

GMAT1110

Surveying and Geospatial Engineering

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Craig Roberts	c.roberts@unsw.edu.au	Office hours	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

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.

Course Learning Outcomes

1. 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
2. Demonstrate skill with various surveying instruments, forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
3. 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.
4. Apply the theory behind the various surveying and geospatial techniques presented in this course and critically assess the quality of geospatial data.

Teaching Strategies

Three main aspects of teaching will be offered in this course: lectures, tutorials and practicals.

The **lectures** introduce the course material and are supported by relevant chapters from the reference book for this course. All notes can be accessed from the class Moodle site and Echo360 recordings. Despite this it is highly recommended that the student attend all lectures. The lecturer will ask questions during lecture periods to stimulate debate, deepen student understanding of the topics and to give them some idea of how to apply the theory to real world situations. A lot of reading outside of lectures using reference material is expected.

Tutorials will support the lectures. Tutorial questions can be accessed from the class website. This course is computational in nature and it is very important that the student practice all of the tutorial problems prior to the tutorial sessions. Tutors will assume that all students attending have attempted the tutorial problems. The tutorial problems are very similar in nature to the sort of questions could be expected in the final exam.

Four **practical exercises** have been set to help the student appreciate how to apply basic surveying techniques to real world situations. Previous students have found practicals to be the most rewarding and enjoyable part of the course and for this reason they are **compulsory** for all students.

The combination of these 3 activities ensure that the student has both a practical and theoretical appreciation of the world of Surveying and Geospatial Engineering.

Assessment

Field practicals:

The field practicals 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.

Online Assignment/ Quiz

As the workshops will not be assessed, a series of online quizzes on Moodle will be given to students to test their knowledge at that stage of the curriculum. More instructions will be given in the lectures. Questions will require some calculation and preparation before a nominated solution can be given. Please note that these exercises are not only assessable but can be seen as revision for the final exam.

Mid-session test:

The mid-session test will be multiple choice and test all material up to and including week 5 (but not the traverse lecture material). Prac 1 & 2, Wkp 1 & 2 and lectures 1 – 7 are included.

Final Exam:

The final exam will be external and will cover all material from the session. Students are required to score at least 30% in the final exam to pass this course.

Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below.

Assessment for the course includes:

Practical reports (3)	30%	Due at completion of exercise
Mid-session test	15%	In week 7
Online assignment/ quiz (5)	15%	During session
Final Exam	40%	In formal exam period

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Practical Reports	30%	10 June 2022	1, 2, 3, 4
2. Mid-session Test	15%	Not Applicable	1, 2, 3, 4
3. Online Quizzes	15%	Not Applicable	1, 2, 3, 4
4. Final Exam	40%	Not Applicable	1, 2, 3, 4

Assessment 1: Practical Reports

Start date: 10 June 2022

Due date: 10 June 2022

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

Assessment criteria

See prac instructions

Assessment 2: Mid-session Test

Start date: 12/07/2022 04:00 PM

Multiple choice mid session test in lecture room

Assessment criteria

Due date: 12/07/2022 05:30 PM

Assessment 3: Online Quizzes

5 quizzes using moodle

Assessment 4: Final Exam

2 hr examination on all material

Hurdle requirement

Example: A mark of at least 40% in the final examination is required before the class work is included in the final mark.

Attendance Requirements

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

Course Schedule

Week No. (Start Week)	Lectures Tuesday: 16–18 Vall 121/ online	Lectures Wednesday: 11-13 CE G1/online	Workshop/ Prac Friday: 14-16 CLB 6/ field	Workshop/ Prac Friday: 16-18pm CLB 6/ field
1 (30 May)	Admin, overview of SAGE (cr)	L1: Levelling (cr)		
2 (6 Jun)	L2: Orientation/ theodolites (cr)	L3: Distance (cr) (release vid 1)	Prac 1A – Levelling (cr, yz, ag, pm)	Prac 1B – Levelling (cr, yz, ag, pm)
3 (13 Jun)		L4: Coordinates and Calculations (cr)	Wkp1 – Level (cr)	
4 (20 Jun)	L5: Intro to GPS (cr)	L6: Intro to GIS & Cartography (cr) (release vid 2)	Prac 2A – GPS/GIS (cr, yz, ag, pm)	Prac 2B – GPS/GIS (cr, yz, ag, pm)
5 (27 Jun)		L7: Intro to Remote Sensing (yl)	Wkp 2 – Ang/Dist (cr) Optional revision	
6 (4 Jul)	Non-teaching week			
7 (11 Jul)	Mid Session Test (cr)	L8: Traverse and Control surveys (cr)		
8	L9: Areas and Vol (cr)	L10: Construction setout (cr) (release vid 3)	Wkp 3B – Coords & trav (cr)	

(18 Jul)				
9 (25 Jul)	L11: Deformation surveys (cr)	L12: Detail surveys and contouring (cr)	Prac 3A – Setout (cr, yz, ag, pm)	Prac 3B – Setout (cr, yz, ag, pm)
10 (1 Aug)		L13: Cadastral Surveying (cr) (release vid 4)	Wkp 4 – Area, vol, const (cr)	Revision session (optional)

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)

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

Students will receive feedback in lectures after field practical exercises and via email after marking these exercises.

Students will receive feedback in the field by prac demonstrators.

Students can request feedback at anytime via email.

This course is informed by previous courses and comments from MyExperience.

Laboratory Workshop Information

Comments: Field practicals are a great opportunity to put theory into practice. Previous students have always rated field practicals very highly.

Field practicals are compulsory. Students must wear closed shoes. This is a strict WHS requirement.

Marking scheme: Depending on the exercise, marks will be allotted for clear and concise field notes (please do not re-write "pretty" field notes for submission. Only original field notes will be accepted so try to make them neat as you work), computations as per instructions, correctness of working, accuracy of observations, completion of all tasks, field sketches (where required), relevant comments or answers to specific questions asked in instructions and submission by allotted deadline. Details of individual assessment is contained in prac instructions for each prac available on Moodle.

Penalties for field practicals: Late submissions will attract a penalty of 5% per day late.

Feedback: The prac supervisor will attempt to mark the prac exercise within 2 weeks of completion and return the marked exercise with annotations to the prac group. An overall report will be sent to all students with generic feedback for all and a class discussion in the lecture period will also take place to reinforce any issues that arose.

Objectives and learning outcomes: The student will learn about survey design, time management, meeting time constraints, producing results in the field, logistics, field preparation, concise report writing and field note taking, producing results to tolerance despite conditions, working safely and in accordance with WHS.

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.

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Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.