

GMAT4150

Field Projects 2

Term 3, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Craig Roberts	c.roberts@unsw.edu.au	Please email for availability	CE412	93854464

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

Projects will involve small groups of students working as a team to complete the design and execution of selected tasks in Surveying and Geospatial Engineering. Topics may be cadastral surveys, remote sensing analysis of the environment from satellite images, digital photogrammetric mapping tasks, setting up a precise geodetic control network, the use of precise GNSS techniques, collection of data for and design of a GIS system, a precise engineering survey or the development and analysis of a geospatial database of a region. Students may be required to attend an off campus field work (survey camp) or regular day trips to an off campus field site and present the results of their group project in a well written technical report and individual presentations to the group.

Course Aims

The objectives of the course are to broaden and deepen your knowledge and experience of data acquisition and surveying instrumentation, field methods, and surveying software, by conducting your own surveys at a site remote from the UNSW campus or on it. The aim is to involve you in management aspects of field surveys, report writing as well as gaining more experience in measurement, fieldwork design, and analysis, and to give you confidence in your ability to do surveys of a type that you may not have done before at University or in employment.

This course is a capstone course in your degree.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Apply surveying/geospatial knowledge learnt so far in the program to design surveys using a range of equipment to solve challenging problems.	PE1.1, PE1.2, PE2.1, PE2.2, PE3.3
2. Manage a team to solve problems, meet deadlines with appropriate outcomes and communicate these results in report form and/or via a presentation to “clients”	PE1.1, PE1.5, PE2.4, PE3.2, PE3.5, PE3.6
3. Analyse and assess data and produce suitable geospatial products that are client ready.	PE1.2, PE1.3, PE2.3, PE3.4
4. Provide a thorough and critical self-assessment of individual performance and provide this to supervisors	PE1.6, PE3.1, PE3.3

By the end of this course you will have some experience at tackling new projects and working as part of a team. Further outcomes are listed or described in the project descriptions below.

For each hour of all the scheduled activities for the course, it is expected that you will put in at least 1.5 hours of private study.

Teaching Strategies

Different types of projects will be offered each year. This year we will try to produce an augmented reality product for a phone app based using the functionalities of a modern smart phone. Industry experts (and former graduate) will be brought in to assist with the technical side of this task. Students will geolocate various grave sites and build a database of gravestone inscriptions attributed to each gravestone. Additionally, a cadastral boundary exercise around the Little Bay cemetery will also be undertaken with the assistance of an industry expert (and former graduate).

The team of students will be expected to work closely with the project supervisor, who will monitor progress, and give advice on project progression and what assessment tasks will be submitted.

The supervisors will play the role of client and specify what tasks they want students to complete. The supervisors won't give lectures or extensive handouts describing in detail how to do the tasks. In this respect, the course is considerably different to GMAT3150. However, the supervisors will be available to give advice to students before, during and after the fieldwork.

Learning methods will be discussed at our class meetings. A significant aspect of this course is the group work and management by students. Part of the learning will include self-assessment because it is important that professional surveyors and engineers are able to assess their abilities and performance reliably.

Face-to-Face classes are preferred so project teams are free to investigate software and hardware and work together to advance their project. Online classes can be scheduled where required. The class has been timetabled from 9am each Thursday in CE201 for a 4-hour timeslot but the student team is free to adapt this to circumstances. This timeslot will also be used for site visits.

Students should meet the supervisor at 9am each Thursday and describe their planned activities for the day and progress of their. It is possible to do field or computer lab work on other days as well as the timetabled class. The teaching strategies that will be used and their rationale.

Assessment

Each student should include a time sheet indicating the time spent on this course – in much the same way as a business would use to charge a client for work on a project. It should include travel and meeting time. Students should not spend more than 150 hours on the course. However, students should not spend 'waste' time doing idle activities merely to accumulate time for the project.

Students will be required to submit a formal documented self-assessment on their participation in this course. Students who spend too few hours on this course have probably not contributed significantly; that affects their own learning and the group's output. The main reason for including time sheets in the course is because some parts of industry report that some graduates are not experienced at recording total time spent on a project and the consequences for budgeting, and quoting for future projects.

As a management exercise, the final reports should include a hypothetical costing of the "job". Students are expected to have group meetings regularly and keep minutes and action items of those meetings.

Students are to prepare all necessary H&S documentation and to submit this to their supervisor.

Feedback for all reports will be given as soon as possible after submission. Details of the Self-assessment task will be given in a separate file on the class website.

Late work will be penalised at the rate of 10% per day after the due time and date have expired.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Project Team (Group) Report	30%	06/10/2022 04:00 PM	1, 2, 3
2. Final (Individual) Report and presentation	60%	17/11/2022 04:00 PM	1, 2, 3
3. Individual Self-Assessment	10%	22/11/2022 04:00 PM	4

Assessment 1: Project Team (Group) Report

Assessment length: Project team (group) report: 15-20 pages

Due date: 06/10/2022 04:00 PM

Marks returned: yes

- Written presentation 5%
- Literature Review - 5%
- Augmented Reality examples in Surveying and Engineering 10%
- Review of software and methodologies required to realise this project 5%
- Site evaluation 5%

Assessment criteria

See Moodle

Assessment 2: Final (Individual) Report and presentation

Assessment length: a) Class presentation (Individual): 8-10 mins; b) Final (individual) report: 30-40 pages

Submission notes: See Moodle

Due date: 17/11/2022 04:00 PM

Marks returned: yes

- Written presentation 5%
- Review of other work 5%
- Quality of project work (design and justification of the case study) 15%
- Results and interpretation 15%
- Conclusions and recommendations 10%
- Individual class presentations (10%) (Thursday, Week 10, a separate document will describe the details)

Additional details

See Moodle

Assessment 3: Individual Self-Assessment

Assessment length: Individual self-assessment: 2 -3 pages

Due date: 22/11/2022 04:00 PM

- Insight of self-assessment 8%
- Written presentation 2%

Attendance Requirements

Students should attend all the scheduled project activities

Course Schedule

During the week 1 class, students will be given the advice on the details for the project. The students will form groups for the project related activities to perform in Week 1, so make sure you attend.

The timetabled class is Thursday 9am onward each week in CE201. The 4-hour timeslot is intended so that you can do fieldwork and or data analysis for this project on some days (not necessarily every week) without interruptions from other classes. Of course you are encouraged to spend some other time on meetings, calculations, report writing, etc. Descriptions of the projects, site photos and maps, H&S forms, etc., will be discussed at the class meeting in Week 1.

The field surveys and mapping activities will be conducted as group work. Students within a group do not necessarily all do the same tasks. For example, one student might take on management duties and organise logistics while other students concentrate on design, pre-fieldwork calculations and preparations, etc. It is up to the groups to ensure all students contribute appropriately, as discussed in ENGG1000. The course coordinator may assign different marks to individual students, at their discretion, based on student performance in the field work and in the class discussions.

Survey Store Equipment

Students wishing to collect survey equipment from the survey store must give a detailed written list of requirements to their supervisor at least one day before its required use, or more as specified by project supervisor for field trips. There is no person permanently in the survey store so students will need to organise times of collection and return of equipment carefully. The supervisor will not be able to come and go from the store frequently during the day or at short notice.

Project A: Augmented Reality at Little Bay Infectious Diseases Cemetery

This project will be supervised by Craig Roberts. The Little Bay infectious diseases cemetery is a quaint, run-down old site inside the Kamay-Botany National Park. It speaks to a rich history of settlement in Sydney. It was the tragic burial site to many victims of infectious diseases from the nearby Prince Henry hospital which is now a residential suburb. Visitors to the national park are often surprised when they stumble upon this cemetery and intrigued as to why it is there and its history. The ravages of weather and time render some of the gravestones unreadable. This project seeks to preserve some of this history and develop an easy-to-use AR experience on a phone app that can be used by visitors easily – perhaps with a QR code.

Using some historical documents from the project supervisor, students will cross reference records with physical graves on the ground, geolocate them by some means and create a database that can be used by an AR software.

Some of the gravestones are prominent, but some are covered by grass and vegetation. The mounds can still be seen. Students will investigate the use of GPR to determine the location of some sub-surface grave sites.

Additionally, students will undertake a cadastral search for boundary evidence and, with the aid of an

industry expert, conduct a cadastral survey of the outer boundary of the cemetery. This has been described as having all the elements of a rural cadastral survey, in the city.

Proposed tasks associated with this project

1. Students will conduct a literature review on the history of the cemetery and Prince Henry Hospital for context.
2. Students will also undertake a review of existing AR/VR projects in surveying/ engineering and list methodologies and software/hardware required.
3. Students will then make a site assessment and what will be required to realise this project. Some consideration of existing geospatial documents such as: ICSM SP1 (v1.7 & v2.2), Surveyor General's Directions no. 1, 2, 4, 7, 9 & 12, GDA technical manual will help inform the survey design.
4. Develop a plan to conduct the survey, test equipment, undertake the survey and prepare captured data in a suitable format.
5. Prepare the database of inscriptions to cross reference with the geospatial data capture.
6. Undertake a cadastral search, SCIMS search and examine plans for cadastral site visit.
7. Learn suitable AR software and try to code an interface for a phone App.
8. Test App
9. Write project report.

** Proposed tasks may change depending on circumstances*

Proposed week-by-week activities:

Note these week-by-week activities will likely change at the agreed discretion of the group. Students will need to familiarise themselves with the context of the project, the concept of augmented reality as it might apply to surveying/ engineering and the building blocks of this project to develop an augmented reality application for use by the general public. A more traditional cadastral survey will be included as part of this project as well.

Week 1: Explanation of projects, agreed division of responsibilities, preparation of documentation (WH & S, time sheets), desktop reconnaissance, preparation for design of surveys, begin literature review on augmented reality examples in surveying/ engineering and the various elements needed to realise such a project. Guest presentation with industry expert.

Week 2: Continue literature review and extract relevant sections as pertains to the design of the survey task. Discuss best software to use for App development and work backwards to determine best data format to facilitate the functionality. Begin cadastral search for project and develop timetable of all tasks for the term. Prepare for site visit in week 3.

Week 3: Visit Little Bay cemetery and perform reconnaissance. Establish some control and coordinate for the purposes of this survey (ie cm-level accuracy is sufficient). Begin survey on headstones and collect enough data to enable database and app development later.

Week 4: Prepare a group report detailing the literature review, site design for each site and the methodology to develop the app including which software to use. Report due by Thursday of week 4. The report will also include the WH&S documentation, time sheets and a description of each of the tasks. Process and prepare data from week 3 and consider development of database.

Week 5: Either continue to process data and prepare database OR go to field and finish collecting data.

Week 6: Either continue to process data and prepare database OR go to field and finish collecting data. Individual student interviews with supervisor. Complete database and try to link to AR software/ App.

Week 7: Enlist industry expert to assist with development of the app.

Week 8: Cadastral exercise in the field. Meet Industry expert and discuss in the field the various plans and how and where to find boundary evidence. Troubleshooting any problems with the app.

Week 9: Report writing. Allocate tasks amongst students to write toward a single report comprising individual parts. Group discussion to distil the outcomes of this project. What is the future for AR in other surveying applications?

Compile a group report detailing the literature review and motivation for the project, current state of AR in surveying/engineering, pros/cons of the method uses, results, discussion, recommendations. Include WH & S documentation and time sheets.

Week 10: Project presentations to invited guests. Project group report submission. Time sheets and self-assessment to be provided at a specified date in week 11.

The reports should be in **electronic form** as a single MS Word format document that includes at least a title page, contents, summary, results, report, plans, input and output files. Spreadsheets, appropriate software output files that support your project. Name the files clearly. Field sheets (if applicable) and any other paper documents should be scanned for submission. The report should be professionally prepared for the client and copies may be adapted for presentation to the Surveying and Spatial profession.

Although the final submission is a group report, there needs to be a breakdown of which individual student performed which task. This will be accompanied by a signed sheet from all group participants agreeing with their specific contribution to the final report and associated time sheets. An individual self-assessment report is required.

[View class timetable](#)

Timetable

Date	Type	Content
Week 4: 3 October - 7 October	Assessment	Project Team (Group) Report
Week 10: 14 November - 18 November	Assessment	Final (Individual) Report and presentation: See Moodle

Study Week: 21 November - 24 November	Assessment	Individual Self-Assessment
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Resources

Prescribed Resources

- Materials from previous GMAT courses that you have studied.
- Additional materials provided on Moodle.
- **Survey equipment from our store CE G7.**

Recommended Resources

We will also use some industry experts to assist.

Course Evaluation and Development

This is a capstone project course, The course projects have been designed to reflect the current trends and best practice in the profession. It has been always a favorite course for students over many years.

Laboratory Workshop Information

Computations and workshops may depend on progress of each project in the course. All the needs will be discussed via the project meetings. Special arrangements will be made on a case-by-case basis.

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 T3 2022 will be held online between 25th November - 8th December 2022 inclusive, and supplementary exams between 9th - 13th January 2023 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	✓