



THE UNIVERSITY OF
NEW SOUTH WALES
SYDNEY • 2052 • AUSTRALIA

SCHOOL OF SURVEYING & SPATIAL INFORMATION SYSTEMS

GMAT 2610

Mining Services (Surveying Component)

Course Outline – Session 1, 2009

UNSW Handbook Description:

This course provides the fundamental principles and relevance of services provided by Surveyors and Electrical Engineers as part of surface and underground mining operations. Topics on surveying include: Principles of surveying; measurements, calculations, instrument and survey errors; map projection coordinates and calculations; traversing and control surveys; an overview of Spatial Information Systems; GPS positioning; deformation monitoring surveys; and correlation of surface surveys with underground surveys. Topics on electrical engineering include: circuit theory - analysis and design of DC and AC circuits comprising various energy sources and complex impedances, 3-phase circuits; laboratory methods - electrical safety, signal generators, measuring devices, oscilloscopes; transformers and AC machines and induction motors. DC machines and motors.

Units of Credit: 6

Indicative Contact Hours per Week: 6

Number of students enrolled: 48

This document, and other material, is available at the Course Website:

<http://www.gmat.unsw.edu.au/gmat2610>

(User name and password supplied in class)

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1. Staff involved in the Surveying part of the course and their Contact Details

1.1 Course Convenor, Lecturer, Tutor and Field Supervisor: Dr Bruce Harvey (BRH)

Office: EE424 (Whenever present, you may just drop in)
Email: b.harvey@unsw.edu.au Phone: 9385 4178

1.2 Teaching assistant: Michael Chang (MC) or Peter Mumford (PM)

MC: Office EE414B hc.chang@unsw.edu.au 9385 4202
PM: Office EE413C p.mumford@unsw.edu.au 9385 4189

1.3 Staff absences during session:

Dr Harvey will be off campus in weeks 4 and 5. During that time he can be contacted by email at the above email address.

2. Educational Aspects of the Surveying part of the Course

2.1 How this course relates to others in the program

This course involves THREE Schools: Mining, Surveying & SIS, and EET.

Therefore, it does present itself as a challenge to learning, teaching and administration. There are TWO components: surveying (3 UoC) and electrical engineering (3 UoC), The SURV classes are taught in the 2nd half of the term (weeks 7-12) while all the ELEC lectures are co-taught in the first six weeks with [ELEC1111 Electrical and Telecommunications Engineering](#).

This course has no prerequisites but it is assumed that most of the students will be in year 2 of their program. The survey part of the course replaces the previous course for Mining Engineering students called GMAT0443 Surveying for Mining Engineers.

2.2 Aim of the Course

To provide the fundamental principles and relevance of surveying to mining engineering. Topics include: Principles of surveying; levelling; contouring; theodolites: angle measurements; instrument and survey errors; distance measurement techniques; coordinate calculations; control surveys; traversing; area and volume calculations; an overview of Spatial Information Systems; GPS satellite positioning; deformation monitoring surveys; map projection coordinates and calculations; correlation of surface surveys with underground surveys.

2.3 Learning Outcomes

By the end of this course students should be able to:

- Critically assess the quality of spatial survey data.
- Practice some basic field surveying techniques such as levelling and use of a total station to acquire raw field observations.
- Develop efficient field work practices such as skill with various surveying instruments (both electronic and non electronic instruments), forward planning for survey tasks, production of clear field notes and redundant field checks to ensure accuracy.
- Undertake basic survey computations from raw field observations to support a range of

surveying and engineering applications such as levelling, traversing, detail and contour survey and set-out surveys.

- Actively participate in (but not lead) mine surveys during industrial training placements.

2.4 Teaching Strategies

The lecturer in 2009 provides did not teach this course in 2008 but he has taught Surveying for many years including surveying to Mining and Civil Engineers some years ago and Mining Surveying at Postgraduate level in 2008. The 2008 postgraduate course taught people who work at mine sites and some of their work examples and case studies will be used to illustrate this GMAT2610 course.

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 (Uren and Price, 4th Ed). All notes can be accessed from the class website (see Section 5). Despite this it is highly recommended that the student attend all lectures. I will ask questions in the lectures to stimulate debate, deepen your understanding of the topics and to give you some idea of how to apply the theory to real world mining situations. A lot of reading outside of lectures using reference material (see below) 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 examination. The tutorial problems are very similar in nature to the sort of questions you could expect in the final exam.

Two 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. A doctor's certificate or other supporting documentation will be needed in the event that a student misses a field practical.

A note for any students repeating GMAT2610. The lectures in 2009 will be somewhat different to those given by another lecturer in 2008 in this course. In 2008 the lectures were similar to those given in GMAT1110, in 2009 new PowerPoint files will be used and some new tutorial questions will be used in GMAT2610 to align the course more strongly with mining.

2.5 Suggested Learning Methods

Download course notes from the webpage and read them. It is not necessary to take detailed notes in lectures. However, it is important to complete all the tutorials and practical reports.

Students will be expected to follow carefully the timetable given in this document and attend all classes.

2.6 CATEI feedback

This course was taught by other staff in 2008 so CATEI feedback is not available or directly applicable. The lecturer looks forward to the feedback from current students.

2.7 UNSW Graduate Attributes

This course provides an environment that fosters in our students the following attributes is listed:

the skills involved in scholarly enquiry	Significant
an in-depth engagement with relevant disciplinary knowledge in its interdisciplinary context	some
the capacity for analytical and critical thinking and for creative problem solving	Significant
the ability to engage in independent and reflective learning	Some
the skills to locate, evaluate and use relevant information (Information Literacy)	Significant
the capacity for enterprise, initiative and creativity	Some
an appreciation of and respect for, diversity	some
a capacity to contribute to, and work within, the international community	Minimal
the skills required for collaborative and multidisciplinary work	Some
an appreciation of, and a responsiveness to, change	Some
a respect for ethical practice and social responsibility	Some

3. Proposed Course Schedule

Any changes will be notified via email, in the class and at the course website.

L = lecture, T = tutorial, P = field practical Rooms may change.

Wk	Week start	Mon 9 – 10 CLB 5	Tue 2 – 4 CE G1 or Matt A?	Thu 9 – 10 Quad G031
7	27/4	L: Introduction to course and Overview of Mine Surveying	L: Heights by Levelling T: Heights by Levelling	L: Angles by theodolite total stations
8	04/05	L: Distance measurement / EDM	P: Levelling Grp A: 1-3pm, Grp B: 3-5pm Or 12-2 and 2-4?	L: GPS
9	11/05	L: Map Projections	L: Coordinate calculations T: Coordinate calculations	L: Traverses and Control Surveys
10	18/05	L: Detail surveys and CAD	P: Setout Grp A: 1-3pm, Grp B: 3-5pm Or 12-2 and 2-4?	L: Areas and volumes
11	25/05	L: Underground surveys	T: Areas and volumes T: Underground surveys	L: GIS in mines
12	01/06	L: Deformation surveys	L: Mine surveying legislation T: "Past" exam questions	L: Revision

4. Assessment in the Course

Assessment for the course includes:

- Prac 1: 5 marks Due two weeks after prac
- Prac 2: 5 marks Due two weeks after prac
- Final exam: 40 marks In formal exam period

Total marks for surveying component: 50

A note for any students repeating GMAT2610. If you have successfully passed the practicals in GMAT2610 in a previous year you can choose to do them again (to perhaps get a better mark) or you may omit the pracs this year and use your marks from previous years. To take the latter option, simply present your previous prac reports to the lecturer in week 7.

5. Course Resources

5.1 Lecture Material (check the course website):

<http://www.gmat.unsw.edu.au/gmat2610/>

(User name and password supplied in class)

The Powerpoint lecture slides, instructions for field practicals, and tutorial questions are available for download as PDF files at the course website.

5.2 Text and Reference Books

It is not compulsory to buy a textbook for this course, but the following books in our library do provide useful reading material.

Reference books:

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

5.3 Computational Aids

Students are required to provide their own pocket calculators for examinations, and for use in all classes in this course. The type of calculator allowed is described by the University at my.unsw.edu.au/student/academiclife/assessment/examinations/Calculator.html

6. Administrative Matters

6.1 Expected work load

At UNSW, the normal workload expectations of a student are 25-30 hours per session for each unit of credit, including class contact hours, preparation and time spent on all assessable work.

To assist students with the organisation of their studies, the expected workloads of the various components of the course are listed below. It is strongly suggested that students use the listed hours to plan their work during session.

Lectures	24hr
Tutorials	3hr
Field exercises	8hr
Revision of Lectures, background reading (approximately 4hr x 14wk)	55hr
Total	90hr

6.2 Rules

Students should read the University Calendar or Student Guide for details of University Rules and special considerations.

Students are reminded that the University regards academic misconduct as a very serious matter. Unauthorised material must not be taken into a test or examination. The penalty for any suspected academic misconduct ranges from zero mark for the assignment or exam involved, through failure of the subject, to expulsion from the University. If absent from an examination, class test or practical, students must submit written documentation to the University, via the Student Centre in the Chancellery.

All practical reports are compulsory parts of the course and must be handed in by the due date. A mark of zero will be given for any submission which violates this rule. If a student is unable to submit on time due to illness or other legitimate reason, then a brief written explanation must be given to the lecturer for consideration as soon as is feasible. In some cases the lecturer may grant an extension to the submission date provided he has been contacted before the due date.

Further assessment may be granted in this course at the lecturer's discretion.

If students attend less than 80% of their possible classes they may be refused final assessment.

6.3 Plagiarism

All practical reports should be submitted with a signed Plagiarism / Assessment Cover Sheet. See www.lc.unsw.edu.au/plagiarism and the UNSW web site for university policy on Plagiarism.

<p>I/We declare that this assessment item is my/our own work, except where acknowledged, and has not been submitted for academic credit elsewhere, and acknowledge that the assessor of this item may, for the purpose of assessing this item:</p> <p>Reproduce this assessment item and provide a copy to another member of the University; and/or,</p> <p>Communicate a copy of this assessment item to a plagiarism checking service (which may then retain a copy of the assessment item on its database for the purpose of future plagiarism checking).</p> <p>I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.</p> <p>Signed:date: <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p> <p>I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.</p> <p>Signed:date: <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p> <p>I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.</p> <p>Signed:date: <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p> <p>I certify that I have read and understood the University Rules in respect of Student Academic Misconduct.</p> <p>Signed:date: <input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/><input type="text"/></p>
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