

# GMAT3150

## Surveying Field Projects

Term 1, 2023



## Course Overview

### Staff Contact Details

#### Convenors

Name	Email	Availability	Location	Phone
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#### Lab Staff

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### 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

An off-campus survey camp, where survey projects of substantial extent are carried out involving control survey design and implementation, detail surveys, contour surveys, the design and setting-out of a rural road, and other selected projects. The processing of the field data and the preparation of plans and reports is done during session. Students are required to attend a one- week residential survey camp near the start of Term 1 equivalent to three contact hours per week, followed by two hours per week project data processing during session and a one-day field project on campus mid term.

### Course Aims

To broaden and deepen the knowledge of surveying instrumentation, field methods, and surveying software, by students conducting their own field survey over a one week intensive period at a site remote from UNSW campus. The aim is to involve students in measurement, survey design, and analysis, and to give them confidence in their ability to carry out field surveys.

By the end of this course you will have some experience with handheld and network RTK GPS, road surveys, detail surveys, engineering surveys, and a small amount of cadastral surveying. Each of these aspects will be assessed as described later. You will also gain considerable experience at managing a small group, because you will be travelling, living and working together in challenging conditions nonstop for 4 days at tasks that are assessed. Morale will be carefully monitored.

### Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Gain experience with hand held and RTK-GPS, road surveys, detail surveys, engineering surveys, and some cadastral surveying	PE1.3, PE1.5, PE1.6, PE2.1, PE2.3, PE3.3
2. Gain considerable experience at managing a small group	PE2.4, PE3.1, PE3.2, PE3.5, PE3.6

### Teaching Strategies

There are no lectures in this course. However, there are briefing and debriefing sessions at the field site and training sessions. Students are expected to spend about 150 hours of active learning and reflection in this course. The field surveys will be conducted as real group work – it is not possible for one person to do most of the work and ‘carry’ the others in the group. Read the “TEAMWORK SKILLS DEVELOPMENT FRAMEWORK” document on the class Moodle site. After the 4 days in the field there is an additional day of fieldwork on-campus and processing of your field data, including plan production and reports, as individuals.

The teaching strategies used by the supervisors at camp will include answering students’ questions

sometimes, leaving students alone at times to ponder their problems, at other times to stand nearby and observe the students at work, at other times to ask the students leading questions while they work in the field or in the office to enhance the learning opportunities.

This course has been very successfully conducted at other sites (Morpeth/Berry) since 1976/2008 resp, obviously with continual modifications to the exercises as instrument and software have developed. The Cataract site was used for the first time in 2021. Each year we make improvements to the survey exercises and requirements.

Subsequent to the one week intensive camp there is a field day in week 6 on campus and processing of the field data, including plan production and reports, as individuals. This course has been very successfully conducted at another site (Morpeth) since 1976, obviously with continual modifications to the exercises as instrument and software have developed. The Berry site was used for the first time in 2008 with some similar exercises to those at Morpeth, but some previous exercises have been replaced with new exercises. Each year we make improvements to the survey exercises and requirements. In 2023 the Cataract site will be used.

There are a set of back-up exercises that can be carried out at the camp site if there is heavy rain and flooding that prevents students from conducting the planned fieldwork.

## **Additional Course Information**

This is a core course for students in the BE Surveying program 3707 and the Bachelor of Civil Engineering (Honours)/Bachelor of Surveying 3776. This course includes a Survey Camp in week 3 from Tuesday 28 Feb to Friday 3 Mar 2023 at the Cataract Scout Park. Students are expected to have completed GMAT1110, GMAT2500 and GMAT2550 as pre-requisite to this course. GMAT2700 and GMAT2120 are highly recommended to have been completed as well. Please discuss with the course coordinator prior to enrolling if unsure. The Magnet Office CAD experience in GMAT2500 is essential for the Detail Survey and Road exercises. The FIXIT experience in GMAT2550 and knowledge of Least Squares is used in the design and analysis of the control traverse and calculations and analysis for the Roundhouse exercise. This course provides experience that is invaluable for some of the projects in GMAT4150.

Please ensure you are enrolled in the course well before the start of term 1 and have visited the class Moodle site. In week 1, there will be an important and compulsory class in the computer lab CE201. All students in GMAT3150 should attend, if absent for legitimate reason then contact the course coordinator. The class will cover WHS matters for the field trip and the preparations needed. Groups will be formed at the meeting. There will be weekly computer lab classes, on Tuesdays at 9am in CE computer lab. There are no lectures in this course.

## Assessment

Technical Instructions will provide specific requirements for submissions. Lecturers will keep students informed of changes due to circumstances and are welcome to request clarification during camp or later during scheduled lab sessions or via email.

### Group work assessment:

At survey camps much of the field work has to be done in groups and at all times equal contributions from each student in the group should be strived for, with tasks rotated in the field and the lab and with all students contributing to decision making. Some of the reports and plans will be done and submitted by individual students – each sharing the data obtained by their group in the field. Make sure you have a copy of all data before you leave Cataract. Group work submissions should ensure all students contribute significantly.

With group work assessment is more difficult to give an equitable assessment of each individual group member. So supervisors will monitor students doing group work in the field and office. When students submit a group report not all students in that group will necessarily get the same mark. Sometimes they will all get the same mark, sometimes not. The allocation of marks within a group will depend on a number of attributes such as:

- The quality (and sometimes quantity) of the project work and its report or plans,
- Participation – the role of each person in the group,
- What level of leadership was taken on for the various aspects of the project, (or were you just a field hand?)
- How many hours were logged or spent by each student?
- Discussions with students,
- Attendance,
- Communication within the group and with the supervisor
- The supervisor's discretion based on experience with other groups and previous year's students.

Therefore, when you see your mark, please note that we have given some serious consideration to your individual circumstances and to reward you accordingly.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Control Survey Report	21%	17/03/2023 04:00 PM	1, 2
2. Detail Survey Project	28%	Part A 06/04/2023 04:00 PM. Part B 11/04/2023 11:00 AM Part B	1, 2
3. Road Survey Project	36%	21/04/2023 04:00 PM	1, 2
4. Other survey	15%	Tunnel: 31/03/2023 04:00 PM, Roundhouse and Cadastral: 14/04/2023 04:00 PM	1, 2

## Assessment 1: Control Survey Report

**Submission notes:** Technical Instructions given

**Due date:** 17/03/2023 04:00 PM

**Marks returned:** Usually within 1 week of submission

Students do a control survey as a group of 3. This includes testing of hand held GPS and its use for finding survey marks; control survey fieldwork and recovery sketches and analysis and report of the control survey. Design and measure as a group, then analysis and report as individuals. Students are given feedback in the field after they design their network and before measurements. More feedback is given during the off campus data analysis. After marking of their reports students are invited to individual feedback from the lecturer.

### Assessment criteria

Students do a control survey as a group of 3. This includes control survey fieldwork and recovery sketches (6%), GNSS results (2%) and analysis and report of the control survey (13%). Design and measure as a group, then analyse and report as individuals. Students are given feedback in the field after they design their network and before measurements. More feedback is given during the off-campus data analysis. After marking of their reports, students are invited to individual feedback from the lecturer. Learning Outcome assessed:

- By the end of this course students will have some experience with handheld and RTK-GPS, road surveys, detail surveys, engineering surveys, close range photogrammetry, tunnel surveys and some aspects of cadastral surveys (finding existing marks).
- Students will also gain considerable experience at managing a small group, because they will be travelling, living and working together in challenging conditions nonstop for a week at tasks that are assessed.
- In-depth technical competence in Surveying and Geospatial technologies, methodologies and practice.
- Ability to carry out problem identification, and the design of the solution with the level of creativity and innovation appropriate to the complexity of the challenge.
- Ability to design and execute Surveying and Geospatial measurement, data analysis, mapping and land development projects.
- Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member.

### Additional details

Some minor assessment given at camp.

## Assessment 2: Detail Survey Project

**Submission notes:** Technical Instructions given

**Due date:** Part A 06/04/2023 04:00 PM. Part B 11/04/2023 11:00 AM Part B

**Marks returned:** Within 2 weeks. Usually much sooner.

Students do a detail topographic and contour survey of part of the site as a group of 3. This project builds on the output of the control survey project. Design and measure as a group, then analysis, plans

and report as individuals. Students are given feedback in the field after they design their network and before measurements. More feedback is given during the off campus data analysis. After marking of their reports students are invited to individual feedback from the lecturer.

### **Assessment criteria**

Learning Outcome assessed:

- By the end of this course students will have some experience with handheld and RTK-GPS, road surveys, detail surveys, engineering surveys, close range photogrammetry, tunnel surveys and some aspects of cadastral surveys (finding existing marks).
- Students will also gain considerable experience at managing a small group, because they will be travelling, living and working together in challenging conditions nonstop for a week at tasks that are assessed.
- Produce high quality survey results, plans and reports.
- In-depth technical competence in Surveying and Geospatial technologies, methodologies and practice.
- Ability to carry out problem identification, and the design of the solution with the level of creativity and innovation appropriate to the complexity of the challenge.
- Ability to design and execute Surveying and Geospatial measurement, data analysis, mapping and land development projects.
- Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member.

More details about requirements of the detail surveys plans and reports are given in documents on Moodle

### **Assessment 3: Road Survey Project**

**Submission notes:** Technical Instructions given on Moodle

**Due date:** 21/04/2023 04:00 PM

Surveying students do a rural road design and set-out survey as a group of 3. Design and measure as a group. Group submission of plans, individual report submission. Students are given feedback in the field after they design their network and before measurements. More feedback is given during the off campus data analysis. After marking of their reports students are invited to individual feedback from the lecturer.

### **Assessment criteria**

The Road plans and related fieldwork and calculations are group work and submitted as a group. They are worth 30% of the course. Students are also required to submit an individual report on various aspects of the Road project. This individual report is worth 6% of the course.

Learning Outcome assessed:

- By the end of this course students will have some experience with handheld and RTK-GPS, road surveys, detail surveys, engineering surveys, tunnel surveys and some

- aspects of cadastral surveys (finding existing marks).
- Students will also gain considerable experience at managing a small group, because they will be travelling, living and working together in challenging conditions nonstop for a week at tasks that are assessed.
  - Produce high quality survey results, plans and reports.
  - In-depth technical competence in Surveying and Geospatial technologies, methodologies and practice.
  - Ability to carry out problem identification, and the design of the solution with the level of creativity and innovation appropriate to the complexity of the challenge.
  - Ability to design and execute Surveying and Geospatial measurement, data analysis, mapping and land development projects.
  - Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member.

## **Assessment 4: Other survey**

**Submission notes:** Technical Instructions given on Moodle

**Due date:** Tunnel: 31/03/2023 04:00 PM, Roundhouse and Cadastral: 14/04/2023 04:00 PM

**Marks returned:** Before the final exam

Several smaller assessment tasks are included in this category. Survey students do a tunnel survey on campus aiming for high accuracy (8%); a cadastral mark survey (3%); and a survey of the UNSW Roundhouse with subsequent least squares curve fit analysis (4%). Individual reports are submitted.

### **Assessment criteria**

These projects are conducted, and reports submitted by groups of three students. Detailed instructions and assessment criteria are given in Moodle documents. Students are given verbal feedback in the field while conducting the surveys and in the office on campus after submission of their reports.

### **Additional details**

The various exercises will have different due dates depending on circumstances. The lecturer will keep students informed during term. Some assessment prior to Census date.



## Attendance Requirements

The first online briefing lecture in week 1 is compulsory. Many questions will be raised and the lecturer may require direct answers live to aid planning for the camp in week 3. A recording of this session will be available for revision. The 4-day camp in week 3 and the 1 day field work in week 6 are compulsory.

## Course Schedule

The lab sessions in CE201 are allocated so that groups can work together on projects and ask questions of their lecturers. The time is scheduled to avoid clashes with other classes for students and staff. Students are encouraged to attend these sessions.

Week	Activity
1 = Tue	Important start to course and its logistics. Explanation of field projects. Health and Safety. Form Groups. Submit forms, payments. Practice detail survey with Robotic Topcon.
14 Feb	Complete and submit any Medical Clearance online forms (Cataract), on or before <b>14 Feb 2023</b> and the UNSW Fieldwork form to the course coordinator on or before <b>14 Feb 2023</b> .  The fee for accommodation and meals that each student is required to pay is \$270 in 2023. The fee must be paid to UNSW using the online system which will be described separately. The School has contributed to the costs of the camp to reduce the fee payable by students.  <b>NO STUDENT WILL BE ADMITTED TO THE CAMP WITHOUT PRIOR EVIDENCE OF PAYMENT.</b>
2	Calculate road centreline coordinates, with horizontal and transition curves. Submit file. Upload road coordinates into Sokkia or Topcon. Undertake a mock detail survey on campus to learn workflow. Organise Equipment for transport. Check instrument settings and test for errors.
3	At Cataract all week for survey camp. Tues – Fri 28 Feb - 3 Mar 2023  Details in separate table below.
4	Lab: Control Survey Report
5	Lab: Control Survey Report
6	Field exercises: Tunnel, Roundhouse
7	Lab: Detail survey plans – your group's area - Individual
8	Lab: Detail survey plans – combined area with other groups- Individual
9	Lab: Road Plans
10	Lab: Road Plans – Group. Roads Report individual

**Survey camp week 3 activities.** We aim to follow the timetable below.

When	Survey Camp week - Activity Groups 1-5	Survey Camp week - Activity Groups 6-10
Tues am	9:30am Site tour + WHS, then move into accommodation. Briefing: Control survey for detail. Site Recon - find existing survey marks, measure  MGA coordinates by HH GPS. Design control survey.	9:30am Site tour + WHS, then move into accommodation. Briefing: Road Survey  Site Recon - find existing survey marks, measure MGA coordinates by HH GPS
Tues	Observe control survey, book manually. Make 2	Road Survey on MGA: Set out marks on road

pm	recovery sketches.	centreline use traverse to carry coordinates.
Tues night	Adjust control survey, or part of it if survey not complete. Practice data recording for detail survey.	Briefing: Road levelling / RTK. Download, check files.
Wed am	Continue to observe control survey, if nec. Commence electronic detail survey, record on board, use feature codes.	Finish set out marks for full length road. Check set out by RTK GPS or by radiation from alternate mark.
Wed pm	Electronic detail survey continues. Remove your control pegs.	Digital level of centreline & RTK heights for cross sections. Remove road pegs.
Wed night	Download and check files in CAD. Adjust control survey if not completed already.	Process levelling and submit spreadsheet. Download data, check files. Find cadastral marks.
Thu am	Road Survey Briefing including levelling and RTK. Upload road centreline coordinates.  Road Survey on MGA: Set out marks on road centreline use traverse to carry coordinates.	Briefing: Control survey for detail.  Site Recon - find existing survey marks, measure MGA coordinates by HH GPS  Design control survey. Observe control survey, book manually.
Thu pm	Finish set out marks for full length road. Check set out by RTK GPS or by radiation. Commence levelling.	Continue to observe control survey. Make 2 recovery sketches.  Commence electronic detail survey, record on board,  use feature codes.
Thu night	Download, check files. Prepare format for levelling spreadsheet.	Adjust control survey. Download and check files in CAD.
Fri am	Digital level of centreline & RTK heights for Cross sections. Process levelling.	Continue electronic detail survey, record on board, use feature codes.
Fri pm	Submit spreadsheet. Find cadastral marks.  Check all survey marks you placed are removed. Depart between 2:30 and 3:30pm.	Electronic detail survey continues.  Check all survey marks you placed are removed. Depart between 2:30 and 3:30pm.

[View class timetable](#)

## Timetable

Date	Type	Content
Week 5: 13 March - 17 March	Assessment	Control Survey Report: Technical Instructions given

Week 10: 17 April - 21 April	Assessment	Road Survey Project: Technical Instructions given on Moodle
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## **Resources**

### **Prescribed Resources**

Students should refer to the documents made available on the Moodle site. Students should also refer to lecture notes and text books from previous courses especially GMAT2500 and GMAT2550.

### **Course Evaluation and Development**

This course has evolved over many years. It is an intensive field camp experience and has been previously conducted in Morpeth and Berry. 2023 is the third time GMAT3150 will take place at Cataract Scout Park. Week 1 will provide a compulsory student briefing. Students will be expected to practice using equipment (eg uploading and downloading from total station, using RTK etc) in week 1 & 2 in preparation for the survey camp.

During the survey camp there will be an initial WHS briefing and orientation before commencing survey tasks. There will be briefing sessions before each task and/or each night. This is a valuable time where students can ask questions in a relaxed environment and learn from each other as well as receiving guidance from the lecturers.

After camp, a series of tasks with staggered deadlines will be conducted in the lab with assistance from the lecturers.

Feedback from previous GMAT3150 students will be discussed in class.

### **Laboratory Workshop Information**

Lab and workshop information will be provided on Moodle. Lecturers will be available during the timetabled lab sessions to answer questions and provide assistance.

## **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 T1 2023 will be held on campus between the 28th of April and the 11th of May, and Supplementary Exams between the 22nd of May and the 26th of May. You are required to be available on these dates. Please do not 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://unswengacademicadvising.as.me/schedule.php>

## 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

Images provided by Bruce Harvey

## 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	✓