Course Outline

GSOE9010
Engineering Research Skills
Semester 2 2015

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Course Details

Course Code:	GSOE9010
Course Title:	Engineering Research Skills
Units of Credit:	6
Course WebSite:	http://www.cse.unsw.edu.au/~gs9010/
Handbook Entry:	http://www.handbook.unsw.edu.au/postgraduate/courses/2015/GSOE9010.html

Classes

Lectures are held in Law Theatre G04 from 4pm on Mondays. In weeks 1,2,12, we will spend the whole time in the lecture theatre. In weeks 3-11, we will spend the first hour in the lecture theatre, and the second hour in rooms G16/G17/G18 in the Tyree Energy Technology Building (a short walk from the lecture theatre).

Course Staff

Staff Name	Role	Email	Phone
John Shepherd	Lecturer	jas at cse.unsw.edu.au	93856494
Emily Mitchell	Course Convenor	emily.mitchell at unsw.edu.au	93857284
Mona Wong	Course Admininstrator	p.wong at unsw.edu.au	

Contacting Us

Administrative queries (e.g. tutorial enrolment, late submission of work, special consideration) should be directed, in the first instance, by email to *both* lecturers. If you send mail to just one of us, it will be ignored.

Course Summary

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.

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.

Student Learning Outcomes

After completing this course, students will be able to:

1. formulate a research problem in engineering
2. conduct effective literature searches and filter relevant material
3. design a solution to the research problem
4. design experiments to demonstrate the effectiveness of the solution
5. collect and analyse experimental results
6. formulate valid conclusions from experimental results
7. present the results of the research effectively to an audience
8. write a well-structured and coherent research document
9. work effectively in a research team
10. develop a research profile
11. practice as an ethical researcher

The course requires students to produce the following:

- a collaborative research report describing an Engineering research challenge (Report)
- an individual research proposal describing the challenge and a research proposal for investigating it (Proposal)

In addtion, students will be required to complete pre-lecture quizzes and actively participate in workshops conducted during the lecture period. Each student is required to lead one of the workshops.

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

Graduate Capability	Acquired in
scholarship: understanding of their discipline in its interdisciplinary context	Report
scholarship: capable of independent and collaborative enquiry	Proposal, Report
scholarship: rigorous in their analysis, critique, and reflection	Proposal
scholarship: able to apply their knowledge and skills to solving problems	Lectures, Proposal
scholarship: ethical practitioners	Lectures
scholarship: capable of effective communication	Lectures, Report, Proposal
scholarship: information literate	Report
scholarship: digitally literate	Report, Proposal
leadership: enterprising, innovative and creative	Proposal
leadership: capable of initiating as well as embracing change	Lectures
leadership: collaborative team workers	Report, Lectures
professionalism: capable of independent, self-directed practice	Report
professionalism: capable of operating within an agreed Code of Practice	Lectures

Assumed Knowledge

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

Teaching Rationale

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

Teaching Strategies

Student-centred activities form the basis of the course, which will draw on the prior knowledge of the students and allow engagement in relevant and challenging experiences. The lectures are designed to be supportive and friendly, and include meaningful realistic learning tasks, as well as promote independent and collaborative study and enquiry.

Teaching strategies used during the course will 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.

Assessment

The following table summarises all of the assessment items in the course:

Assessment Item	Due Date	Weight
Participation in Lecture/Workshops	weeks 3-11	4%
Facilitation in Lecture/Workshop	allocatedÂ week	18%
Pre-lecture Quizzes	weeks 3-11	4%
Collaborative Research Report	week 12	25%
Individual Research Proposal	week 10	45%

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. We give a brief summary of each assessment item below:

Lecture/Workshop Facilitation: Students work in *pairs* to prepare and facilitate a 45 minute workshop during the second part of an allocated lecture 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.)

Lecture/Workshop Participation: The first hour of most lectures will be a Q&A session with the guest lecturer for that week. You should view all of the video material and read all of the written material before each lecture and come along with some questions on the material. You are also required to complete a quiz on the video material *before* the lecture. You should also participate fully in the workshops that follow the Q&A session. Participation will be assessed by course staff, who will be present during all workshop sessions. Note that you will be required to rate and provide feedback to the workshop presenters; you can only do this well if you participate fully.

Quizzes: Quizzes will be held in the tutorial classes in Weeks 7, 10 and 13. Each quiz requires you to answer multiple choice questions related to the content covered in the lectures and readings in the previous few weeks. In the week before each quiz, you will develop a "cheat sheet" for the quiz: a set of notes which summarize the topics being tested. Quizzes are done online during the tutorial class and so you will need access to a computer or smartphone that can connect to the UNSW campus-wide network. Test questions are chosen at random from a large pool, so no two students will have exactly the same set of questions. You can make only one attempt at completing the test.

(**Note:** If you have any issues with your test please contact John Shepherd. Please note medical or other supporting documentation will be required if you are unable to attend a quiz.)

Collaborative Research Wiki: Students will work in teams (of around 16 people) to investigate a selected topic from a list of Engineering Research Challenges. The team should collaborate online to assemble a set of resources on the topic and build a web site to present your team's view of the Challenge. Wikis will initially be private to the team, but will eventually be made public to the whole class. You can use a private Moodle forum for your initial collaboration and the Moodle WIki to build the web site.

(**Note**: each student's activity on the forum and Wiki will be monitored and part of the mark for this assessment item will be based on how much you contribute to the discussion and development of the Wiki.)

Written Report: Using guidelines similar to those for Australian Research Councli grants, you are to **individually** write report of around 2500-3000 words in length. Your report will be based on your collaborative research topic. The report has two parts:

- **Literature review**: a discussion and analysis of of the selected topic, including prior work on the topic and an analysis of relevant experimental techniques.
- **Project proposal**: based on your selected topic write a detailed proposal explaining how you would investigate one aspect of the topic, and how the results could positively contribute to the field of engineering.

The report should be submitted in PDF format. You must include a list of references and appropriate citations using Harvard style.

(**Note**: Late submission of the final Report attracts a penalty of 0.3 marks per hour late (i.e. your maximum report mark is capped at 50-0.3**hours*), including Saturday and Sunday. If you have a valid (generally, medical) reason for late submission, you must notify academic staff and submit a special consideration through the regular UNSW special consideration mechanisms.)

Academic Honesty and Plagiarism

Plagiarism is defined as "using the words or ideas of others and presenting them as your own". UNSW treats plagiarism by students as academic misconduct, which means that it carries penalties as severe as being

excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Learning Centre: Plagiarism and Academic Integrity
- MyUNSW: Plagiarism and Academic Misconduct

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism.

Course Schedule

Week	Lecture	Tutorial	CRG Tasks (due Fri)	Deliverables
1	Course Introduction	(none)	-	-
2	Consolidation: future challenges and collaborative research groups	Choose/explore CRG topic; facilitation exercise	-	-
3	Group Dynamics (Guest lecturer *Emily Mitchell*)	Tasks and Topic	Group rules and roles (A4)	-
4	Literature Search (Guest lecturer *John Shepherd*)	Group Dynamics	-	-
5	Writing (Guest lecturer *Pam Mort*)	Literature Search	Mind Map of topic (A3)	-
6	Academic Integrity (Guest lecturer *Gwyn Jones*)	Abstracts and Lit Review	List of Sources	-
7	Statistics (Guest lecturer *Rhett Evans*)	Plagiarism, Turnitin	-	-
8	Experimental Design (Guest lecturer *Ross Odell*)	Statistics; Indivdual Proposals	Report Skeleton	-
9	Presenting (Guest lecturer *Mona Wong*)	Experimental Design; Individual Proposals	Write Report Draft Sections	Individual Proposal turnitin check
10	No Lecture - Public Holiday	-	Edit Others' Report Draft Sections	Individual Proposal due
11	Research Profile, Publishing and Grants (Guest lecturer *Stuart Wenham*)	-	-	CRG Report turnitin check
12	CRG Presentations	-	Peer Assessment of Contributions; Self reflection	CRG Report due

Resources for Students

There is no textbook for this course.

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 CRG and the Proposal.

Course Evaluation and Development

This is only the second offering of this course and your feedback is essential for its future development. Based on the feedback we received from students last semester, we have made a number of changes to improve the delivery (e.g. decoupling the Proposal from the CRG topic, having tute groups as CRGs). With your feedback, we should be able to make the course even better in future.