



**UNSW**

## UNSW Course Outline

# GMAT1110 Surveying and Geospatial Engineering - 2024

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## General Course Information

**Course Code :** GMAT1110

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**Is a multi-term course? :** No

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Civil and Environmental Engineering

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Surveying and Geospatial Engineering deals with the science of determining relative positions of features above, on or below the surface of the Earth for a range of mapping, engineering and construction operations. The course combines lectures, workshops and outdoor practical

exercises using modern electronic surveying equipment. Topics include levelling, orientation, distance measurement which combine into coordinate reference systems. Also traversing and control surveys, electronic detail surveys, construction setout, GPS satellite positioning, geographic information systems (GIS) and sources of geospatial data such as remote sensing, aerial photography and satellite imagery. Basic land law and cadastral surveying for NSW is introduced. The student will learn some basic surveying computations to critically assess spatial data quality. Students will be expected to have a good background in trigonometry and geometry from high school mathematics.

## Course Aims

The aim of this course is to provide a broad overview of the surveying and geospatial discipline and industry. Geographical Information Systems (GIS) software will be introduced and combined with GPS data captured by the student. This knowledge gives context and contrast to the fundamentals of basic plane surveying such as levelling, angle measurement, distance measurement, field recording of measurements, coordinate and reference systems, terrain representation, satellite techniques for surveying (GPS - Global Positioning System) and applications of these techniques to solve some real world problems. The theory presented in lectures will be reinforced with practicals, assignments and tutorial exercises.

## Relationship to Other Courses

This is a pre-requisite for GMAT2500 Surveying Computations A.

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure
CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.
CLO4 : Apply the theory behind the various surveying and geospatial techniques presented in this course and critically assess the quality of geospatial data.

Course Learning Outcomes	Assessment Item
CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure	<ul style="list-style-type: none"><li>• Practical Reports</li><li>• Mid-session Test</li><li>• Online Quizzes</li><li>• Final Exam</li></ul>
CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.	<ul style="list-style-type: none"><li>• Practical Reports</li><li>• Mid-session Test</li><li>• Online Quizzes</li><li>• Final Exam</li></ul>
CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.	<ul style="list-style-type: none"><li>• Practical Reports</li><li>• Mid-session Test</li><li>• Online Quizzes</li><li>• Final Exam</li></ul>
CLO4 : Apply the theory behind the various surveying and geospatial techniques presented in this course and critically assess the quality of geospatial data.	

## Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

## Learning and Teaching in this course

**Course Materials and Instructions** - The Moodle website contains files, online quizzes and links to useful resources. Monitor the site during term because it will be updated regularly. The website material is only for use by students enrolled in this course.

**Lecture Recordings** - Echo 360 will be used to record the lectures, and a copy of the slides used during the presentation will be made available on Moodle. However due to the interactive nature of the lectures it is recommended that all lectures are attended in person.

**Computational Aids** - Students are expected to have a calculator that meets UNSW's [Calculator Guidelines](#). Computer software relevant to this course is available in the School's computer labs (CE201 & CE611).

## Additional Course Information

The course is very interactive with lectures, in-class discussions, individual learning activities, and field pracs. The lectures will be recorded and the slides will be available from Moodle, however this is not a hybrid class and attendance to the lectures in person is recommended. Many of the lectures will include discussions interspersed with traditional slide presentations. Field pracs will be assessed and attendance is mandatory.

### Suggested Learning Methods

- Undertake the individual activities each week prior to the relevant lectures or field pracs to improve your understanding of the topics
- Peer learning - the field pracs will be completed in small groups, and I encourage you to complete the 'worksheet' activities in small groups also
- Attempt the worksheets as soon as they are available, and review them once the solutions have been posted
- Attend the optional Workshop sessions to clarify any topics that you don't understand

## Assessments

### Assessment Structure

Assessment Item	Weight	Relevant Dates
Practical Reports	30%	Due Date: Week 2: 03 June - 09 June, Week 4: 17 June - 23 June, Week 9: 22 July - 28 July
Mid-session Test	15%	Due Date: Week 7: 08 July - 14 July
Online Quizzes	15%	Due Date: Week 3: 10 June - 16 June, Week 5: 24 June - 30 June, Week 8: 15 July - 21 July, Week 10: 29 July - 04 August
Final Exam	40%	

# Assessment Details

## Practical Reports

### Assessment Overview

Field Practical exercise trying to achieve a specified outcome and reporting on the results

### Course Learning Outcomes

- CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure
- CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
- CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.

### Detailed Assessment Description

The field pracs are designed to be conducted by a student group in a prescribed location on campus at a set time. Short reports and field notes will be submitted to the prac demonstrator at the completion of the exercise.

Completion of the field pracs is mandatory.

### Assignment submission Turnitin type

This is not a Turnitin assignment

## Mid-session Test

### Assessment Overview

Multiple choice mid session test in lecture room

### Course Learning Outcomes

- CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure
- CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
- CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.

## Detailed Assessment Description

The Mid-session Test in Week 7 will test all material up to and including Week 5.

## Assignment submission Turnitin type

Not Applicable

## **Online Quizzes**

### Assessment Overview

5 quizzes using moodle

### Course Learning Outcomes

- CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure
- CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
- CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.

## Detailed Assessment Description

Regular online Moodle quizzes will be given to students to test their knowledge as they progress through the curriculum. Questions will require some calculation and preparation before a nominated solution can be given.

## Assignment submission Turnitin type

This is not a Turnitin assignment

## **Final Exam**

### Assessment Overview

2 hr examination on all material

### Course Learning Outcomes

- CLO1 : Demonstrate basic field surveying techniques including handheld GPS and GIS, levelling, and use of a total station to acquire raw field observations and set out of a minor structure
- CLO2 : Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
- CLO3 : Undertake basic survey computations from raw field observations to support a range of surveying and engineering applications such as levelling and terrain representation, area and volume calculations, traversing and construction set out.

and volume calculations, traversing and construction set out.

### Detailed Assessment Description

The final exam will assess all material covered in the lectures, and will include calculations.

### Assignment submission Turnitin type

This is not a Turnitin assignment

### Hurdle rules

A minimum of mark 40% in the Final Exam is required to pass the course.

## General Assessment Information

### Grading Basis

Standard

## Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	<ul style="list-style-type: none"><li>• What is Surveying &amp; Geospatial Engineering?</li><li>• Course info and admin</li><li>• Levelling Surveys</li></ul>
Week 2 : 3 June - 9 June	Lecture	<ul style="list-style-type: none"><li>• Angle and Distance Measurements</li><li>• Total Stations &amp; Theodolites</li></ul>
	Fieldwork	Assessment - Levelling Field Prac
Week 3 : 10 June - 16 June	Lecture	<ul style="list-style-type: none"><li>• Survey Marks</li><li>• Traverse and Control Surveys</li></ul>
	Workshop	Optional workshop / tutorial to review any challenges with the worksheet and for Q&A with the lecturer.
Week 4 : 17 June - 23 June	Lecture	<ul style="list-style-type: none"><li>• Detail Surveys</li><li>• Set-out Surveys</li><li>• Case Studies</li></ul>
	Fieldwork	Assessment - Total Station Field Prac
Week 5 : 24 June - 30 June	Lecture	<ul style="list-style-type: none"><li>• Calculations</li><li>• Coordinate Systems</li><li>• Geodesy</li></ul>
	Workshop	Optional workshop / tutorial to review any challenges with the worksheet and for Q&A with the lecturer.
Week 6 : 1 July - 7 July	Homework	Flexible Study Week - No Lectures
Week 7 : 8 July - 14 July	Lecture	<ul style="list-style-type: none"><li>• GPS &amp; GNSS</li></ul>
	Assessment	Mid-Term Exam
Week 8 : 15 July - 21 July	Workshop	Optional workshop / tutorial to review any challenges with the worksheet and for Q&A with the lecturer.
	Lecture	<ul style="list-style-type: none"><li>• GIS</li><li>• Cartography</li><li>• Remote Sensing</li></ul>
Week 9 : 22 July - 28 July	Lecture	<ul style="list-style-type: none"><li>• Deformation Surveys</li><li>• Calculations</li></ul>
	Fieldwork	Assessment - GNSS & GIS Field Prac
Week 10 : 29 July - 4 August	Lecture	<ul style="list-style-type: none"><li>• Cadastral Surveying</li><li>• Case Studies</li></ul>
	Workshop	Optional workshop / tutorial to review any challenges with the worksheet and for Q&A with the lecturer.

# Attendance Requirements

For undergraduate courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must attend at least 80% of the workshop/lab in which you are enrolled for the duration of the sessions. Attendance at the Field Practicals is mandatory.

## General Schedule Information

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

Attendance at the Field Practicals is mandatory.

# Course Resources

## Prescribed Resources

Uren, J & Price, WF. "Surveying for Engineers", 5th edition, 2010 (available in bookshop - compulsory to purchase for B Eng(Surveying) and Dual award (3776) students only. Optional for other students)

Students are expected to have a calculator that meets UNSW's [Calculator Guidelines](#).

## Recommended Resources

- Uren, J & Price, WF. "Surveying for Engineers", 4th edition, 2006
- Schofield, W. "Engineering Surveying", 4th edition, 1993
- Bannister, A., Raymond, S. Baker, R. (1992) Surveying, 6th Edition, Pitman, London.
- Kavanagh, B.F. (2003) Surveying: Principles and Applications, 6th Ed, Prentice Hall, ISBN 0-13-099582-7

## Course Evaluation and Development

This course is informed by previous courses and comments from MyExperience, and is tweaked each year to ensure that the content is engaging and includes the latest technological developments.

# Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Sandra Hofmann		CE415	9348 2227	During scheduled workshops, or appointment via email	Yes	Yes

## Other Useful Information

### Academic Information

#### 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, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, 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 polices. 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.

#### **IV. Professional Outcomes and Program Design**

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: [https://www.unsw.edu.au/engineering/student-life/  
student-resources/program-design](https://www.unsw.edu.au/engineering/student-life/student-resources/program-design).

*Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

#### **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](https://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](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## 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 five percent (5%) 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. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be 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;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific 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)

## School-specific Information

### Final Examinations

Final Exams in T2 2024 will be held on campus between the 9th - 22nd August, and Supplementary Exams between the 2nd - 6th September 2024. You are required to be available on these dates. Please do not make any personal or travel arrangements during this period.

### School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.