GMAT4061

Thesis B

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Jinling Wang	jinling.wang@unsw.edu.au	You may contact me via Teams or email any time.	CE413	9385 4203

School Contact Information

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

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

This course is the second of two parts and is undertaken after the completion of GMAT4060 Thesis A. The Thesis involves formulating the designs for and solution to open-ended surveying and geospatial engineering problems, as well as challenging applications. The thesis project topics will be drawn from industry and emerging areas of research. The thesis projects will involve applications of material and skills learnt throughout the undergraduate program and will require creative thought. The course will include the preparation of relevant professional documents. GMAT4061 Thesis B involves the satisfactory preparation and submission of an individual thesis addressing the project plan defined in GMAT4060 Thesis A.

Course Aims

This course enhances the student's skills for undertaking scholarly enquiry by attempting to achieve a specific topic objective within a defined period of time. A significant component of the course relates to the review of literature, which promotes independent and reflective learning as well as increases students' capacity to develop information literacy. The thesis is expected to reinforce the student's ability and confidence in both the oral and written communication of technical information.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Undertake and execute a research project	PE1.4, PE3.2, PE3.5
2. Conduct a thorough literature review	PE1.3, PE1.5
3. Satisfaction of intellectual curiosity and contribution of original ideas and research	PE1.2, PE3.3
4. Development of transferable skills in the process of developing and crafting a feasible research project	PE1.6, PE3.1
5. Produce a self-contained technical report	PE1.1, PE1.4
6. Development of oral and written communication skills	PE3.2, PE3.4
7. Present the research in a seminar	PE1.4, PE3.2
8. Demonstrate an ability to work to produce designs which draw upon knowledge gained in the undergraduate program.	PE2.2, PE3.5
9. Be in a position to make a positive contribution to the workforce as a professional engineer.	PE1.5, PE2.3
10. Critically evaluate information and demonstrate deep	PE1.1, PE3.1, PE3.4

Learning Outcome	EA Stage 1 Competencies
engineering understanding of the given design project.	

Teaching Strategies

The thesis is an individual thesis in which each student works under the guidance of academic staff. Each student will have the flexibility in selecting a thesis topic which is related to contemporary practice or some emerging areas of research in the profession. The thesis research work involves investigations into various aspects of best professional practices or challenging technical development for engineering applications.

Major thesis project theme topics will be given to the class each year and the student will be guided to establish the project activities. The students are encouraged to propose her/his own thesis research topics. Some example project activities may include, such as, a) Positioning with smartphones, b) Building information modelling (BIM) with handheld laser scanners; and c) Geospatial mapping for construction automation; d) Ultra-Wide-Band (UWB) localization for construction site monitoring; e) Geospatial Digital Twins; f) Geospatial VR/AR/MR, g) Geospatial Metaverse.

A variety of teaching activities will be conducted to achieve optimal teaching and learning outcomes. Major teaching activities in this course are:
1. Regular lectures.
2. Workshop case studies.
3. Field work and experiments.
4. Class discussions.

The most important factors in learning are students' commitment and learning methods. You are encouraged to attend all the lectures and other teaching activities. In addition, relevant resources on the web (visit the course website for details) are of great help in understanding the basic concepts discussed in the lectures and the trends in the discipline of surveying and geospatial engineering, including modern positioning/mapping, navigation and timing technologies.

Based on some studies by a higher education research expert John Biggs, most active students in the class do not just listen, see, collect notes and take notes, but most importantly, they will "express understanding; raise issues, speculate, solve problems, discuss, answer questions and reflect". Students are strongly encouraged to do sufficient preparation for class discussions on selected topics.

An example of the approaches to learning is:

Private Study	• Review lecture material and research resources • Reflect on the literarure and research issues
Lectures	• Find out what you must learn • Hear announcements on course changes Find out what you must learn
Workshops	• Be guided by Lecturer • Ask questions
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and research skills
Field Work	• Hands-on work, to test the project design, and to set studies in context

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Extended Literature Review Report	10%	10/06/2022 06:00 PM	1, 2, 5
2. Presentation on Initial Thesis Outcome	15%	27/06/2022 02:00 PM	1, 4, 6, 7, 8
3. Thesis Seminar Presentation	15%	01/08/2022 02:00 PM	4, 6, 7, 8, 10
4. Final Thesis Report	60%	09/08/2022 06:00 PM	1, 3, 4, 5, 8, 9, 10

Assessment 1: Extended Literature Review Report

Due date: 10/06/2022 06:00 PM
Marks returned: Week 3

Literature review is a critical part of any research. Over time, it is expected that many new research results may appear in various literature. Thus, literature review will be a on-going task for a professional/researcher. At the begining of the Thesis B, it is essential for each student to reflect on the research statement laid out in the Thesis A and some initial experimenal results obtained in Term 1, together with an extended literature review. **The detailed marking scheme will be provided together with the Extended Literature Review instructions in Week 1.**

Assessment 2: Presentation on Initial Thesis Outcome

Assessment length: 10 slides for a class discussion presentation of about 10 minutes
Submission notes: Draft presentation slides are submitted 1 day earlier for feedback
Due date: 27/06/2022 02:00 PM
Marks returned: Week 7

Each student will prepare a class discussion presentation on the initial thesis research outcomes, which are expected in the middle term of the Thesis B research process. Building upon the extended literature review in the previous assessment, as well as the reflection/revision of the early research proposal, some forms of thesis research outcomes towards the revisited research objectives are to be presented and demonsrated in this class discussion presentation. The detailed marking scheme will be provided together with the class presentation instructions on the Initial Thesis Outcome in Week 2.

Assessment 3: Thesis Seminar Presentation

Assessment length: 10-15 slides for a class discussion presentation of about 10-15 minutes
Submission notes: Draft presentation slides are submitted 1 day earlier for feedback
Due date: 01/08/2022 02:00 PM
Marks returned: Week 11

Different from the previous presentation on your intial thesis outcome, the Thesis Seminar is the opportunity for the overall presentation of your whole thesis research work, which has been built up over

time starting from the beginning of Term 1 (Thesis A) to the end of the Term 2 (Thesis B). It is expected that the Thesis Seminar will delivery much deeper understandinng of the research topic and your much more specific research issue, with greater confidence, and supported by your solid outcomes from various research activities. The detailed marking scheme will be provided together with the class presentation instructions on the Thesis Seminar in Week 7.

Assessment 4: Final Thesis Report

Due date: 09/08/2022 06:00 PM
Marks returned: Week 13

Each student will individually prepare and submit the final thesis report. This is an opportunity to reflect on the whole research process and the outcomes towards of the identified research issue. Firstly, the final thesis should be well structured to logically articulate the research topic area, espciallty highlighting the specific research issue identified and the research objectives to be achieved, thus demonstaring the motivation of the particular research work. Such discussions are supported by the extended literature review. Secondly, the research methodology and experimental design for the intended research issue are explained in details. Thirdly, relevant investigation and experimental results towards of the research objectives shoud be described and analyed to gain new insights and knowledge. Finally, concluding remarks and recommendations for future research are provided. Each thesis report will include the formatted list of all the references. Final thesis report (60%) will be assessed based on the following criteria: a) Written presentation (15%); b) Review of other work (5%); c) Quality of thesis research work (10%); d) Experiments, workflows, results and analysis (15%); e) Conclusions and recommendations (10%); f) Documenting and archiving the full project field notes, data sets, and software packages used (5%).

Attendance Requirements

The students are expected to attend >85% of the lectures, workshops and other teaching activities scheduled in this course.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 30 May - 3 June	Lecture	Course outline; Revisit the research process.
	Workshop	Extended literature search targeting research issues - Case studies
Week 2: 6 June - 10 June	Lecture	Review of Thesis A Proposals; Revision of a Research Proposal.
	Workshop	Analying and reviewing the selected literature within a theoretical/conceptual framework: Case studies
	Assessment	Extended Literature Review Report
Week 3: 13 June - 17 June	Homework	Revising the research plans and research data collection (No class)
Week 4: 20 June - 24 June	Lecture	Research thesis case study; Research techniques and tools
	Workshop	Research data collection and analysis
Week 5: 27 June - 1 July	Lecture	Researching mapping and navigation with multi-sensor systems; Individual presentations on initial thesis outcomes
	Workshop	Individual presentations on initial thesis outcomes
	Assessment	Presentation on Initial Thesis Outcome : Draft presentation slides are submitted 1 day earlier for feedback
Week 6: 4 July - 8 July	Fieldwork	Research project data collection and analysis (No classes)
Week 7: 11 July - 15 July	Lecture	Research case study from the geospatial profession
	Workshop	Analysis and feedback on intial thesis progress and outcome

Week 8: 18 July - 22 July	Lecture	The time slot is rescheduled for fieldwork, data collection and analysis
	Workshop	Thesis research progress discussions
Week 9: 25 July - 29 July	Lecture	Research presentations; Thesis Seminars
	Workshop	The time slot is rescheduled for fieldwork, data collection and analysis
Week 10: 1 August - 5 August	Lecture	Research thesis writing; Thesis seminar presentations
	Workshop	Thesis seminar presentations. Concluding remarks on the Thesis B
	Assessment	Thesis Seminar Presentation: Draft presentation slides are submitted 1 day earlier for feedback
Study Week: 8 August - 11 August	Homework	**Submission of the final thesis report**
	Assessment	Final Thesis Report

Resources

Prescribed Resources

Materials from previous GMAT courses that you have studied.

The Power Point lecture slides are available for download as PDF files at the course website. Electronic resources on the lecture topics are available at the course website.

The class notes, latest journal articles and references related the course topics will be referred to and/or distributed during the lectures.

Locus Charter: Principles to support ethical and responsible practice when using location data https://ethicalgeo.org/locus-charter/

Recommended Resources

a) Writing Skills Support at UNSW: https://student.unsw.edu.au/writing
b) Computer software relevant to this course and available in the School's computer lab CE611/201, including: Matlab or MicroSoft Excel, which will be used for data analysis for thesis research activities.

Course Evaluation and Development

Students are encouraged to engage into all the teaching activities, and the feedback from students on any aspects of the course is always welcome. There will be regular chats with individual or groups of students, to deal with any potential difficulties in learning. As a small class, we have all the advantages to collect feedback and address any concerns in a timely manner.

Laboratory Workshop Information

Surveying and mapping equipment from our store CE G7.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final exams in T2 2022 will be held online between 12th - 25th August 2022 inclusive, and supplementary exams between 5th - 9th September 2022 inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- 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
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- 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
- Book an Academic Advising session: https://app.acuityscheduling.com/schedule.php?owner=19024765

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.

Image Credit

Mike Gal.

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	