



Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

MMAN9452

Research Thesis B

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1. Staff contact details

Academic staff, sometimes together with some senior engineers from industry, act as supervisors to students undertaking Thesis work. Support is also provided by the workshop and laboratory staff. For any project-related issues, contact your thesis supervisor directly.

Contact details and consultation times for course convenor

Name: Professor Tracie Barber

Office location: Ainsworth building (J17)

Tel: (02) 9385 4081

Email: t.barber@unsw.edu.au (email is the easiest way to contact me)

Please consult the course Teams site first in case your questions have already been answered by information available online.

2. Important links

- [Lab Access](#)
- [Health and Safety](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Engineering Student Support Services Centre](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)
- [UNSW Mechanical and Manufacturing Engineering](#)

3. Course details

Credit points

This is a 4 unit-of-credit (UoC) course and involves an unprescribed number of contact hours per week (h/w) with your supervisor. This varies on a case-by-case basis, as agreed with your supervisor.

Various factors, such as your own ability, your target grade, etc., will influence the time needed in your case.

This means that you should aim to spend not less than about 10 h/w on this course, including consultation with supervisor and workshop/laboratory staff and library/internet search. However, most students spend more time on their thesis work.

Contact hours

There are no set contact hours for thesis.

Summary and Aims of the course

Aims

The thesis 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 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 to require a degree of project planning from the student. The thesis 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.

This course requires each student to demonstrate managerial, technical and professional skills in planning and executing an approved engineering project within a stipulated time limit. The student should show improved project management skills in the progression from Thesis A to B and C, as well as a deeper understanding of the specific research topic. Each student is guided by their supervisor, but successfully planning, executing and reporting on the project are the sole responsibility of each student.

It is not the responsibility of the supervisor to tell the student what to do, nor should it be assumed that the supervisor is an expert in all areas of engineering. They are there to offer guidance and advice, as are laboratory staff, workshop staff, and others in the school that may have expertise in the area of your project. The successful execution of the project is solely the responsibility of the student.

Organisation and prerequisites

The undergraduate Research Thesis is organised in three courses: Thesis A (MMAN9451), B (MMAN9452) and C (MMAN9453). By default, students must ordinarily take Thesis A, Thesis B and Thesis C consecutive terms. Thesis A is therefore the first course you have to undertake for the completion of the Research Thesis and can be started in any of the three terms. Thesis A is a prerequisite for Thesis B, and Thesis B is a prerequisite for Thesis C. If you need to complete your Thesis in two terms only and your program allows it (i.e. 8338 Masters of Engineering Science), then you should choose the Practice project stream (MMAN9001-MMAN9002).

B+C Term in one Term

With School permission and only in exceptional circumstances, students may apply to take Research Thesis A in one term, then Research Thesis B and C together in the subsequent term. This option is limited to students who have exceptional circumstances and can

demonstrate an outstanding ability to progress. Moreover, it requires a prerequisite waiver to waive the Thesis B requirement for Thesis C.

Laboratory Activities and Staff

COVID-19 NOTE: The School laboratory facilities are open to research thesis students in T2; however, access is limited. To comply with government's social distancing requirements, e.g., 4 square meters per person, each room has a maximum capacity limit, which will be monitored by the supervising professional staff. Please check with the laboratory officer in your area before accessing and observe the limit and all other safety precautions.

You must seek guidance and approval from your Thesis supervisor prior to any laboratory activities.

The laboratories are the responsibility of the staff-in-charge, and you must operate within the accepted practices of the laboratory concerned. You should not expect laboratory staff to take responsibility for your thesis or carry out work for you. Laboratory staff are highly skilled and helpful; take full advantage of their experience.

If your project involves laboratory work, contact the officer-in-charge (OIC) of the laboratory in which you will be working as soon as possible to discuss your requirements. They will issue you with a Laboratory Access Approval (LAA) form which you must complete and return to the OIC.

For more information about accessing the School's laboratories, including necessary safety precautions, please visit the School website:

<https://www.engineering.unsw.edu.au/mechanical-engineering/resources/lab-access-how-to-forms>

Workshop

You must seek guidance and approval from your Thesis supervisor prior to requesting any workshop activities.

All student activities requiring manufacture in the Mechanical and Manufacturing Engineering (MME) workshop should be discussed with the workshop personnel at the inception of the work. The workshop personnel must have the opportunity to advise and influence the design to help minimise assembly, manufacture or functional problems.

The workshop is usually in very high demand. If you require the workshop to manufacture equipment essential to your thesis, then make sure that you discuss your requirements as early as possible with the Workshop/Laboratory Manager. You should provide engineering drawings which are first approved by the laboratory OIC. You should make every effort to minimise the Workshop load by modifying existing equipment rather than building from new, and by keeping your designs simple.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		EA Stage 1 Competencies
1.	Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.	PE2.1, PE2.2, PE2.3, PE2.4
2.	Critically reflect on a specialist body of knowledge related to their thesis topic.	PE1.3
3.	Apply scientific and engineering methods to solve an engineering problem.	PE2.1
4.	Analyse data objectively using quantitative and mathematical methods.	PE1.2, PE2.1, P2.2
5.	Demonstrate oral and written communication in professional and lay domains.	PE3.2

4. Teaching strategies

There is no formal teaching, but students learn from both internal and external sources. The supervisor, other academics and laboratory/workshop staff are the internal sources, whereas the Library, internet and industry mentors are the external sources.

5. Course schedule

There are no set lectures for this course.

6. Assessment

Project A and B will initially carry a 'satisfactory' (EC grade) or 'not satisfactory' mark. Only students receiving a 'satisfactory' evaluation in Project A will be allowed to enroll in Project B, and only students receiving a 'satisfactory' evaluation in Project B will be allowed to enroll in Project C. After the successful completion of Project C, a student's final thesis mark will reflect the overall weighted percentage of marks achieved during all three courses (A, B and C), and the earlier EC grades will be replaced with the final mark achieved in Thesis C at that time.

There is one assessment item in Project B: the "Progress Report", whose details are reported below. In order to progress to Research Project C, the grade of your Progress Report must be greater than 50%.

Please also consult the report's template.

Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Progress Report	No	10 pages max (excl. appendices and references)	10%	1, 2, 3, 4 and 5	Rubric below	Friday 5 PM Week 9 for students enrolled in Thesis B <u>only</u> Monday 5 PM Week 4 for students enrolled in B+C concurrently*	5 PM Friday Week 10 (students enrolled in Thesis B <u>only</u>) 5 PM Week 5 (students enrolled in B+C concurrently)	Two weeks after submission

* The early deadline for B+C students is due to the need to have supervisors provide preliminary feedback to students before census date.

Marking criteria and rubrics for the Progress report

Note: The points in the marking criteria below will be scaled by the associated weighting.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	75-84%	65-74%	50-64%	0-49%
Progress and its discussion Length approx. 6 pages	60%	Achievement is beyond expectations with respect to plan. If any complexities or challenges have been encountered, a plan for equivalent work has been developed with significant progress made. Highly detailed discussions on work completed. The student is clearly on track to demonstrate a sophisticated understanding of the meaning and implications of their research findings.	Highly satisfactory achievement against the plan. If complexities or challenges have been encountered, a plan for equivalent work has been developed with satisfactory progress made. Detailed discussions on the work completed. The student clearly on their way to demonstrating a good understanding of the meaning and implications of their research findings.	Mostly satisfactory achievement against the plan. If complexities have been encountered a plan for equivalent work has been developed and a good start has been made. Some discussion of the work completed. The student looks to be developing a reasonable understanding of the meaning of their research findings.	Marginal achievement compared to the plan. If complexities have been encountered a plan for equivalent work has been developed but with little progress. Only superficial discussions of the work completed. The student will probably be able to demonstrate some understanding of the meaning of their results.	Achievement is not satisfactory with respect to the plan. Little work has been done to address any complexities or challenges encountered. Little or no discussion of the work completed. It is unclear that the student understands what their results mean.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	75-84%	65-74%	50-64%	0-49%
Reflection on Progress Length approx. 2 pages	15%	Compares and contrasts the thesis, with industrial and other academic experiences, illuminating the differences and similarities between them. The student also demonstrates deep understanding of their field(s) of study and broadening perspective through the research experience. Evaluates changes in learning through the thesis, recognizing complex contextual factors (e.g. works with ambiguity and risk, deals with frustration), demonstrating self-awareness, and envisions a future self or develops plans that build on the research experience.	Compares and contrasts the thesis, with industrial and other academic experiences, illuminating the differences and similarities between them. The student also demonstrates a growing understanding of their field(s) of study and developing perspective through the research experience. Evaluates changes in learning through the thesis, through either recognizing complex contextual factors (e.g. works with ambiguity and risk, deals with frustration), demonstrating self-awareness, and/or envisioning a future self / developing plans that build on the research experience.	Compares and contrasts the thesis, with industrial and/or other academic experiences, illuminating the differences and similarities between them. Evaluates changes in learning through the thesis, recognizing complex contextual factors (e.g. works with ambiguity and risk, deals with frustration).	Compares and contrasts the thesis, with industrial or other academic experiences, inferring differences and similarities between them. Articulates strengths and challenges during the thesis, with contexts.	Identifies superficial connections between the thesis, and industrial or other academic experiences. Describes own performances during the thesis with general descriptors of success and failure at a superficial level.
Revised project plan Length approx. 2 pages	15%	Highly thoughtful and incisive discussions on future project plan and expected results. A reasonable strategy to ensure progress is stated, explained in detail and innovative.	Quality discussion of the future project plan and expected results. A reasonable strategy to ensure progress is stated and explained in detail.	Some discussions of future project plan and outcomes. A reasonable strategy to ensure progress is stated and briefly explained.	Superficial discussion of future project plan &/or outcomes. A reasonable strategy to ensure progress is stated.	Little or no discussion of future project plan or outcomes. No reasonable strategy to ensure progress in stated.

Criterion	Wt	Accomplished	Distinguished	Solid	Adequate	Deficient
		85-100%	75-84%	65-74%	50-64%	0-49%
Document presentation	10%	The document follows a clear and logical structure indicated using headings and other conventions. The report is very easy to read: well-written, with good spelling and grammar, and appropriate language style. Text spacing aids readability. All aspects of formatting are consistent throughout the document. Graphical and tabular presentation of data is appropriate, clear, consistent and economical. Discernment is shown in the placement of graphical elements (figures, tables, etc.), whether in the body of the work or in the appendices. References in text match reference list (and vice versa) and are cited properly.	The document makes good use of headings, sub-headings and other stylistic conventions to indicate document structure. The report is easy to read: writing is clear enough, with good spelling and grammar, and reasonable choice of language style. Graphical elements (figures, tables, etc.) are labelled, largely formatted consistently and cited correctly. References in text match reference list (and vice versa) and are cited properly.	The document makes some use of headings and other stylistic conventions to indicate document structure. The report is reasonably easy to read: there may be some issues with spelling, grammar or style but it doesn't affect comprehension. Figures and diagrams are generally fine, although there may be some issues with the graphical presentation of data - poor choice of axes, overcrowding, poor use of chart space, etc. References in text match reference list (and vice versa) and are cited properly.	Document is not at a professional level but does make use of headings and sub-headings to indicate document structure. The report may be difficult to read: writing is just ok, broad idea comes across; spelling and grammar have some flaws, not quite appropriate language style. Although figures and tables are labelled, the formatting is unclear and/or inconsistent to the extent that the reader can lose track of the context when reading. References in text match reference list (and vice versa) and are mostly cited correctly.	The document is poorly structured, does not cohere or shows a lack of understanding of the purpose of its sections. Much effort is required to read and understand the report: writing is poor, many mistakes with spelling and grammar, and possibly inappropriate language style (e.g. too informal). Presentation is poor to the extent that it impedes reading of the document. Examples include inconsistent formatting, and unlabeled figures or tables. References are either not cited or cited inconsistently.

Submission

Please submit your report electronically, directly through the submission inbox which will be made available, unless you have been granted “confidential submission”.

Confidential Submission

Confidential submission can be granted by the course conveners in case of confidential projects (e.g. with sensitive data from company partners). This must be requested from the course convenor at the beginning of Thesis A (not later than Week 4 of Thesis A) by the student and have the support of the supervisor (email explaining reason). If you have been granted “confidential submission”, you should **SUBMIT DIRECTLY TO YOUR SUPERVISOR** by means of a medium agreed with your supervisor, still within the same assignment deadline.

Please note that Thesis C will require two markers, so you and your supervisor will need to propose a solution that satisfies your confidentiality constraints. The conveners will have to approve your proposed solution before the beginning of Thesis C.

It is always the student’s responsibility (in discussion with the primary supervisor) to ensure that the confidentiality constraints are met in the processes of submission, marking and thesis document management.

Late submission of the report (Thesis B)

Late submissions for Thesis B will not be accepted, unless agreed with the course convenor prior to Friday 5pm, Week 9.

Late submission of the report (Thesis A & C)

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day that the assessment is overdue (weekends and public holidays count as days). There is no pro-rata of the late penalty for submissions made part way through a day. The penalty applies until the marks for the course decrease to 50, and further lateness does not result in failure of the course, until the deadline for absolute fail. Any report submitted after the ‘deadline for absolute fail’ is not accepted and a mark of zero will be awarded for that assessment item, thus resulting in the failure of the course. The penalty will be applied directly by the marker.

Extensions and special consideration

Normal cases for special consideration (illness, misadventure) should be lodged through the formal UNSW system and dealt with accordingly.

Please note that UNSW now has a [Fit to Sit / Submit rule](#), which means that if you attempt an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of consideration, please see the information on UNSW's [Special Consideration page](#).

Other applications for extension of submission of thesis reports (e.g. equipment breakdown, etc.) must comply with the following:

1. The request for extension must come from the supervisor. That is, it is written by, and justified, by the supervisor.
2. Request must be lodged by week 7 of term.

Feedback and Template use

The supervisor (or a delegated marker in case of supervisor unavailability) will assess the assignments and grade the work. The supervisor will provide feedback on the student's progress and may ask for additional material. It is up to you to discuss with your supervisor the exact layout of the report, but it should be based on the template that will be made available.

7. Consequences if you fail in Research Thesis B

If you Fail in Research Thesis B, you have 3 options:

1. Enrol in MMAN9451 Thesis A and MMAN9452 Thesis B again in 2 subsequent terms with a new project and supervisor with the permission of your course convenor.
2. Enrol in MMAN9452 Thesis B in the next term (with the same supervisor and project), with the permission of your supervisor and the course convenor.

Students taking B and C concurrently and failing both B and C cannot concurrently enrol in B and C again. Note that a failure in Thesis B for students doing thesis B+C concurrently means an automatic failure in C as well. Students failing only in C, but completing B satisfactorily, can then take Thesis C in the next term as stated above.

8. Expected resources for students

UNSW Library website: <https://www.library.unsw.edu.au/>

UNSW course Teams site

9. Course evaluation and development

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 convenor. In our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

10. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

11. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	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