Faculty of Engineering

School of Photovoltaic and Renewable Energy Engineering

SOLA4952 Thesis B

Term 3, 2019

Contents

Course Description and Eligibility

The Thesis Project is carried out in the last three terms of the BE program. The course comprises four units of credit in each Term. As a rough guide students are expected to work on their thesis for at least 6 hours per week in each term. During this time students are involved with directed laboratory and research work on an approved topic and under the guidance of members of the academic and research staff. Students may commence the thesis in either term 1, 2 or 3 of an academic year.

The thesis is an opportunity for you to demonstrate what you have learned throughout your studies in PV and RE. It is expected that your research, analytical work, and writing will far exceed the level of work completed in your second year project. The thesis comprises a large portion of student's WAM calculations which is used to assign Honours levels and to assess APA applications. The School also awards a prize for the best thesis in photovoltaics every year. For details about this prize, please see the University Calendar.

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 (mapped to BE Program Learning Outcomes below)
At the conclusion 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. (7, 8, 9, 10)
2. Critically reflect on a specialist body of knowledge related to their thesis topic. (3)
3. Apply scientific and engineering methods to solve an engineering problem. (7)
4. Analyse data objectively using quantitative and mathematical methods. (2, 7, 8)
5. Demonstrate oral and written communication in professional and lay domains. (12)
6. Complete a risk assessment associated with a project.

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.

Thesis Guidelines

- The prerequisites for Thesis B (SOLA4952) and Thesis C (SOLA4953) are Thesis A (SOLA4951) and Thesis B (SOLA4952), respectively.
- With School permission, students may take Thesis B and C together. This option is be 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 take Thesis courses in consecutive terms, unless exceptional circumstances are demonstrated by the student through the standard channels and accepted by the School.
- 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.

Lectures and Information Seminar

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. It is very important in the early stages of your project to be in contact with your supervisor to ensure that you have a clear understanding of the topic, what is required, and to check that what you are

doing is addressing the aims of the project. 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.

Thesis Course Administration

Dr Merlinde Kay is the Thesis Course Coordinator.

Technical issues should be resolved with the help of the nominated supervisor. However, if you experience any administrative issues, please see Dr Kay.

Dr Merlinde Kay
Room: 215, TETB
Ph: 9385 4031
Email: m.kay@unsw.edu.au

Please do not leave problems and questions unresolved, as this could affect the successful completion of your thesis. Talk to your supervisor about any concerns or issues you may be experiencing, and if this becomes difficult, please see the Thesis Coordinator, the Undergraduate Coordinator, or even staff from the Counselling Service, www.counselling.unsw.edu.au, or the Learning Centre, www.lc.unsw.edu.au.

Website

The official subject site is Moodle and can be found by navigating to https://moodle.telt.unsw.edu.au/login/index.php . Here you will find information about the course, day-day announcements, and handouts, etc.

The School also encourages students who wish to do an industry-led thesis topic. In this case the mentor from industry would be the student's co-supervisor, however an academic staff member from the School must act as the supervisor of the thesis. Students wishing to do an industry-led thesis must obtain approval from an academic of the School to supervise the topic and should submit a signed letter from the industry representative and academic supervisor with a brief outline of the project with their Thesis Nomination Form.

Assessment †

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 A)

2. Literature 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. The literature review document will contain the following items: (Thesis A)

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 Report – this should comprise their methodology which includes their goals, tasks and outcomes and preliminary work. As part of the progress report a thesis table of contents should also be included outlining the structure of the thesis.
2. Seminar Presentation – The seminar should include aspects of the literature review/progress report and preliminary results as well as future plans.

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. Poster – Students will participate in a poster afternoon presenting their work (Thesis C)

Overview of all deliverables is below, specific due dates for each term, as well as the criteria will be found in each terms course outline.

Deliverables:

	Assessments	Due Week	Contribution to final mark	Assessed by
Thesis A	1. Submit nomination form	1	Loss of 2% out of 10% participation mark if not submitted	Thesis Co-ordinator
	2. Project Plan	3	Loss of 2.5% out of 10% participation mark if not submitted	Supervisor
	3. Literature and Progress Review	10	10%	Supervisor/Assessor (50/50)
Thesis B*	1. *Progress Update	3	Loss of 2.5% out of 10% participation mark if not submitted	Supervisor
	2. Seminar Presentation	6	10%	Supervisor/Assessor (50/50)
	3. Progress Report	9	5%	Supervisor
Thesis C	1. Final Report	11	60%	Supervisor/Assessor (50/50)
	2. Participation	10	10%	Supervisor
	3. Poster	11	5%	Supervisor/Assessor (50/50)

NOTE: For Thesis A,B mark will be EC, and a final mark is given in Thesis C taking into account the breakdown.
* 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 progress report in week 3 instead of week 8 and having to give a short presentation to both assessor and supervisor (a 5 minute thesis presentation). 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.

Failure to submit any assessment on time will result in a 5% per day penalty.

Thesis B (SOLA4952) Assessment

A Seminar and progress report are the main assessments for thesis B, and your performance in thesis B to date.

Task – T3	Due Date	Graded
Progress Update	Week 3 – Friday 5pm 4th October	Loss of 2.5% from participation mark if not submitted (**No marks lost if handed in on time)**
Seminar Presentations **Presentation due on Moodle** **24th October Thursday: room G22, 10am – 2pm** **Room 110, 3pm -5pm** **25th October Friday: room 110, 12pm - 5pm**	Week 6 22nd October by 3pm Week 6 – 24th – 25th October	10%
Progress Report	Week 9 – 15th November Friday 5pm	5%

Progress Update – week 3
This will comprise a 1-2 page document (template on moodle) explaining the plans for T2 for your project, a rough layout of the methodology for the project, and what you have accomplished so far.
Please submit your plan to moodle and email a copy to your supervisor by week 3 - Friday 21st June by 5pm.
Note: a failure to do so will cause a deduction of 2.5% from the 10% of your participation mark

Seminar – week 6
Technical skills are 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

demonstrate your communication skills. Your talk should be addressed both to your examiners 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 area. Students are assigned 20 minutes for their seminar presentation which includes approximately 5 minutes of question time. Students are also required to upload a copy of their presentation to moodle before the start of seminar week (in this case due Tuesday 22nd October by 3pm). Failure to do so will incur a penalty of 5% from your seminar mark.
Upload the presentation in the following format (Studentnumber_SURNAME_Presentationdate_time)
e.g. 1234567_KAY_THU_1100

In addition to giving a seminar, you are required to attend seminars given by at least four other students and to chair the speaker after you.
Your responsibility as chair:

- Introduce the next speaker
- Keep a track of the time – give the speaker a 2 minute warning before the 15 minutes is up
- Ask the audience for questions making sure they do not go longer than 5 minutes
- Thank the speaker

Seminar Attendance Sheets are to be signed by a member of academic staff who has attended that seminar.

The assessment will take account of the following:

Criteria	Mark	Marked out of	Guides
Structure - **logical development** - **clarity of description**		**10%**	**Unsatisfactory <5%** **Adequate (5%-6.5%)** **Good (6.5%-7.5%)** **Very Good (7.5%-8.5%)** **Outstanding (8.5%-10%)**
Subject Matter - **Contents of the problem and underlying theory** - **Knowledge of the area of investigation** - **Relation to published work**		**20%**	**Unsatisfactory <12.5%** **Adequate (12.5%-16.5%)** **Good (16.5%-19%)** **Very Good (19%-21.5%)** **Outstanding (21.5%-25%)**
Technical Content - **Quality of thesis work** - **Methodology and work plan** - **Preliminary Results**		**35%**	**Unsatisfactory <15%** **Adequate (15%-20%)** **Good (20%-23%)** **Very Good (23%-26%)** **Outstanding (26%-30%)**
Presentation (i.e. English usage, rate of speech, audibility, use of aids, platform manner etc.)		**20%**	**Unsatisfactory <10%** **Adequate (10%-13%)** **Good (13%-15%)** **Very Good (15%-17%)** **Outstanding (17%-20%)**
Competence in handling questions		**10%**	**Unsatisfactory <5%** **Adequate (5%-6.5%)** **Good (6.5%-7.5%)** **Very Good (7.5%-8.5%)** **Outstanding (8.5%-10%)**
Chairing students seminar and presentation uploaded on time		**5%**	

If failed attendance for the seminars a loss of 1% from the seminar mark.

Progress Report – week 9

The Progress Report will cover the following aspects: (more details will be posted onto the moodle page)

Descriptor	Weighting	
Mark bands		
Progress Report (10-12 pages)	60%	Will show how you have achieved the work against the original project plan. Will cover a detailed discussion on work completed, showing an understanding of their results to date and the implications of these results compared to what they found in the literature.
Reflection on Progress (up to 2 pages)	15%	Compares and contrasts the thesis, with industrial or other academic experiences. Evaluates changes in learning through the thesis and demonstrating self-awareness and develops plans that build on the research experience
Revised project plan (up to 2 pages)	15%	Discussions on future project plan and expected results. A reasonable strategy to ensure progress is stated.
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. References in text match reference list (and vice versa) and are cited properly.

Plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.*

Examples include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;

- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students 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 items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

† Adapted with kind permission from the University of Melbourne.

To ensure that you are not penalised for plagiarism, ***please check that all material used in your report is referenced and attributed properly and that unreferenced text and figures are your own.***

Thesis Withdrawal, Suspension, and Time Extension †

Requests for thesis withdrawal, suspension or extension should be made in writing to the Thesis Coordinator. The following procedures and rules will be applied when a student wishes to withdraw from, or suspend SOLA4952. These rules supplement the UNSW deadlines, conditions, and procedures for withdrawing from a course.
PLEASE NOTE: **Thesis C must be completed in the term following Thesis B**

1. In every case where a student wishes to postpone completion of the thesis, i.e. to suspend work and complete the thesis in a later session, written approval of the supervisor must first be obtained before submitting a written request to the Thesis Co-ordinator.

   The supervisor may refuse approval for a variety of reasons, e.g. that the necessary facilities will no longer be available at the later date, that the supervisor will be absent, or that the student has already had overlong time on the particular thesis topic, etc.

   When a supervisor feels that a student is incapable of successfully completing the selected thesis topic, the supervisor should strongly advise the student to withdraw from that particular topic and seek a new one, possibly with a different supervisor.

2. A student who is permitted to withdraw without failure from subject SOLA4952 should re-enrol in the following session with a Thesis Nomination Form. Note that under normal circumstances discontinuation without failure or financial penalty is possible only up to the Census Date.

3. When a student is granted an extension there may be a penalty resulting in a reduction of the thesis mark. This will be imposed according to rules approved by the Thesis Coordinator and will be done after consultation with the thesis supervisor. Supervisors and assessors marking the thesis should however award a mark entirely on the merits of the thesis, the reduction then being made subsequently by the Thesis Co-ordinator.

Prizes

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

Wal Read Memorial Prize

The Australian and New Zealand Solar Energy Society awards annual prizes for final for reports on "final year project covering some aspect of solar energy".
According to the guidelines:

> *"Nominations must be received by 20th February each year accompanied by an official nomination form signed and dated by the Head of Department. Valid entries will be those projects completed in the previous year. Only two entries may be nominated from any one Department."*

Further information is available at: http://www.anzses.org/index.php?q=node/25

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 Blackboard 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).

Hints and Tips for the Thesis Course

- 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!