



GSOE9010

Engineering Postgraduate Coursework Research Skills

Term Three // 2020

Course Overview

Staff Contact Details

Convenors

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School Contact Information

Faculty of Engineering

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Course Details

Credit Points 6

Summary of the Course

This course explores the various skills and processes in carrying out an engineering research project: formulating a research problem, exploring prior work, designing experiments to test hypotheses, evaluating the results and presenting the work both verbally and in a written report.

There are weekly lectures and tutorials, Moodle course activities (e.g. Pre-lecture quizzes) and group assignments as well as individual assignments. The course themes include: group dynamics, formulating a research topic, locating and critically evaluating the literature, engineering research methods, writing about research, speaking about research, academic integrity.

Course Aims

This course aims to prepare students to carry out their research project in later semesters of their MEngSc program or for undertaking research projects in an industrial setting. This course covers skills common to both contexts.

1. Develop students' skills in identifying research problems, critically evaluating the literature, designing experiments to demonstrate the effectiveness of the solution, and developing a research proposal relating to an engineering research project.
2. Develop students' skills in writing a well-structured and coherent research document.
3. Develop students' understanding and skills in effectively communicating their developed work both verbally and in a written report.
4. Develop students' skills in working effectively in a research team.
5. Raise awareness and practice as an ethical researcher.
6. Develop students' understanding of building a research profile
7. Provide students with strategies for constructively giving and responding to feedback.

Course Learning Outcomes

1. Locate and critically analyse research papers, and develop a review of literature on a specific research topic.
2. Formulate a small research topic in an area of engineering problem, research hypotheses and aims and describe methodologies to test these in a research proposal report.
3. Design solutions to the research problem, design experiments and analyse methods to demonstrate the effectiveness of the solution
4. Present the results of the research effectively to audiences
5. Work effectively in a research team
6. Develop a research profile
7. Write a well-structured and coherent research document
8. Practice as an ethical researcher.
9. Require students to produce an individual research proposal describing a problem and a research proposal for investigating it
10. Require students to produce a poster and video for a team innovation project exploring a global engineering research challenge, case study and proposed solution
11. Require students to complete pre-lecture quizzes and actively participate in workshops

conducted during the lecture period. Each student is required to facilitate one of the workshops.

This course contributes to the development of the following graduate capabilities:

- understanding of their discipline in its interdisciplinary context (Team project)
- capable of independent and collaborative enquiry (Proposal, Team project)
- rigorous in their analysis, critique, and reflection (Proposal)
- able to apply their knowledge and skills to Solving problems (Lectures, Proposal)
- ethical practice (Lectures)
- capable of effective communication (Lectures, Team project, Proposal)
- information literate (Team project)
- digitally literate (Team project, Proposal)
- enterprising, innovative and creative (Proposal)
- capable of initiating as well as embracing change (Lectures)
- collaborative team workers (Team project, Lectures)
- capable of independent, self-directed practice (Team project, Proposal)
- capable of operating within an agreed Code of Practice (Lectures)

Teaching Strategies

GSOE9010 employs student-centred learning as the basis for its instructional design and emphasizes the importance of active learning. The teaching in this course is based on a flipped-classroom philosophy and includes project-based learning.

The course provides a range of student-centred activities that draw on the prior knowledge of the students to exercise the particular research skills that the course develops. The lectures are designed to be a focal point for each week, providing a supportive forum for open discussion on the task in hand and supported through exercises in the tutorial classes, quizzes and assignments. Each element is designed to encourage independent and collaborative study and enquiry.

Teaching strategies used during the course include:

- small-group learning to understand the importance of teamwork in an engineering context and to demonstrate the use of appropriate collaboration to address research goals;
- explicit teaching including lectures and a range of teaching strategies to foster interest and support learning;
- structured occasions for reflection on learning, to allow students to reflect critically on topics discussed;
- extensive opportunities for whole group and small group dialogue and discussion, allowing students the opportunity to demonstrate their capacity to communicate. These activities will occur in a climate that is supportive and inclusive of all learners.

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Additional Course Information

The only assumed knowledge we make is that students have completed an undergraduate degree in some branch of engineering.

Assessment

Standard UNSW grades (HD, DN, etc.) will be awarded. A combined overall mark of at least 50% is required in order to pass this course. Full details on what is required for each submission will be posted on the course web site well before the due date. The detailed assessment information for each Assessment can be found in Moodle: "About the course" section.

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Pre-lecture Quizzes	10%	Weekly on Tuesday at 2PM, weeks 2-9	1, 2, 3, 4, 5, 6, 8, 11
Facilitation in Workshop	10%	Allocated week	4, 5, 8, 11
Team Innovation Project	25%	TUESDAY 2PM for Weeks 3-10	1, 2, 3, 4, 5, 7, 8, 10
Individual Research Proposal	55%	Tuesday, Week 5 (12/10/20) at 2PM – submit Research Proposal Outline Friday, Week 10 (20/11/20) at 5PM – submit final proposal using the "TurnItIn" system.	1, 2, 3, 7, 8, 9

Assessment Details

Assessment 1: Pre-lecture Quizzes

Start date: Not Applicable

Length: Weeks 2-9

Details:

In the GSOE9010 course, 8 of the lectures are run in 'flipped classroom' mode, which means that students learn the basics before coming to class and then discuss and engage more actively with the concepts during class. The purpose of the online quizzes is to check students' understanding of the lecture videos. Once students understand the basic concepts of the topic, then can benefit more from the discussion hour and the group topic workshop.

Pre-lecture quizzes will be placed on the Moodle site to accompany the video material for each lecture. Students should complete each quiz after having viewed the corresponding videos. Students will be allowed 1 attempt for the quiz. Each weekly quiz is worth 1.25 marks.

More details of the Online Multiple Choice Quizzes can be found in the Moodle of "About the course" section.

Additional details:

Added in Moodle.

Turnitin setting: This is not a Turnitin assignment

Assessment 2: Facilitation in Workshop

Start date: Allocated week

Length: Allocated week

Details:

Developing good communication skills is essential for every researcher. Verbal communication skills are at least as important as written skills, but are usually less developed. Often, we think verbal communication skills are primarily about “giving presentations”. However, the more advanced and more useful skill is facilitation. It is trickier than presenting because you are not completely in control! Interactions with and input from participants play a bigger role than anything you say as facilitator or how you say it. Essentially, facilitation is about gathering the best thinking from all the individuals in a group. If you can master facilitation, then you have the skills to run productive meetings, lead research activities, and make the most of collaboration opportunities, either internally or externally from your team.

Students work in groups (usually 3 members) to prepare and facilitate a 50-minute workshop during the first part of an allocated tutorial period. The workshop will follow a list of class activities; activities will be posted on the class Moodle site in the week prior to your facilitation. (Note: Workshop facilitation is mandatory. Once workshop topics have been allocated, no changing of topic or week of presentation is allowed. A workshop cannot be delayed to another week. Any student who fails to present at the specified time will have to contact the lecturers for an alternative assessment. Please note medical or other supporting documentation will be required.

Additional details:

Added in Moodle.

Turnitin setting: This is not a Turnitin assignment

Assessment 3: Team Innovation Project

Start date: Week 2

Length: Weeks 3-10

Details:

In 2012, Engineers Australia released a report called “Innovation in Engineering”. In real academic and industrial settings, research work is achieved collaboratively in groups. Teamwork is an important research skill and is a focus of this assessment task.

Students will work in teams of 4 to 6 people to investigate a topic chosen in the first two tutorials. You should explore the engineering aspects of the topic, identifying research and innovation opportunities. The team should collaborate to assemble a set of resources on the topic, using whatever collaboration

tools you wish. There are a number of milestones to be submitted during the semester (e.g. group roles, mind-map of the topic, bibliography, etc.). On Tuesday of Week 7, each team must submit a poster presenting the global status of research on that topic. Then, in Week 10, each team must submit a 3-minute video presenting a relevant specific case study and a proposal for an innovative engineering solution to the problem. The team will be awarded a mark for the poster and video, and each team member's mark will then be modified by the peer-assessment of their individual contribution.

Additional details:

Added in Moodle: "About the course" section.

Submission notes: Each team will produce a poster and a video (plus submit weekly sub-tasks)

Assessment 4: Individual Research Proposal

Start date: Week 1

Length: Throughout the course

Details:

The research proposal is the major individual assignment in this course, and aims to bring together in a single document many of the ideas covered in the lectures and workshops. Students continuing on to undertake a Research Project in their MEngSc program can use it as a way of developing a proposal to show to potential supervisors. Students who have been exempted from the Research Project can use it as practice for developing research proposals in an industry setting. Whichever focus you take, the document must satisfy the requirements described below. The proposal should be developed by you individually, based on work carried out by you over the course of the semester to think about an engineering research problem in your own discipline.

Each student will choose a topic from their own discipline on which to develop a research proposal. This topic does not have to be related to the topic of their team project. The final proposal must contain describe the topic, current practice (and its deficiencies), and suggest an innovation to improve practice, along with a description of experimental work and its analysis that would be required to convince others that the innovation did improve practice. (Note that this is a proposal so you are not required to carry out any experiments).

Additional details:

Added in Moodle: "About the course" section.

Submission notes: Tuesday, Week 5 (12/10/20) at 2PM – submit Research Proposal Outline Friday, Week 10 (20/11/20) at 5PM – submit final proposal using the "Turnitin" system.

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

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O Week: 8 September - 9 September	Lecture	Please check Moodle Module for the preparation work, lectures/workshops schedule, project work schedule for weeks 1-10: https://moodle.telt.unsw.edu.au

Resources

Prescribed Resources

There is no formal textbook for this course, you may wish to consult the "recommended resources" if you would like additional guidance.

Videos and other material will be made available as the course progresses. The course Moodle site will hold all of the resources you need, apart from the ones you discover yourself during your exploration of topics for the team project and the research proposal.

Recommended Resources

There is no formal textbook for this course, you may wish to consult the following resources if you would like additional guidance:

Academic writing for graduate students : essential tasks and skills, John Swales, Christine B Feak, 3rd ed., Ann Arbor, Mich. : University of Michigan Press, 2012

The Literature Review : A Step-by-Step Guide for Students, Diana Ridley, Sage Publications Ltd (UK), 2012

Critical Reading and Writing for Postgraduates, Mike Wallace, Alison Wray, Sage Publications Ltd (UK), 2016

Writing for Science and Engineering: Papers, Presentations and Reports, Heather Silyn-Roberts, Oxford : Butterworth-Heinemann. 2000

The Pyramid Principle Logic in Writing and Thinking, Barbara Minto, 2008

Course Evaluation and Development

Your feedback is essential for its future development and we adjust the course in response to the comments we have received from student. With your feedback, we can continue adapting the course to best meet the needs of students in the future. Towards the end of the course you will be invited to provide feedback using a "My Experience" link on Moodle.

Laboratory Workshop Information

Please check Moodle for your Tutorial allocation: <https://moodle.telt.unsw.edu.au>

"Group allocation for Tutorials, Facilitation and Team Project-Toggle"

Submission of Assessment Tasks

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.

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.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark, or
- Online quizzes where answers are released to students on completion, or Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or Pass/Fail assessment tasks.

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.

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 or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

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

Academic Information

Other Matters

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

Please note that UNSW now has a Fit to Sit / Submit rule, which means that if you sit 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 supplementary assessment, please see the information on UNSW's Special Consideration page.

II. 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](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

Image Credit

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Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW

Kensington campus is located.