School of Electrical Engineering and Telecommunications

Term 3, 2019
Course Outline

ELEC9451
Masters Project A

COURSE STAFF

Project supervisor: To be nominated by the student (together with project 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 ME project coordinator. All email enquiries should be made from your student email address with ELEC9451 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: ELEC4951/9451 Research Thesis/Master Project A T3/2019.

COURSE SUMMARY

Contact Hours

The project consists of regular 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

The Master of Engineering project is undertaken in the second (and final) year of the 2-year ME. The course, ME 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 their ability to work in a research and development environment

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

Schedule

Period	Activity
	▪ Prior to start of semester, student selects project topic and gets approval from supervisor. ▪ Weekly meetings during the semester with supervisor for technical guidance on project work ▪ Laboratory work during the semester subject to arrangement with technical staff
Week 1	▪ Overview of project work - Introductory talk by Project Coordinator ▪ 4pm Friday: deadline for registering your thesis topic and supervisor name via Moodle portal 'EET School Thesis/Project'
Week 1-4	▪ Provide Thesis/Project details for each assessment via Moodle course page 'ELEC4951/9451 Research Thesis/Master Project A T3/2019' ○ For start, provide general thesis/project topic, your name and supervisor's name. Thesis/project topic does not have to final at this stage as you can modify it till week 10. ○ The details should be provided for each assessment. In this course, the assessments are PART A SEMINAR ASSESSMENT and PART A REPORT ASSESSMENT. ○ To provide the details for PART A SEMINAR ASSESSMENT, follow the steps below ▪ Go to ME Project A Seminar (click to expand the section) ▪ Click on PART A SEMINAR ASSESSMENT ○ To provide the details for PART A REPORT ASSESSMENT, follow the steps below ▪ Go to ME Project A Report (click to expand the section) ▪ Click on PART A REPORT ASSESSMENT
Week 2	▪ Thesis guide seminar by Prof. Victor Solo
Week 5	▪ Risk Management Form completed and approved by supervisor ▪ If applicable, ethics approval required from relevant authority
Week 8-9	▪ Seminars, location and time to be announced during Week 10 ▪ Apart from their own presentations, students must attend at least 6 other seminars as a compulsory requirement.
Week 10	▪ 12pm Thursday: deadline for submission of your "Seminar Attendance Form" and the report via Moodle.

Assessment

1.	Seminar	43% weighting
2.	Report	57% weighting
3.	Risk management and ethics approval if required	no weighting
4.	Seminar attendance	no weighting

COURSE DETAILS

Credits

This is a 4 UOC course. The expected workload is 10 hours per week throughout the 10 week term.

Relationship to Other Courses

Masters Project A constitutes the first of the three part project work (part A, B and C). ME 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 ME Project B and C in the following two terms.

Pre-requisites and Assumed Knowledge

Completion of one year in the ME by coursework program – 48 UoC.

Following Courses

The course is a pre-requisite for ELEC9452 Masters Project B which must be taken in the immediate following semester.

Learning outcomes

The ME project provides a good introduction into working in industry and research, and further opportunities for postgraduate students to explore research ideas and concepts already encountered 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 oral and written communication in professional and lay domains through a seminar presentation and a written report on their chosen research topic outlining the motivation, background and selected methodology that will be used in Masters Project B and C in the subsequent terms.
6. Explain the general infrastructure requirements of engineering projects including laboratory, workshop, computing facilities, information systems and WHS requirements. Understand the role thesis 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. Students are to make their own selection. Usually, the topic chosen is influenced by the students' future career directions. 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. There is provision for 'wildcard' topics nominated by students or industry. However, it is required to find an academic staff who can recognize the technical merits and is prepared to act as a supervisor (or co-supervisor) of such a topic.

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 both written and oral communications – the students will deliver professional seminar presentations on their chosen research topic outlining the motivation, background and selected research methodology that will be employed in Masters Project B and C subsequently.

TEACHING STRATEGIES

Delivery Mode

- One introduction lecture by the project coordinator – to explain project requirements, procedures, available resources, and assessment scheme.
- Regular weekly 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 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.

ASSESSMENT

Assessment is based on evaluating the student's work through the interim report (57%) and seminar (43% weighting). The assessment will be carried out by the project supervisor and the project assessor whose marks are equally weighed. The assessor is an academic staff assigned by the School. The same assessor will be assigned for Masters Project C. The marking is done independently by each marker, without collusion or knowledge of the other mark. If there is a significant difference between the two marks for the report (>10%), the Thesis Coordinator has the discretion to decide the next course of action, e.g. ask the two markers to review their marks.

It is intended that Project A covers the planning, preparing and completing some initial work on the project. To measure these achievements through the report and seminar, the marking breakdowns are: (i) 50% on gathering, understanding and prioritizing relevant technical background about the project,

literature review and the problem statement; (ii) 20% on project planning (detailed proposed solution or design, work plan with specific tasks for realizing this solution, and skills, resources and trainings identified) and their quality (degree of challenges involved, level of intellectual contribution); (iii) 20% on project preparation (preliminary work completed, skills acquired, trainings completed, and risk assessment)and (iii) 10% on the presentation.

It is most important to note that Masters 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

The penalty is detailed below:

- For project seminar – zero (0) mark is awarded
- For project 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 report (weekends count as days). Any project report not turned in within 6 weeks after the deadline will be finalised at zero (0) marks.

In all cases, applications for late submission can be applied for BEFORE the due date. This is 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**
Project seminar	✓	✓	✓	✓	✓	
Written report	✓	✓	✓	✓	✓	✓

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).

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. Preferably, this should be done well before the start of the semester. Follow these steps:

- Go to https://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 semester. Furthermore, you must enroll in the appropriate thesis course code on myUNSW, as you would normally enroll in other courses. This will give you access to the main Moodle for this course: 'ELEC4951/9451 Research Thesis/Master Project A T3/2019'.

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.

ME Project seminar

During **week 8 (or week 9 depending on scheduling)**, you are required to give a Seminar presentation describing your work on the topic.

Student seminars will take place at the times given in the Timetable at locations to be advised. The duration of each seminar will be 30 minutes. Plan your presentation to last about 20 minutes plus 7 minutes for answering questions and 3 minutes for the changeover. By this stage you will be knowledgeable in your topic, but you should present the materials so that it can be understood by the other students attending your seminar. Go at a steady pace. Practice the right emphasis and timing. Rehearsals will give you confidence and remove some of the nervousness.

Technical skill is very important; but just as important is the ability to talk about your work in an informative and convincing way. The seminar provides the opportunity both to inform and to demonstrate your communication skills. Your talk should be addressed both to your examiners (supervisor and assessor) who will need to know details about your progress with the topic, and to students and staff members having a more general interest in the project.

The project seminar might have the following outline:

- Project definition, i.e. what is the problem you are trying to solve including motivation.
- Background and literature review
- Description of preliminary work (e.g. simulation, modeling, experimental procedure)
- Outline and timetable schedule for work in Masters Project B and C in the following subsequent terms.

PowerPoint slides or Acrobat PDF for presentation on a data projector are recommended.

The student giving the seminar must bring along ~20 printed copies of the "Summary Sheet" for distribution to the audience. This one-page handout contains your project title, your name and student ID, project aim and objectives, background, your solution to the problem.

You are also required to be the chairperson for the seminar that follows yours in the same room (note: seminars may be run in several locations). This is compulsory and students must ensure that they perform this duty. See "Advice for Chairpersons and Speakers" document on the course web site.

In addition to your own oral presentation, you are required to attend at least six seminar sessions given by other students. You are required to keep a record of the seminars attended on a *Seminar Attendance Form*. For verification, each attendance must be signed off by a member of the academic staff who is present at the

seminar. You need to have your form signed BEFORE you leave the seminar room. Keep this sheet until you have attended 6 seminars, then submit it as a pdf file via Moodle by **12pm (noon) Thursday of week 10**.

Written report

A written report of about 5000 words is also required. This is to be submitted in **week 10 (Thursday 12pm noon)**, 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 Masters Project B and C, it would be expected that preliminary work would be carried out in Masters Project A.
- Outline and timetable schedule for work in ME Project B in the following semester. This should be more than just a simple Gantt chart. This should include a description of the work required to be carried out in Masters Project B and C, and possible perceived problems or risks you may encounter which could change the schedule and planned work.

The report must be individually written even for cases where a group of students work 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.

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 **nine to ten hours per week** studying a 4 UoC course, from Week 1 until the final assessment, including both face-to-face 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 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 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	
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	