

# **SOLA4953, SOLA9453**

Research Thesis C

Term 2, 2022



## Course Overview

### Staff Contact Details

#### Convenors

| Name           | Email  | Availability                        | Location      | Phone           |
|----------------|--|-------------------------------------|---------------|-----------------|
| Merlinde Kay   | <a href="mailto:m.kay@unsw.edu.au">m.kay@unsw.edu.au</a>           | please email to make an appointment | TETB room 215 | 9065 5520       |
| Murad Tayebjee | <a href="mailto:m.tayebjee@unsw.edu.au">m.tayebjee@unsw.edu.au</a> | please email to make an appointment | TETB room 242 | +61 2 9065 6128 |

### School Contact Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

**Phone:** (+61 2) 9385 8500 – Nucleus Student Hub

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

## Course Details

### Units of Credit 4

### Summary of the Course

The thesis provides an opportunity for you to bring together engineering principles learned over your 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 are complex, open-ended problems that allow room for your creativity, and the acquisition, analysis and interpretation of results. There are multiple possible solutions or conclusions at the outset and sufficient complexity to require a degree of project planning. The thesis requires you to formulate problems in scientific or engineering terms, manage a technical project and find solutions by applying scientific and engineering methods. You will also develop their ability to work in a research and development environment. You must identify a supervisor and project prior to enrolling in this course. This is the last course of the 3 course thesis structure.

### 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.

### Course Learning Outcomes

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. | PE1.5, PE2.1, PE2.3        |
| 2. Critically reflect on a specialist body of knowledge related to their thesis topic.                                  | PE1.1, PE1.3, PE1.6, PE3.2 |
| 3. Apply scientific and engineering methods to solve an engineering problem.  | PE2.1, PE2.4, PE3.4        |
| 4. Analyse data objectively using quantitative and mathematical methods.  | PE1.1, PE1.2, PE1.4, PE2.1 |
| 5. Demonstrate oral and written communication in professional and lay domains.  | PE3.1, PE3.2, PE3.3        |

### BE (Hons) Program Learning Outcomes

1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
4. Discernment of knowledge development and research directions within the engineering discipline.
5. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
7. Application of established engineering methods to complex engineering problem solving.
8. Fluent application of engineering techniques, tools and resources.
9. Application of systematic engineering synthesis and design processes.
10. Application of systematic approaches to the conduct and management of engineering projects.
11. Ethical conduct and professional accountability.
12. Effective oral and written communication in professional and lay domains.
13. Creative, innovative and pro-active demeanour.
14. Professional use and management of information.
15. Orderly management of self, and professional conduct.
16. Effective team membership and team leadership.

## Teaching Strategies

The course is taught as an individual research project, to develop a level of research skills and autonomy.

## Additional Course Information

### Contact Hours, Contact Details, and Consultation times

There are no formal lectures for this course. Students should stay in contact with their nominated supervisor throughout the three thesis terms, perhaps at a pre-organised weekly meeting time. If a student would like to contact their supervisor outside of a pre-organised weekly meeting, email is the preferred method of contact.

The School would also like to arrange a seminar during thesis B, provided that enough students are interested in attending. The seminar would provide students with information about writing a thesis. Students will be contacted about this in due course.

Please see the course [Moodle](#).

## Important Links

- [Moodle](#)
- [Health and Safety](#)
- [Student Resources](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)
- [Engineering Student Support Services Centre](#)
- [UNSW Photovoltaic and Renewable Energy Engineering](#)

## Course Details

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 6 hr/wk on this course. The additional time should be spent in making sure that you understand the material, completing the set deliverables, further reading, and planning.

## Thesis Guidelines

- The prerequisites for Thesis B (SOLA4952/9452) and Thesis C (SOLA4953/9453) are Thesis A (SOLA4951/9451) and Thesis B (SOLA4952/9452), respectively.
- With School/course co-ordinator permission, students may take Thesis B and C together. This option is limited only to students who can demonstrate the ability to progress. This will require a prerequisite waiver to waive the Thesis B requirement for Thesis C. Students must inform the co-ordinator before they start thesis B.
- **Students must take Thesis courses in consecutive terms**, unless exceptional circumstances are demonstrated by the student through the standard channels and accepted by the School. If a student fails to do this a penalty will apply of a 30% reduction in assessment marks for the thesis course.
- Thesis A and B will initially carry a 'satisfactory' (EC grade) or 'not satisfactory' (EF grade). A student's final Thesis mark for A, B and C will reflect the overall weighted percentage of marks achieved during all three courses once Thesis C is completed, and the earlier EC grades will be replaced with the final mark at that time. A student **MUST** pass each thesis course to be allowed to move onto the next stage.

## School Prizes

Two School prizes are associated with this course:

1. The Photovoltaics Thesis Prize for the best performance in an undergraduate thesis in the area of photovoltaics in the Bachelor of Engineering program. This prize is a cheque for \$500.
2. Renewable Energy Thesis Prize For the best performance by an Undergraduate student in a Renewable Energy Thesis. This prize is a cheque for \$500.

<https://my.unsw.edu.au/student/prizes/PrizesEngineering.html#SchoolofPhotovoltaicandRenewableEnergyEngineering>

## Health and Safety

The University has a legal obligation to provide a healthy and safe workplace for employees and students. Students must follow reasonable directions of their supervisors and the Course Coordinator.

One way in which our safety is protected is through the preparation, review and approval of Risk Assessments. Students intending to carry out practical work are required to prepare or otherwise obtain a Risk Assessment for approval by their supervisor and by the Space Manager in whose space the work is to be done.

Risk Assessment templates for SPACES, EQUIPMENT and PROCEDURES are available on the moodle site. Risk Assessments and examples are already available, through your supervisor for many

activities. Completed or modified versions should be submitted as signed hard copies and MS Word electronic versions to Kian Fong Chin (kf.chin@unsw.edu.au).

## Assessment

| Thesis C Task      | Due Date                                    | Graded                       |
|--------------------|---|------------------------------|
| Thesis Submission  | Week 10- Friday 5th August<br>12pm (midday) | 60%<br>(Supervisor/Assessor) |
| Video Presentation | Week 10- Friday 5th August<br>5pm           | 5%                           |

Details on specific requirements of the actual thesis submission can be found on moodle.

Students must make sure they have downloaded the template for writing the thesis.

Thesis Part C has a total of 100 marks, broken down as:

| Assessment                         | % contribution to final mark 100% |
|------------------------------------|-----------------------------------|
| Literature review and project plan | 10                                |
| Seminar Presentation               | 10                                |
| Progress Update                    | 5                                 |
| Final Report                       | 60                                |
| Participation and Engagement       | 10                                |
| Video Presentation                 | 5                                 |

If there is a significant difference between the marks, the supervisor and assessor will be asked to discuss the marks and to come to an agreement. If this is not possible, a second assessor will be appointed. The two marks that are closest to within 10 will be taken.

**NOTE:** Late written work will be penalized 5 marks per day (out of the 60 marks awarded for the thesis). Penalty applies until the marks for the course decrease to 50. Any thesis not turned in within 6 weeks after the deadline will be finalised at zero (0) marks

## Presentation

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

## Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 5% per day of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

## Marking

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

## Overview of all Assessments For Thesis A/B/C

**Thesis A:** It is intended that Thesis A cover the scoping, planning, and completing preparations for the project.

1. Project Plan – this will comprise a 1-2 page document explaining the justification for their project, a rough layout of a plan of work throughout the project, including any software, methods etc., they need to be trained on. (Thesis
2. Literature and Progress review– this should comprise the relevant literature and background of the topic, the problem statement and motivation for the work and a detailed research plan. For details of what to include see below in Assessment

**Thesis B:** The primary intention behind Thesis B is to ensure students stay on track with their projects and project work as they progress through the year.

1. Progress update – a form on moodle where you update your progress, and talk about any obstacles or changes to your original plan.
2. Seminar Presentation – The seminar should include overall aim of project, intended outcomes, a progress report including a detailed methodology, and preliminary results.
3. Progress Report – this should comprise a thesis table of contents outlining the structure of the thesis. A 2-5 page summary on goals and tasks accomplished and future work.

**Thesis C:** Thesis C continues the project work. The key deliverable is the Written Report. The following course assessments relate to the student's research planning, conducting the research project and writing the thesis document, and disseminating the results in different forms.

1. Participation – assesses the students commitment and engagement to the project assessed by the supervisor - see participation criteria document. (Assessed over Thesis A, B and C)
2. Final Report – the final thesis document (Thesis C)
3. Dissemination of work – Students will participate in an online 3-minute thesis presentation presenting their work (Thesis C)

A table with an overview of the deliverables is provided in the Course Outline for SOLA4591/4951

\* For any student wanting to complete Thesis B and C concurrently, additional assessment criteria will be put in place. It will be expected that any student requesting this will be at the stage of submitting 1. the literature review with preliminary results included. They must be at a DN level for all aspects to be allowed to move to finishing in two terms. 2. the progress report document will be due week 3 of term 2 of thesis, if not at a DN level the student will have to go back down to thesis B only.



| Assessment task              | Weight | Due Date            | Course Learning Outcomes Assessed |
|------------------------------|--------|---------------------|-----------------------------------|
| 1. Thesis Project and Report | 60%    | 05/08/2022 12:00 PM | 1, 2, 3, 4, 5                     |
| 2. Video presentation        | 5%     | 05/08/2022 05:00 PM | 5                                 |
| 3. Participation             | 10%    | Not Applicable      | 1, 2, 3, 4, 5                     |

## Assessment 1: Thesis Project and Report

**Assessment length:** No more than 80 pages

**Submission notes:** Submit to both the Turnitin assignment and the grading for thesis section

**Due date:** 05/08/2022 12:00 PM

**Deadline for absolute fail:** 5 days after the due date

Thesis C continues the project work. The key deliverable is the Written Report. The following course assessments relate to the student's research planning, conducting the research project and writing the thesis document, and disseminating the results in different forms.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

### Assessment criteria

Students must submit an electronic copy only via turn-it-in on Moodle AND in the thesis marking section by 12pm (midday) Friday 22nd April. Even where a student has been affected by an illness or misadventure, they must submit as much of their thesis as possible, and then lodge a Request for Special Consideration through UNSW Student Central. Students who do not submit by the deadline will be penalised. An extension of time may only be granted after receipt of a Request for Special Consideration, with consideration of the incomplete thesis and only under exceptional circumstances beyond the student's control. For further details please see the section below titled 'Thesis Withdrawal, Suspension, and Time Extension'. Guidance for writing the thesis, and the specifications for its presentation will be posted on Moodle. Each student is expected to submit their own individual thesis. The thesis must be a standalone piece of work, where even if students have worked in a group it must be able to be viewed as an individual piece of work on its own.

### Additional details

The marking criteria is available on moodle

## Assessment 2: Video presentation

**Assessment length:** 3 minutes

**Submission notes:** Submit to the Voicethread Presentations under Assessment for Thesis Submissions Section

**Due date:** 05/08/2022 05:00 PM

**Deadline for absolute fail:** 5 days after due date

In addition to submitting a thesis, students are expected to present a video presentation, in week 10. The video provides relevant information about their project, more details on what to include will be put on the moodle course site.

**Assessment criteria**

Details can be found on moodle

**Assessment 3: Participation**

This is given by your supervisor which assesses your engagement and participation throughout the thesis project

**Additional details**

See Moodle for details

## Attendance Requirements

### Course Schedule

There are no lectures for this course. Please make sure you stay in contact with your supervisor. It is your responsibility to arrange regular meetings and stay up to date with all deliverables for thesis.

[View class timetable](#)

### Timetable

| Date                         | Type       | Content   |
|------------------------------|------------|---|
| Week 10: 1 August - 5 August | Assessment | Thesis Project and Report: Submit to both the Turnitin assignment and the grading for thesis section        |
|                              | Assessment | Video presentation: Submit to the Voicethread Presentations under Assessment for Thesis Submissions Section |

## Resources

### Prescribed Resources

Your supervisor will provide access to the resources you need.

### Recommended Resources

- Start work on your topic as soon as you can. This will give you plenty of time to address problems that you may encounter on the way.
- Plan the progress of your thesis using, for example, a GANNT chart, and revise the plan as it proceeds.
- Start by performing a review of the available literature on research completed in the same area as your project. This will help you further define your topic and the direction your thesis will take.
- Order materials as soon as you are sure what you need.
- *EndNote* is bibliographic software that allows you to manage your references in a database. References can be inserted from inside MS Word documents to create in-text citations and bibliographies in various referencing styles. The program is available free to UNSW staff and students. Information and links are available through the UNSW Library:  
<http://info.library.unsw.edu.au/skills/endnote.html>.
- The Learning Centre has an “Honours thesis writing for engineering and science students” guide at: <http://www.lc.unsw.edu.au/thesis/index.html>

Does your thesis 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 come 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.

Also, projects involving animals will need ethics approval.

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

- If you have a question – ask!

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

## **Course Evaluation and Development**

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

## **Laboratory Workshop Information**

Supervisors will provide information on what is needed for the project

## 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](http://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](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Important 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](#)
- [Equitable Learning Services](#)

## Disclaimer

*This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.*

## CRICOS

CRICOS Provider Code: 00098G

## Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

## Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

| Program Intended Learning Outcomes  |   |
|---|---|
| Knowledge and skill base  |   |
| PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline | ✓ |
| PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline          | ✓ |
| PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline  | ✓ |
| PE1.4 Discernment of knowledge development and research directions within the engineering discipline  | ✓ |
| PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline  | ✓ |
| PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline                             | ✓ |
| Engineering application ability   |   |
| PE2.1 Application of established engineering methods to complex engineering 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  | ✓ |
| Professional and personal attributes  |   |
| PE3.1 Ethical conduct and professional accountability   | ✓ |
| PE3.2 Effective oral and written communication in 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   |   |