School of Civil and Environmental Engineering

Summer Term, 2022

CVEN9451/9452/9453 MASTER THESIS A/B/C

COURSE DETAILS

Units of Credit	4 + 4 + 4
Contact hours	as agreed with supervisor
Course Coordinator	**Summer Term:** Dr Ulrike Dackermann email: u.dackermann@unsw.edu.au office: Building H20, Room CE610

INFORMATION ABOUT THE COURSE

This course is in three parts. Master Thesis A is undertaken in the first term of enrolment. Master Thesis A is a prerequisite for Master Thesis B and Master Thesis B is a prerequisite for Master Thesis C.

By default, students must ordinarily take Master Thesis A, B and C in each consecutive term.

With School permission, students may request to take Master Thesis A in the first term then Master Thesis B + C together in the second term. This option is strictly limited only to students who can demonstrate the ability to progress. Further details are provided in the ASSESSMENT section below.

Students may be exempted of completing a Master Thesis if they have previously completed a recognised Thesis in their undergraduate studies or further postgraduate studies. See further details in the section on “Who is required to complete a Thesis?”.

HANDBOOK DESCRIPTION

The Master thesis may describe directed laboratory, investigatory, design, field or research work on an approved subject and will be completed under the guidance and supervision of a member of the School’s academic staff.

The online Handbook description is available at myUNSW:

https://www.handbook.unsw.edu.au/postgraduate/courses/2022/CVEN9451
https://www.handbook.unsw.edu.au/postgraduate/courses/2022/CVEN9452
https://www.handbook.unsw.edu.au/postgraduate/courses/2022/CVEN9453

PROCEDURE FOR SELECTION AND CONFIRMATION OF A MASTER THESIS TOPIC (CVEN9451)

1. FIND A SUPERVISOR:

Option 1

If you are employed and your employer is willing to nominate a topic and co-supervise the thesis, you can choose to do your thesis in external or distance mode.

You will have to find an academic supervisor within the school to assist with administration and assessment. This should be an academic from the appropriate discipline. Please see the link below.
https://www.unsw.edu.au/engineering/our-schools/civil-and-environmental-engineering/about-us

Option 2
If you are not employed or your employer is not willing to nominate a topic and co-supervise the thesis, you have to complete the thesis in internal mode. Browse the internet link below ('Search Projects') to find available topics and contact potential supervisors.
http://intranet.civeng.unsw.edu.au/info-about/student-intranet/honours#master

Note: It is unlikely that this list is fully up-to-date and comprehensive. It is essential that individual students approach School teaching & research staff in area(s) of potential interest, to explore the range of possible thesis topics that may be available.

Different modes of delivery and their requirements
Internal: This mode applies to all students who choose a topic under option 2. They have to find a supervisor internally and complete all components within the School. As part of their examination, they are required to submit an abstract and prepare a 5-minute video presentation within CVEN9453.

External: This mode applies to students who choose a topic under option 1, i.e., they have an external employer to co-supervise their Master Thesis. If the student resides within the Sydney Basin, the student will submit a thesis abstract and present a 5-minute video presentation within CVEN9453 as part of the thesis assessment.

Distance: This mode applies to students who choose a topic under option 1, i.e., they have an external employer to co-supervise their Master Thesis. If the student resides outside the Sydney Basin, this student will have the option to submit a video presentation as part of their thesis examination instead of giving a research seminar. Students are strongly encouraged to present their thesis additionally to their work colleagues.

2. ORGANISE ENROLMENT:

- Discuss your selection with potential topic supervisors.
- Once you have a Supervisor and topic, you will need to download, complete and sign (both you and your Supervisor) a Master Project Thesis Form → enrol yourself on myUNSW → then upload the signed form to the Student Intranet here: https://intranet.civeng.unsw.edu.au/info-about/student-intranet/submit-thesis-application-form
- Please note that you will only be able to complete course enrolment for CVEN9451. The School will complete your class registration once you've submitted your topic nomination form to the Student Intranet.

PLEASE BE AWARE THAT IF YOU CANNOT FIND A SUPERVISOR BY THE START OF TERM OF MASTER THESIS A, THEN YOU WILL NOT BE ALLOWED TO ENROL/CONTINUE IN THE COURSE AND IT WILL BE AUTOMATICALLY DROPPED FROM YOUR ENROLMENTS. IF YOU HAVE CONTACTED THE COURSE COORDINATOR TO ASSIST YOU FINDING A SUPERVISOR, THEN YOU WILL REMAIN ENROLLED IN THE COURSE.

OBJECTIVES

The Master Thesis Project is an individual project in which each student works under the guidance of a nominated member of the academic staff (supervisor). A co-supervisor may also be nominated depending on the set up of the project (e.g., an employer could be a co-supervisor in an external thesis project). The work may involve laboratory experiments, field or industry-based investigations, design applications or theoretical research.

The Master Thesis aims to provide students with the opportunity to:

- Undertake and execute an academic research project.
- Produce a self-contained research thesis, which may be understood and used by others with technical background knowledge in the same discipline area as the thesis topic, and may potentially be suitable for publication.
- Present their research in a video presentation.

WHO IS REQUIRED TO COMPLETE A THESIS?

Program 8621: All students in program 8621 must complete the thesis project in their final year of study. **Alternatively, students enrolled in this program may take CVEN9050 and CVEN9051 *in lieu* of undertaking the thesis project.**

Program 8338: Students who have not completed a recognised Thesis in their undergraduate studies or further postgraduate studies are required to complete a Thesis in their Master program. If you are unsure if you have completed one, or if the School is not aware that you have completed one, please contact The Nucleus: Student Hub so an assessment can be made. **Alternatively, students enrolled in this program may take CVEN9050 and CVEN9051 *in lieu* of undertaking the thesis project.**

WHAT IS A MASTER THESIS?

That depends quite a bit on your field of study. However, all theses have at least two things in common:

- They are based on students' original research.
- They take the form of a written report, which presents the findings of that research.

WHY WRITE A MASTER THESIS?

- ***Satisfy your intellectual curiosity***
  This is the most compelling reason to write a research thesis. You have studied courses during your degree that perhaps really piqued your interest. Now is your chance to follow your passions, explore further, and contribute some original ideas and research in your field.

- ***Develop transferable research skills***
  Whether you choose to pursue further research (e.g. complete a PhD) or not, the process of developing and crafting a feasible research project will polish skills that will serve you well in almost any future job. After all, most jobs require some form of problem solving and oral and written communication. Writing a research thesis requires that you:
  - ask smart questions
  - acquire the investigative instincts needed to find answers
  - navigate libraries, laboratories, archives, databases, and other research venues
  - develop the flexibility to redirect your research if your initial plan flops
  - master the art of time management
  - sharpen your argumentation skills
  - organize a lengthy piece of writing
  - polish your oral communication skills by presenting and defending your research to academic staff and students
- ***Work closely with academic staff***
  At large research universities like UNSW, you have likely taken classes where you barely got to know your lecturer. Writing a thesis offers the opportunity to work one-on-one with an academic supervisor. Such relationships can enrich your intellectual development and later serve as invaluable references for employment.

- ***Open windows into future professions***
  A research thesis will give you a taste of what it's like to do research in your field. It also might help you decide whether to pursue that field in your future career.

TEACHING STRATEGIES

The Master Thesis is an individual project in which each student works under the guidance of a nominated member of the School's academic staff (supervisor). One or more co-supervisors (including from outside the School) may also be nominated depending on the set up of the project. The research may involve laboratory experiments, field- or industry-based investigations, design applications or theoretical research.

PRIVATE STUDY

- **As a rough guide only, an average student would be expected to spend approximately 35 hours per week on work related to this course during the summer term**.
- More guidance is needed initially from the supervisor when the topic is being defined to establish the objectives and methodology of the thesis.

SUPERVISION

- There are no specific hours assigned to this course, except for the scheduled workshops (see below).
- Meetings between the supervisor(s) and the student may take place periodically or by private arrangement.
- Should supervisors be on study leave or unavailable for a considerable period of the term, alternative arrangements need to be established and made known to both the student and course coordinator.

CONSULTATION

- The course coordinator will be available by email to liaise with enrolled students as needed.

EXPECTED 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 Stage1 Competency Standards may be found in Appendix A.

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

	Learning Outcomes	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, PE2.2
5.	*Demonstrate oral and written communication in professional and lay domains.*	PE3.2

IT IS ESSENTIAL THAT YOU REGULARLY CHECK YOUR OFFICAL UNSW EMAIL FOR UPDATES, REMINDERS, ETC.

ASSESSMENT – KEY DATES FOR YOUR DIARY

Master Thesis A: Covers the planning/preparing and completion of the initial work on the project, including undertaking a comprehensive literature review related to their specific area of research.

Master Thesis B: Continue to progress the research and commence the writing of methodology and results chapters of the thesis.

Master Thesis C: Thesis C complete any outstanding lab/field/modelling research and analyses; complete and submit the keystone deliverable Master Thesis; and present findings through a videopresentation.

The following course assessments relate to the student's research planning (A), conducting the research project and writing the thesis document (A, B & C), and disseminating the results in different forms (A, B & C).

In the event of an unsatisfactory assessment in Master Thesis A or Master Thesis B, a student must submit a show cause. A plan of future action to improve student performance must be prepared and agreed upon by both the supervisor and course coordinator before progress to Master Thesis B or Master Thesis C is allowed. Failure to receive the progress assessment by the due date will result in the student results being withheld and/or failure.

MASTER THESIS A (CVEN 9451) SUBMISSIONS

ITEM	WHEN	DETAILS
Component A1	Week 3	*Should include: Statement of the Problem and draft Literature Review.*
Component A2	Week 5	*Should include: More detailed, revised and improved Introduction (Statement of the Problem); and an enhanced Literature Review, incorporating Supervisor feedback.* ***NOTE:** If students are seeking to apply for permission to enrol concurrently in Master Thesis B + C in the following term, then the additional requirements are that the A2 submission must also include a Thesis Outline (Chapters and indicative sub-headings) plus a 1 – 2-page description of Research Methodology, sufficient to indicate clear understanding of the nature and extent of the work required.*

Submissions A1 & A2 must be provided to the supervisor by 4.00pm Friday of the submission week.

MASTER THESIS B (CVEN 9452) SUBMISSIONS

ITEM	WHEN	DETAILS
Component B1*	Week 3	***for students enrolled in Master Thesis B+C concurrently.*** *Progress Report – this will take the form of an improved and extended A2 submission, including a detailed Thesis Outline (chapter and sub-headings), Research Methodology and preliminary Results and Analyses.*
Component B1*	Week 5	***for students enrolled in Master Thesis B only.*** *Progress Report – this will take the form of an improved and extended A2 submission, including a detailed Thesis Outline (chapter and sub-headings), Research Methodology and preliminary Results and Analyses.*

Submission B1 must be provided to the supervisor by 4.00pm on Friday of the submission week.

MASTER THESIS C (CVEN 9453) SUBMISSIONS

ITEM	WHEN	DETAILS
Research Abstract	Week 3	*Further details of the requirements for the Research Abstract will be advised bythe Course Coordinator during the term via Moodle.*
Video Presentation	Week 4	*Further details of the requirements for the 5-Minute Video Presentation will be advised by the Course Coordinator during the term via Moodle*
Thesis Submission	Week 5	*The Master Thesis is to be submitted electronically as a single pdf by 4.00pm on Friday of the submission week via the School's web portal at:* http://intranet.civeng.unsw.edu.au/research-thesis-upload-page *Further document requirements and upload instructions are available at this site. Students are encouraged to print for themselves a hard copy of their work, and supervisors may also request that they be provide a hard copy for their records. If you are conducting a thesis based at an employer, you are required to provide them with a copy of your thesis in Week 5.*

SUMMARY OF ALL MASTER THESIS MARKED ASSESSMENTS			
		Due Date	**Mark**
Master Thesis A:			
1.	Component A1	Week 3	**satisfactory/unsatisfactory**
2.	Component A2	Week 5	**10 % of Final Mark**
Master Thesis B:			
1.	Component B1	Week 5 (B+C: Week 3)	**5 % of Final Mark**
Master Thesis C:			
1.	Research Abstract	Week 3	**5 % of Final Mark**
2.	Video Presentation	Week 4	**10 % of Final Mark**
3.	Thesis Submission	Week 5	**70 % of Final Mark (incl. 10 % Supervisor)**

PROCEDURE FOR SEEKING APPROVAL TO ENROL IN MASTER THESIS B + C CONCURRENTLY

With Supervisor and School approval, students who demonstrate accelerated progress during Master Thesis A may enrol in a 4+8 UoC structure, where Master Thesis B and C are both taken in the same term after Master Thesis A.

Students should submit their request to undertake Master Thesis B+C (concurrent) at the same time they submit their extended Component A2 submission (see the ASSESSMENTS section above for the additional content to be include).

It is strongly recommended that you discuss with your supervisor, prior to submitting your formal request for approval. Once your application for concurrent B+C is received, your supervisor will be asked to approve or decline this request.

Students who do not demonstrate enough progress during Master Thesis A may be instructed to change enrolment and complete Master Thesis C in a third term after Master Thesis B.

FAIL/LATE PENALTIES AND PROCEDURES

Fail in Master Thesis A – must re-enrol in Master Thesis A again (or enrol in CVEN9050)

Fail in Master Thesis B – must re-enrol in Master Thesis B again (or enrol in CVEN9050)

Fail in Master Thesis C – Students have three options.

1) re-enrol for Master Thesis A, B & C again, new project and supervisor
2) re-enrol for Master Thesis C again, same project - needs consent of an appropriate supervisor & student
3) student does further work, re-submits thesis after a maximum of 6 weeks. Course mark capped at 50%. If still not satisfactory, then needs to re-enrol. (This option is only available if the original mark was ≥40, OR if the student is in their last term before graduation, regardless of the original mark).

Fail in Master Thesis B & C (when taken simultaneously) – Students must re-enrol in Master Thesis B again, and cannot concurrently enrol in Master Thesis C. They can then take Master Thesis C when Master Thesis B has been satisfactorily completed.

Late Procedure – In all cases, applications for late submission (special consideration) can be applied for BEFORE the due date. This is at the discretion of the Thesis Coordinator, but will only be granted in exceptional circumstances. As per normal, students apply through myUNSW for special consideration.

Further information on what constitutes special consideration, and how to apply for it, can be found at this website: https://student.unsw.edu.au/special-consideration

Late Penalties (when special consideration hasn't been submitted and accepted)

- For all assignments other than the thesis – zero (0) marks are awarded after the due date and time.
- For the thesis – 5 marks are taken off the grade for the *thesis* every day it is late.
- Any thesis not submitted within 13 days after the deadline will be finalised at zero (0) marks.

RELEVANT RESOURCES

Topic material as direct by the supervisor.

The online references provided below are directed at final year undergraduate research students. However, for all practical purposes, there are many similarities in the academic expectations of Research and Master theses.

Honours Thesis Writing for Engineering Students:
https://student.unsw.edu.au/honours-thesis-writing-engineering-and-science-students

Online iWrite thesis writing tutorial:
http://iwrite.sydney.edu.au/tutorials/start/starthere.htm

UNSW Learning and Career Hub:
https://student.unsw.edu.au/individual-consultations-academic-support

References on writing style and technical communication skill:

- Lindsay, D "A Guide to Scientific Writing" 2nd ed. Longman, 1995
- Eisenberg, A "Effective Technical Communication" 2nd ed. McGraw-Hill, 1992.
- Evans, D. "How to write a better thesis or report" Melbourne University Press, 1995.
- Winkle, A and Hart, B "Report writing Style Guide for engineering students" 3rd ed. Faculty of Engineering, Flexible Learning Centre, University of South Australia, 1996.

HEALTH & SAFETY

UNSW is committed to the health and safety of all people who work, study, visit UNSW campuses. Health and safety are intrinsic to the way UNSW does business and UNSWs overall aim is "Harm to Zero", with the expectation that no person shall come to any harm while working, studying or visiting UNSW.

UNSW will comply with the NSW Work Health and Safety Act 2011 and the Work Health and Safety Regulation 2011.

Details about UNSW Health and Safety commitment are available online:
https://safety.unsw.edu.au/unsw-health-and-safety-policy-statement

and comprehensive information about UNSW's Health and Safety can be found on:
http://safety.unsw.edu.au/

Student requirements, training and responsibilities

As a student undertaking a research thesis you are often undertaking experimental works in laboratories, attending data collection in the field or participating in community consultations. Independent of your thesis topic, the expectation is that you adhere to the UNSW Health & Safety policies.

Every student must complete online safety training at the beginning of Master Thesis Project A by the end of Week 2.

All students have to complete the following online training:

- On-Line Work Health & Safety Awareness
- On-Line Ergonomics

Students working in the laboratory also have to complete:

- On-Line Laboratory Safety Awareness
- On-Line Green Lab Environment Compliance

There are additional courses for students who work with radiation or gene technology or in a PC2 Laboratory.

It is the responsibility of the student to self-enrol into these courses via this webpage:
http://safety.unsw.edu.au/Training/student-training

In addition to the online courses, every student must complete a local induction (RIPA Folder) with the laboratory manager of the laboratory they are working in. Anyone working in WRL laboratories can organise their local induction with their supervisor.

In meetings with their supervisor, students will be informed about their project specific Risk Assessments, Risk Management Forms and Safe Work Procedures. It is the responsibility of the student to engage in this discussion with their supervisor and to follow Health & Safety requirements and expectations.

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

https://student.unsw.edu.au/dates

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

Useful information and resources:

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub

MASTER THESIS A (CVEN 9451) COURSE PROGRAM			
Week	Milestones	Suggested Activities	Assessment/Workshops
1	Confirm Thesis Topic and Enrolment Arrange regular supervision meetings withSupervisor(s)	**Attend Live Orientation Workshop** Work on Statement of the Problem and Literature Review, and consult with supervisor(s)	**Live Orientation Workshop + Q&A** (see Moodle for details)
2	Complete mandatory student health and safety training	**View Literature Review & Problem Statement Workshop** Work on Statement of the Problem and Literature Review, and consult with supervisor(s)	**Literature Review & Problem Statement Workshop** Recorded session (see Moodle for details)
3	**Submit Component A1** – Statement of the Problem and draft Literature Review	Work on Statement of the Problem and Literature Review, and consult with supervisor Consult Investigation and Methodology with supervisor. **Submit Component A1 to Supervisor(s)**	**Component A1 Due – submit to your supervisor(s) by 4pm on Friday**
4	Receive review of Component A1 from supervisor(s)	Revise Statement of the Problem and Literature Review. Consult on your proposed Research Methodology with supervisor(s).	
5	**Submit Component A2** – more detailed, revised and improved Introduction (Statement of Problem) & Literature Review.	Expand on Literature Review and prepare draft project skeleton. Agree on your proposed Research Methodology with supervisor(s). **Submit Component A2 to Supervisor(s)**	**Component A2 Due – submit to your supervisor(s) by 4pm on Friday**

If students are seeking to apply for permission to enrol concurrently in Research Thesis B + C in the following Term, then the additional requirement is that the A2 submission must also include a Thesis Outline (Chapters and indicative sub-headings) plus a description of the Research Methodology.

MASTER THESIS B (CVEN 9452) COURSE PROGRAM			
Week	Milestones	Suggested Activities	Assessment/Workshops
1	Review and discussion of Component A2 feedback from supervisor(s)	Undertake thesis research with Supervisor(s) guidance. Work on Progress Report.	***Thesis Writing Workshop*** Recorded session (see Moodle for details)
2		Undertake thesis research with Supervisor(s) guidance. Work on Progress Report.	
3	***Master Thesis B+C students only:** **Submit Component B1** - detailed Thesis Outline (chapter and sub-headings), Research Methodology and (Preliminary) Results and Analyses.	Undertake thesis research with Supervisor(s) guidance. Work on Progress Report. ***Master Thesis B+C students only:** **Submit Component B1** to Supervisor(s)	****Master Thesis B+C students only:* *Component B1 Due –submit to your supervisor by 4.00 pm on Friday.*
4	***Master Thesis B+C students only:** Receive review of Component B1 from supervisor(s)	Undertake thesis research with Supervisor(s) guidance. Work on Progress Report. Revise thesis.	
5	**Submit Component B1** - detailed Thesis Outline (chapter and sub-headings), Research Methodology and (Preliminary) Results and Analyses.	Undertake thesis research with Supervisor(s) guidance. Work on Progress Report. Revise thesis. **Submit Component B1** to Supervisor(s)	***Component B1 Due –submit to your supervisor by 4.00 pm on Friday.***

MASTER THESIS C (CVEN 9453) COURSE PROGRAM			
Week	Milestones	Suggested Activities	Assessment/Workshops
1	Complete remaining research work	Complete remaining thesis research with Supervisor(s) guidance. Work on thesis with Supervisor(s) guidance.	
2	Complete analysis of results	Complete remaining thesis research with Supervisor(s) guidance. Work on thesis with Supervisor(s) guidance. Prepare draft of Research Abstract.	
3	**Submit Research Abstract**	Complete remaining thesis research with Supervisor(s) guidance. Work on thesis with Supervisor(s) guidance. **Submit Research Abstract**	***Research Abstract Due – submit by 4.00 pm on Friday. Course coordinator to advise on submission requirements.***
4	Receive supervisor feedback on video presentation	Work on thesis with Supervisor(s) guidance. Prepare 5-minute video presentation with Supervisor(s) guidance.	***Video Presentations Due – Course Coordinator to provide further details.***
5	Receive supervisor feedback on thesis **Submit Master Thesis**	Work on thesis with Supervisor(s) guidance.	***Master Thesis Due – Submit on-line by 4.00 pm onFriday.***

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