularly time implications you need to be well aware of. There may be significant lead time with component delivery. Workshop time is always limited and long delays are frequently experienced and therefore it is important to get drawings to the workshop as soon as possible. Access to research facility often requires laboratory inductions and extensive training. Discuss these issues with your supervisor to draw up realistic and time efficient plan.

ASSESSMENT

Assessment is based on evaluating the student's work through the progress report (50%) and participation effort (50%). The assessments will be carried out by the **thesis supervisor only**.

It is intended that Project B covers completing preliminary work that was started in Project A to acquire and demonstrate the required skills, detailed and revised planning, refining solution (methodology) and initial work into executing the main task. To measure these achievements through the progress report, the marking breakdowns are: (i) 60% for completing preliminary work, refining solution (methodology) and producing initial results from project execution; (ii) 15% for detailed and revised project planning; (iii) 15% for reflection on progress including the research tasks and experience in Project A; (iv) 10% on the presentation.

The progress report is to be submitted by **5pm, Thursday week 5 of term 2**. For those doing B&C together, the progress report must be submitted by **5pm, Thursday week 3 of term 2**. This is done by uploading the report via Moodle as a pdf formatted file. The progress report must be individually written even for cases where a group of students work on the same topic. If your supervisor or assessor specifically requests a printed copy of your report, please make one and hand it to them directly (but you still also need to upload your report).

The marking of the participation effort is based on: (i) student's attendance at lab and meetings throughout the term, levels of intellectual contribution (e.g. did the student come up with ideas), examination of relevant documentation (project diary, student's lab book detailing experiment activities or measurement records), etc; (ii) submission of a three-page report and meeting log sheet in week 10.

The three-page report and meeting log sheet are to be submitted by 5pm in week 10. This is done by uploading the report via Moodle as a pdf formatted file. The weekly update report must also be individually written even for cases where a group of students work on the same topic. If your supervisor or assessor specifically requests a printed copy of your report, please make one and hand it to them directly (but you still also need to upload your report)

It is most important to note that Project B is not just about completing preliminary work but also producing initial results from the execution of the main task. Students must demonstrate real progress in the project with tangible project deliverables. It is also expected that students have already undertaken and completed the literature review in Project A, and the literature review should not be the focus of Project B.

Policy for lateness

The penalty is detailed below:

- For Project progress report – 5 marks off the *Project* for every day late. Penalty applies until the marks for the *course* decrease to 50, and further lateness does not result in failure of the *course*, but might be a

failure of the Project (weekends count as days). Any Project report not turned in within 6 weeks after the deadline will be finalised at zero (0) marks.

- For participation effort – 1 mark off the participation mark for every day late submission of three-page weekly update report.

In all cases, applications for late submission can be applied for BEFORE the due date. This is at the discretion of the thesis coordinator but should only be granted in exceptional circumstances. As per normal, students can also apply through myUNSW for special consideration.

Relationship of Assessment Methods to Learning Outcomes

	Learning outcomes				
Assessment	**1**	**2**	**3**	**4**	**5**
Written report	✓	✓	✓	✓	✓
Participation effort	✓		✓	✓	✓

COURSE RESOURCES

Recommended texts(s)

Reading materials are specified by the supervisor (related to particular Project topic).

On-line Resources

Moodle

As a part of the teaching component, Moodle will be used to disseminate materials, host forums: https://moodle.telt.unsw.edu.au/login/index.php. All information about this course is available from this link which is regularly updated.

Mailing list

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

ADDITIONAL INFORMATION ABOUT THE PROJECT

Progress report

A written report should not be more than 5000 words. This is to be submitted in **week 5 (Thursday 5pm)**, by uploading the report as one single pdf formatted file. **For those who are doing Project B and C together, the due date for submitting the report will be in week 3 (Thursday 5pm)**. The file to be submitted should include, as the first page, a scanned image of the report cover sheet. The report cover sheet can be downloaded from the course web site. The report must also include an Appendix for a scanned copy of the completed Risk Assessment Form. This could be the same as what you included in Project A report. If using double space and size 12 font, a typical report is about 15 to 25 pages (everything included: graphs, figures, diagrams, attached forms).
As with the seminar, the report should contain the following elements:

- Abstract / Table of contents / Introduction / Body / Conclusion (these do not necessarily constitute Chapter titles).
- Description and analysis of preliminary work – although much of the design and synthesis will be carried out in Project C, it would be expected that preliminary work would be carried out and completed in Project B.
- Detailed and revised planning - timetable schedule for work in the remaining Project B and Project C in the following term. This should be more than just a simple Gantt chart. This should include (i) description of the tasks required to be carried out in Project B and C; (ii) why the tasks and how they relate to each other and the end goal; (iii) discussion on the expected results; (iv) discussion on possible perceived problems or risks you may encounter which could change the schedule and planned work, and any contingency plan if required;
- Reflection on progress – it is important to reflect on the progress so far made including the research tasks and experiences in Project A. You are expected to: (i) compare and contrast the Project with your other experiences such as industry or other courses; (ii) address how the experience helps you to expand your knowledge and

understanding of the field; (iii) evaluate changes in learning through Project recognising complex contextual factors (such as working with ambiguity and risk and deal with frustration); (iv) demonstrate self-awareness and develop plans that build on the research experience.

The report must be individually written even for cases where a group of students work on the same topic. Submission is via Moodle.

Three-page report

A three-page report should be submitted on Thursday 5pm in **week 10** by uploading a pdf formatted file. This file should include a meeting log sheet as an additional attachment. This applies to those who are doing Project B and C together.

There are no any particular formats for the three-page report and meeting log sheet. The report should be able to show the progress that has been made since progress report and may

- Be related to the milestones in your detailed plan and/or
- List and explain the tasks you have conducted since last submission.

The report must be submitted individually even a group project. Submission is via Moodle.

If Things Go Wrong

If you start having serious problems, don't ignore them or stop working; the problems won't go away. Talk over your worries with your supervisor to see what you can do to get going again. If you are still not able to resolve the problems, then see the Thesis Coordinator, the Director of Academic Studies in EE&T or the Student Counselling and Careers Unit. The Learning Centre also offers advice and support on these matters. Often some advice or perhaps reducing the scope of the project can get you working effectively for the rest of the year.

OTHER MATTERS

Dates to note

Important Dates available at: https://student.unsw.edu.au/dates

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://student.unsw.edu.au/guide), and particular attention is drawn to the following:

Workload

It is expected that you will spend at least **10 hours per week** studying a 4 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

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 Behavior

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 can apply for special consideration when illness or other circumstances beyond your control interfere with an assessment performance. If you need to submit an application for special consideration for an exam or assessment, you must submit the application **prior to the start** of the exam or before the assessment is submitted, except where illness or misadventure prevent you from doing so. Be aware of the "fit to sit/submit" rule which means that if you sit an exam or submit an assignment, you are declaring yourself well enough to do so and cannot later apply for Special Consideration. For more information and how to apply, see 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 online student survey myExperience. You can also provide feedback to ELSOC who will raise your concerns at student focus group meetings.

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:
https://student.unsw.edu.au/guide
https://www.engineering.unsw.edu.au/electrical-engineering/resources

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, mostly through self-study with little guidance from staff.
- Developing rigorous analysis, critique, and reflection, and ability to apply knowledge and skills to solving problems encountered in the course of Project work.
- Developing capable independent and collaborative enquiry, through self-study and information gathering spanning the duration of the course.

- Developing digital and information literacy and lifelong learning skills through the literature review and selective gathering of background technical information required for the project.
- Developing ethical practitioners who are collaborative and effective team workers, through group activities, seminars.
- 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	