UNSW Course Outline

GMAT2500 Surveying Computations A - 2024

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General Course Information

Course Code : GMAT2500
Year : 2024
Term : Term 1
Teaching Period : T1
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

<u>Useful Links</u>

<u>Handbook</u> <u>Class Timetable</u>

Course Details & Outcomes

Course Description

Principles of survey calculations. Radiation, intersection, resection, and trilateration calculations. Traversing: fieldwork, calculations, error detection and adjustment. Detail surveys with engineering surveying CAD software: data transfer with survey instruments, plan editing, and

contouring from a digital terrain model. Cadastral calculations. Land Subdivisions in CAD. Design and computation of horizontal and vertical curves for roads, rail and pipelines in CAD.

Course Aims

Calculations and plan drawing are a traditional part of surveyors' work and many fields of surveying involve data collection, calculations and presentation of results using computers. Using computer aided drafting (CAD) (e.g. CivilCAD and AutoCAD) software to process surveying data for design and plan production purposes is an important and essential skill for surveying and geospatial engineering graduates. This course introduces surveying/civil CAD packages commonly used in engineering surveying. Instructions are given in data entry, data reduction, graphics and attributes editing, contouring and plan drawing for detail survey, subdivision and road design. The aim of this course is **not** to acquire a vast knowledge of all the options/steps available in CivilCAD, nor is it to remember all the equations used in plane survey computations. The aim of the course is to enable students to solve plane survey computation problems and to be able to learn to use any of the currently available surveying CAD packages or those developed in the future.

At UNSW we currently teach using the CivilCAD software. There are a few, mostly historical, reasons for the use of this package. We aim to make students aware of some features of a generic/representative CAD package, and to gain some experience. Further training can often be obtained during students work experience, e.g. summer employment. The lab exercises and assessment tasks in this course use CivilCAD.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Be able to solve calculation problems using a variety of approaches and computing resources including manual calculation, calculators, spreadsheets (MS Excel or open source equivalents) and CAD software with surveying modules.
CLO2 : Be able to produce surveying, road design and subdivision drawings/plans using Magnet Office software package.
CLO3 : Ability to function effectively as an individual and in multicultural teams, as a team leader or manager as well as an effective team member.

Course Learning Outcomes	Assessment Item
CLO1 : Be able to solve calculation problems using a variety of approaches and computing resources including manual calculation, calculators, spreadsheets (MS Excel or open source equivalents) and CAD software with surveying modules.	• Mid-session Test • Computer lab tasks
CLO2 : Be able to produce surveying, road design and subdivision drawings/plans using Magnet Office software package.	• Final Exam • Computer lab tasks
CLO3 : Ability to function effectively as an individual and in multicultural teams, as a team leader or manager as well as an effective team member.	• Field Practicals

Learning and Teaching Technologies

Moodle - Learning Management System

Additional Course Information

The course is very interactive with lectures, guided practice in the Computer Lab, and fieldwork. Two major field practical exercises are included in the course so that students can better understand the full process from data collection to data analysis and final presentation, i.e. "field-to-finish".

In 2024 there are three teachers involved in delivering the course:

- Professor Linlin Ge - Course Convenor & Assessments
- Dr Bruce Harvey - Fieldwork
- Sandra Hoffmann - Computer 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 PowerPoint based lecturing.

Suggested Learning Methods (as described to students in the course outline):

This is a practical course, the more practice and experience you get the better you will understand the topic, and the faster you will be able to solve problems. We suggest you spend some of your 5 hours per week study time (in addition to class time) using a computer in the lab as well as applying the usual study methods. There will be a lot of practical surveying data calculations and map editing work in the lab exercises. In the CAD component of the course we will have an instructed practice following each lecture to lead you go through the CAD software package.

It is strongly recommended that students: attend all classes; do not get too far behind with the lab work; and ask for help if you need it. It is not necessary to take detailed notes in lectures. However, it is important to complete all the lab tasks and to keep up to date. Also feel free to work independently - read references and try to solve problems yourself, do not just sit in class and follow the leader.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Final Exam	45%	Start Date: Not Applicable Due Date: During exam period.
Mid-session Test	25%	Due Date: Week 5: 11 March - 17 March
Field Practicals	12%	Start Date: Fri Weeks 5, 6, 7 Due Date: Not Applicable
Computer lab tasks	18%	

Assessment Details
Final Exam

<u>Assessment Overview</u>

The Final exam will be in the exam period and will be conducted in a computer lab, probably CE201. It will involve written questions on the exam paper plus use of software on a computer.

A sample past paper will be supplied well before the exam. Large data sets are usually supplied to the students on computer files and CAD software is available and expected to be used in the exam. The test environment will be similar to the mid session test and there will be thorough invigilation by course coordinator

Course Learning Outcomes

- CLO2 : Be able to produce surveying, road design and subdivision drawings/plans using Magnet Office software package.

Assessment Length

2 hour + reading and submission time

Assignment submission Turnitin type

Not Applicable

Hurdle rules

A minimum of mark 40% in the final assessment is required to pass the course.

Mid-session Test

Assessment Overview

The topics are surveying computations part of the course not CAD. The test is conducted in the school's computer lab using the computers with limited specific access, and thorough invigilation by course coordinator. The test environment and conditions will be discussed with students well before the test.

Course Learning Outcomes

- CLO1 : Be able to solve calculation problems using a variety of approaches and computing resources including manual calculation, calculators, spreadsheets (MS Excel or open source equivalents) and CAD software with surveying modules.

Assessment Length

110 minutes

Assessment information

The topics are surveying computations part of the course, not CAD.

Primarily we test whether you can do survey computations yourself in exam conditions. An important learning outcome is to be able to reliably check your calculations, so you know they are correct and not just hope they are correct. Also, the test links to attributes: an in-depth engagement with relevant disciplinary knowledge; and the capacity for analytical and critical

thinking.

Assignment submission Turnitin type

Not Applicable

Field Practicals

Assessment Overview

Field practicals are included in this course so that you experience survey computations with your own real data with all its nuances, not just text book data. There are two Field Practicals worth 6 marks each. They are group work. Most practicals will be done in groups of 4 students.

Course Learning Outcomes

- CLO3 : Ability to function effectively as an individual and in multicultural teams, as a team leader or manager as well as an effective team member.

Detailed Assessment Description

Due date:

Group report for loop traverse prac 1 is due on or before 2pm Mon Week 7.

Group report for MGA traverse prac 2 is due on or before 2pm Mon week 9.

The bushwalk field exercise is submitted at the end of the bushwalk (no marks will be assigned for this educational activity).

Assessment Length

Usually about 4 hours each

Assessment information

The practical exercises form an important part of the subject. A good deal of time and care has gone into the organisation of these classes to ensure that you get the maximum benefit. It is important that each student understands the field process and participates in all aspects of the fieldwork.

The fieldwork to be assessed is scheduled in Week 4 and Week 7.

Assignment submission Turnitin type

Not Applicable

Computer lab tasks

Assessment Overview

The computer lab tasks in this course will be delivered, managed and assessed via Moodle quizzes and auditing. Using Moodle to administer the tasks will enable students to see their progress and to work on the tasks at a pace that suits them. The requirements for lab work are given in the Moodle quizzes and assistance is available in the textbook files. Students are urged to manage their workload and make regular submissions during session. It is possible for students to do the computer lab tasks in blended learning mode.

Course Learning Outcomes

- CLO1 : Be able to solve calculation problems using a variety of approaches and computing resources including manual calculation, calculators, spreadsheets (MS Excel or open source equivalents) and CAD software with surveying modules.
- CLO2 : Be able to produce surveying, road design and subdivision drawings/plans using Magnet Office software package.

Detailed Assessment Description

Attendance at the Week 6 bushwalk is worth 2% of the final course mark.

Assessment Length

NA

Assignment submission Turnitin type

Not Applicable

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	• Introduction to course • Principles of survey calculations • Revision of 1st year calculations • Intersection calculations
	Laboratory	• Revision of 1st year calculations • Intersection calculations
Week 2 : 19 February - 25 February	Lecture	• Resection calculations • Traverse field method • Loop close "missing data" problems
	Laboratory	• Graphical & numerical resections • Missing data problems
Week 3 : 26 February - 3 March	Lecture	• Traverse adjustment calculations • Blunder detection • Developing 2D / 3D spatial skills • Visualisation
	Laboratory	• Traverse Calculations • Missing data problems
Week 4 : 4 March - 10 March	Lecture	• CoGo computations • Terrain modelling in CAD • Map editing & feature coding in CAD
	Laboratory	• CoGo Computations • CAD: Familiarisation of Magnet Office Feature point survey Entry of codes
	Fieldwork	Loop traverse
Week 5 : 11 March - 17 March	Lecture	• Cartography • Introduction to digital mapping • Revision
	Assessment	MID TERM TEST
Week 6 : 18 March - 24 March	Fieldwork	Navigation and mapping exercise
Week 7 : 25 March - 31 March	Lecture	• Cadastral calculations • rural roads • subdivisions • PO comparison • Detail surveys in CAD • Plan editing • Text annotation
	Fieldwork	MGA Traverse
Week 8 : 1 April - 7 April	Lecture	• Traditional road curve calculations • Data types • Subdivision in Magnet Office
	Laboratory	• Cadastral calculations • Magnet office setup • Plan editing • Terrain Modelling • Annotation
Week 9 : 8 April - 14 April	Lecture	• Road design in Magnet Office alignments cross sections long sections • Volume calculations
	Laboratory	• Subdivision parcel design • Road design in Magnet Office alignments cross sections long sections • Volume calculations
Week 10 : 15 April - 21 April	Lecture	• Autodesk Civil3D introduction detail survey road design parcel design • Problem solving • Future of survey computations • Course review
	Laboratory	• Autodesk Civil3D introduction detail survey road design parcel design • "Horner's" problems

Attendance Requirements

A minimum of 80% attendance is required at the weekly computer based workshops in order to pass the course.

General Schedule Information

Course Resources

Prescribed Resources

Lecture Material - The lecture slides are available for download as pdf files at the course website: http://moodle.telt.unsw.edu.au Monitor the site during term because it will be updated regularly. The website material is only for use by students enrolled in this course.

Textbook - A textbook has been written specifically for this course mostly by Dr Bruce Harvey, who taught this class for many years and has generously made it available in pdf form on the class website - free.

Computational Aids - Students are expected to have a calculator. Students may use any calculator they wish in this course, however in examinations they may not use pre-programmed calculators with, for example, close or resection programs. Computer software relevant to this course is available in the School's computer lab. We will use MS Excel spreadsheets in the lab; students who do not have that software on their home computers will be advised on how to get free open source equivalent software and how to use it. We will use CAD software that is installed in our labs. Magnet Office CAD software is too expensive for most students to buy so we will show you have to install an educational version at no cost. Autodesk Civil3D is also available as an educational version.

Course Evaluation and Development

Feedback from the students via the myExperience process and from discussions in class and on campus outside class time will be used to keep the contents relevant and useful for students.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Lecturer	Sandra Hoffmann		CE 415	9348 2227	Available any time outside of teaching commitments, knock on the door or email to arrange a time.	No	No
Convenor	Linlin Ge		Civil Engineering Building Room 414	9385 4177	email to make an appointment	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.

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 Plagarism

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. 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

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 T1 2024 will be held on campus between the 26th April and 9th May, and Supplementary Exams between the 20th - 24th May 2024. You are required to be available on these dates. Please do not to 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.