School of Electrical Engineering and Telecommunications

Term 1, 2021
Course Outline

ELEC9771
MEngSc Project Part A

1. Course Staff

Project supervisor: Students should nominate

Project coordinator: Dr. Hassan Habibi Gharakheili, Electrical Engineering Building rm 417, h.habibi@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 ELEC9771 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: ELEC9771(MEngSc Project Part A) T1/2021.

2. Course Summary

Contact Hours

The project will be undertaken in groups (3-4 students) and consists of regular meetings with the supervisor as a group, typically about 30-60 minutes weekly. An individual group meeting by the team members is mandatory every week for one hour, which needs to be recorded for assessment purposes. In addition, the project usually involves experimental work and thus requires remote laboratory assistance from the supervisor and/or technical staff.

Context and Aims

The Master of Engineering project is undertaken in the first or second term of the final year of the 2-year MEngSc. The course, MEngSc Project A, is the first part of the project. 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. The projects must be complex, open-ended problems that allow 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 that requires high degree of project planning from the student. The project requires the student to formulate problems in engineering terms, manage an engineering project and find solutions by applying engineering methods. Students also develop skills that enable them to work in a research and development environment. As this is a group thesis, students should discuss how each one in the group would make individual contribution to the problem solution. This should be clearly identified and documented in the written report.

As a Masters (Postgraduate) level project, it is expected that the outcomes and standard of work undertaken in the MEngSc project is of a more advanced level than that during a final year undergraduate thesis.

Assessment

1. Report - Satisfactory/Unsatisfactory by Project Supervisor
2. Risk management and ethics approval if required

Schedule

Period	Activity
	▪ Prior to start of the term, students form the group, selects project topic and gets approval from supervisor. If unable to form the group or/and take approval from a supervisor, the students cannot take the project and should apply for project substitution. ▪ Weekly meetings during the term with supervisor for technical guidance on project work (typically 1 hour). ▪ Individual team meetings with the group members for 1 hour every week. The meeting minutes must be recorded and submitted to the supervisor for assessment. ▪ Laboratory work during the term subject to arrangement with technical staff.
Week 1	▪ 4pm Friday: deadline for registering your thesis topic and supervisor name via Moodle portal 'EET School Thesis/Project' ▪ Meet with the supervisor to discuss: (i) problem statement, (ii) methodologies/hypothesis, (iii) software/hardware requirement, (iv) keywords for literature review. ▪ Meet with the team to: (i) understand problem statement, (ii) assign responsibilities for each team member, (iii) commence learning the required software, (iv) plan for lab access where required, (v) record the team meeting minutes and duration of the meeting (min 1 hour). ▪ Enter the details in the EET database ▪ Read the course outline ▪ Commence working in the research direction.
Week 2	▪ Meet with the supervisor to: (i) discuss refining problem statement, (ii) discuss methodologies/hypothesis, (iii) report at least one key literature (iv) discuss unique scope for individual team member, (v) organise lab access where required. ▪ Meet with the team to: (i) reflect on the feedback from the supervisor (ii) discuss methodology to address individual scope (iii) continue learning the required software, (iv) plan schedule for joint lab work where necessary, (v) record the team meeting minutes and duration of the meeting (min 1 hour). ▪ Continue working in the research direction and set the initial milestones.

Weeks 3-10	▪ Meet with the supervisor to discuss: (i) milestones achieved (ii) bottlenecks/concerns (iii) findings from the experimental / software simulation, (iv) structure of report writing, (v) implementation plans for project B. ▪ Meet with the team to: (i) work on the experimental / software simulation, (ii) further literature and their understanding, (iii) develop basic model for implementing the scope in project B, (iv) discuss report writing, to cite different work from the literature, (v) record the team meeting minutes and duration of the meeting (min 1 hour). ▪ Complete the set milestones.
Week 7	▪ Risk Management Form completed and approved by supervisor ▪ If applicable, ethics approval required from relevant authority
Week 10	▪ 12pm Thursday: deadline for submission of the report via Moodle (note the report submission is individual) and group meeting minutes to the supervisor.

COVID-19

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by NSW health or government authorities. Current alerts and a list of hotspots can be found here. **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate**. We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed.

If you are required to self-isolate and/or need emotional or financial support, please contact the Nucleus: Student Hub.

If you are unable to complete an assessment, or attend a class with an attendance or participation requirement, please let your teacher know and apply for special consideration through the Special Consideration portal.

To advise the University of a positive COVID-19 test result or if you suspect you have COVID-19 and are being tested, please fill in this form.

UNSW requires all staff and students to follow NSW Health advice. Any failure to act in accordance with that advice may amount to a breach of the Student Code of Conduct. Please refer to the Safe Return to Campus guide for students for more information on safe practices.

3. Course Details

Credits

This is a 6 UOC course. The expected workload is 15 hours per week throughout the 10-week term.

Relationship to Other Courses

MEngSc Project A constitutes the first of the two-part project work (part A and B). MEngSc Project A involves a substantive literature search and reviews of the background for the chosen topic, gaining a clear understanding of the problem that is to be solved, familiarisation with the tools or equipment required for the project, some preliminary development work, and formulation of a research plan. This prepares the student for the detailed project work undertaken in MEngSc Project B in the following session.

Pre-requisites and Assumed Knowledge

The following pre-requisites must be met:

- Completion of one year in the 2-year MEngSc by coursework (54 UoC), or completion of two terms in the 1.5-year MEngSc by Coursework program (36 UoC)
- An overall WAM of min 65 at the end of first year (If not, students have the option for project substitution)
- Completion of any related courses based on the requirement of the project topic

Projects will be done in a group (3-4 students). The students should form the group, contact and take consent from the supervisor and email the group detail (full name, zID and overall WAM), supervisor's name and the approval of the supervisor to project coordinator by 05 Feb 2021.

Following Courses

The course is a pre-requisite for ELEC9772 MEngSc Project B which must be taken in the immediate following term.

Learning outcomes

The MEngSc project provides a good introduction into working in industry and research, and further opportunities for postgraduate students to explore already encountered research ideas and concepts at an advanced level. It serves as an important indicator of how well students are able to bring together what they have learnt at an undergraduate and postgraduate level as well as from any relevant work experience.

By the end 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 exhibit detailed background knowledge of the chosen topic area as a basis for demonstrating clear understanding of the problem to be solved and challenges associated with it, and further proposing their own solution for the problem and developing program of work.
3. Apply scientific and engineering methods to solve an engineering problem. Demonstrate completion of initial stages of this process, e.g. preliminary design.
4. Analyse data objectively using quantitative and mathematical methods.
5. Demonstrate written communication in professional and lay domains through a written report on their chosen research topic outlining the motivation, background and selected methodology that will be used in Project Report B.
6. Improve research standard via peer-support.
7. Work collaboratively in a team-based environment.
8. Explain the general infrastructure requirements of engineering projects including laboratory, workshop, computing facilities, information systems and WHS requirements. Understand the role supervisors play in quality assurance.

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

The project topic area chosen by the student may be in any technical area covered by the interests and expertise of the academic staff of the EE&T School who will act as the supervisors. A list of topics offered by the school is published each year and can be viewed on the Moodle 'EET School Thesis/Project' database. Note that some topics offered on the list are of a general nature, requiring the topic to be defined in discussion with the supervisor. Many topics can be modified to cater for specific student interests. However, since the project work is done in a group, a clear discussion with the supervisor is required.

In addition to the key elements of problem analysis and synthesis, the course requires information literacy, revision and explicit application of project management concepts, safety considerations, and risk mitigation. The assessment includes individual written report on their chosen research topic outlining the motivation, background and selected research methodology that will be employed in MEngSc Project B.

4. Teaching Strategies

Delivery Mode

- Regular weekly meetings with the supervisor and student team – to discuss and collaborate on the project work.
- Laboratory access remotely throughout the term – for students to carry out practical design and development work with some assistance from technical staff. Laboratory access might not be possible due to COVID-19 restricted access to building and laboratory. Please discuss with your supervisor prior starting of MEngSc Project A.

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 written 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.

Before carrying out any research it is important to be aware of what work has been done by other researchers. You can ask your supervisor for assistance with the available resources and how to access them, e.g. IEEE-Xplore on-line database. The Internet has become a major source of information for research activities.

While a majority of the design and synthesis tasks will be carried out in the second session, it is important that you take full advantage of time in the first session to grasp what the underlying problem and challenges are, as well as begin the design and synthesis tasks.

Regular meetings with your supervisor are important, especially during the early stages when it is important to check that what you are doing is indeed what is required. If you want to contact your supervisor outside a regular meeting time, leave a message arranging a time to meet. Pre-arranged consultations are often more effective, check contact details on the School website.

Defining a topic is difficult, but it is probably your most important task. Once you have a clear idea of what is required, you can then analyse the alternative courses of action available for achieving your goal. However, if you have the wrong problem then no amount of brilliant analysis or design will achieve the required objective.

Once you have defined your problem, review what has been achieved before, and list what alternative courses of action or methods of solution are available. Analyse the alternatives and decide which of them is the most appropriate for the task in hand. At this stage you should have a clear idea what you are going to do and what tasks have got to be performed on the way to achieving your goal.

It is a good idea to draw up a developmental schedule and allocate times for each task and important stages or project milestones. 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.

5. Assessment

Assessment is based on evaluating the student's work through individual written report via Moodle and submission of the group meeting minutes to the supervisor. The assessment will be carried out by the project supervisor.

It is intended that MEngSc Project A covers the planning, preparing and completing some initial work on the project. The report will be marked as "satisfactory" by the supervisor if the report demonstrates the following: (i) gathering, understanding and prioritizing relevant technical background about the project, literature review and the problem statement; (ii) project deliverables (detailed proposed solution or design, work plan with specific tasks for realizing this solution, and which tasks completed to date) and their quality (degree of challenges involved, level of intellectual contribution); and (iii) good presentation. It is most important to note that MEngSc Project A is not just about doing a literature review but students must demonstrate real progress in the project with tangible project deliverables.

Policy for lateness in report submission

The penalty is detailed below:

- If the report is not submitted by the due date, it will be marked "unsatisfactory".
- If there is a delay in submission due to unforeseen reasons (e.g., medical issues), prior permission should be obtained from the project coordinator, with the consent of the supervisor, at least two weeks before the due date. A maximum late submission of 4 weeks is then allowed at the discretion of the project 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**	**6**	**7**	**8**
Written report	✓	✓	✓	✓	✓	✓	✓	✓

6. Course Resources

Recommended text(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).

7. Additional Information about the project

How to nominate a project topic

The Moodle portal 'EET School Thesis/Project' helps you find a supervisor and register a project topic to work on. This should be done well before the start of the term. Follow these steps:

- Go to http://moodle.telt.unsw.edu.au/course/view.php?id=20890 and enrol yourself as a student; the self-enrolment key is **EETTPstudent**.
- From here, you can view the research profiles of prospective supervisors and topics by clicking on the 'Research Topics' icon. Please note that the topics list is only indicative and may not show all the topics available. Supervisors may have other new topics in mind or you may want to propose your own topic that matches the supervisor' interests and expertise.

When you have found a supervisor with a topic that suits your interests, you are required to contact this person to discuss your intention. If you both agree to team up, ask the supervisor to email you to confirm approval of the topic title. You can then proceed to register your topic:

- Go into Moodle 'EET School Thesis/Project', click 'Select Your Supervisor' icon then click 'Select Supervisor'. Find your supervisor name and click the action box to become a member.
- From the home page, click 'Select Your Supervisor' icon then click 'Register Topic', 'Add Entry' and enter your details and topic title.
- You now have formally secured a supervisor with a specific topic to work on in the forthcoming term. Furthermore, you must enrol in the appropriate thesis course code on myUNSW, as you would normally enrol in other courses. This will give you access to the main Moodle for this course: 'ELEC9771 (MEngSc Project Part A) T1 _2021'.

Risk Management

Your thesis work may involve practical experiments in the laboratory or only using office computers. Regardless of the nature of your thesis work, you must do a risk assessment before commencing. The *Risk Management Form* has to be completed on-line via https://safesys.unsw.edu.au and signed off by you and approved by your supervisor. The system will generate a unique Risk Management Document Number for identification.

Note that when you submit your thesis report, you will be asked to state your Risk Management Document Number and also, if applicable, to indicate that appropriate ethics approvals have been obtained.

Written report

A written report of about 5000 words is also required. This is to be submitted by **12pm (noon) Thursday 22nd of April 2021**, by uploading the report as one single pdf formatted file. This file 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. 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 preliminary report should have the following elements:

- Abstract / Table of contents / Introduction / Body / Conclusion (these do not necessarily constitute Chapter titles).
- Project definition, which includes the problem statement, and motivation for trying to solve this particular problem, possible solutions to the problem along with their pros and cons and challenges.
- Literature review.
- Description of preliminary work – although much of the design and synthesis will be carried out in MEngSc Project B, it would be expected that preliminary work would be carried out in MEngSc Project A.
- Outline and timetable schedule for work in MEngSc Project B in the following term. This should be more than just a simple Gantt chart. This should include a description of the work required to be carried out in MEngSc Project B, and possible perceived problems or risks you may encounter which could change the schedule and planned work.

The report must be individually written even though the students work in a group on the same topic. 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 Project Coordinator, the Director of Academic Studies in EE&T or the Student Counseling 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.

8. 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.

There were several instances of plagiarism in courses with thesis or project report submissions. The most common penalty was failure of the course. If you don't understand what plagiarism is, please act now to educate yourself.

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 **15 hours per week** studying a 6 UoC course, from Week 1 until the final assessment, including both meetings with your supervisor and *independent, self-directed study*. In periods where you need to need to complete assignments or prepare for assessments, 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.

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.

Ethics approval

The project work may require ethics approval. Does your project involve other people doing something for you? If so, it may require ethics approval. The basic principle is that if you want people to provide you with something, even if just 5 min of their time to answer questions, then you should (i) treat them with suitable dignity and (ii) ensure any possibility that they may be badly affected is absolutely minimised. When research at UNSW involves people, then it comes under the oversight of the UNSW Ethics Committee which must give approval before it proceeds.

You will need to get approval, if your project involves any of the following (more than one may apply):

- a survey, even if done on-line
- an interview, focus group, or other such "qualitative" method
- data-mining, when individual identities might be revealed
- behavioural observation, e.g. people using something, choices people make, on-line activities
- recording or photography of people, even if in public spaces

- experiments on human reactions (or other abilities)
- human performance, e.g. running, falling, playing music
- testing a device
- tasting or smelling, e.g. foods
- and, of course, drug trials, body tissues and other medical activities.
- experiments on animals

If your project does require approval, in the first instance, discuss this with your supervisor.

Special Consideration

You must submit all assessments 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 **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 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 Course and Teaching Evaluation and Improvement Process. You can also provide feedback to ELSOC who will raise your concerns at student focus group meetings.

In our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods. The assessment criteria and marking guidelines have been extensively revised together with clearly-defined policies on handling marking differences and late submission of work. Course administration is now via Moodle where students can access online databases, find supervisors to sign up topic, obtain course material and submit their work for assessment.

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://student.unsw.edu.au/guide

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	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	2, 3, 4
	PE1.3 In-depth understanding of specialist bodies of knowledge	1, 2
	PE1.4 Discernment of knowledge development and research directions	6
	PE1.5 Knowledge of engineering design practice	1, 8
	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	1, 3, 4
	PE2.2 Fluent application of engineering techniques, tools and resources	3, 4
	PE2.3 Application of systematic engineering synthesis and design processes	1, 3
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects	5, 7
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability	7
	PE3.2 Effective oral and written communication (professional and lay domains)	5
	PE3.3 Creative, innovative and pro-active demeanour	5, 6
	PE3.4 Professional use and management of information	7, 8
	PE3.5 Orderly management of self, and professional conduct	8
	PE3.6 Effective team membership and team leadership	7