



THE UNIVERSITY OF  
NEW SOUTH WALES  
SYDNEY · 2052 · AUSTRALIA

**SCHOOL OF SURVEYING & SPATIAL INFORMATION SYSTEMS**

## **GMAT 4150    FIELD PROJECTS 2**

### **Course Outline – Session 1, 2009**

Version: 9/03/2009

**Note that this is a ‘fluid’ document; it will be updated and changed regularly during session, as work progresses on the projects. Monitor the class web site to get the latest version and associated files.**

*This document, and other material, is available at the Course Website:  
<http://www.gmat.unsw.edu.au/gmat4020>*

(User name and password supplied in class)

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## 1. Staff involved in the Course and their Contact Details

**1.1 Course Convenor & Supervisor:** Bruce Harvey  
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## 2. Educational Aspects of the Course

### 2.1 How this course relates to others in the program

This course builds on previous surveying courses in years 1, 2 and 3. You should have already passed or been exempt from those courses. If you have not passed any of the year 1, 2 or 3 GMAT courses then you should contact the course convenors for advice and permission to enrol in this course.

### 2.2 Aim of the Course

To broaden and deepen your knowledge and experience of surveying instrumentation, field methods, and surveying software, by conducting your own surveys over a one week intensive period at a site remote from UNSW campus. The aim is to involve you in management aspects of field surveys as well as gaining more experience in measurement, survey design, and analysis, and to give you confidence in your ability to do surveys of a type that you may not have done before at University or in employment.

### 2.3 Learning Outcomes

By the end of this course you will have some experience at tackling new projects and working as part of a team.

### 2.4 Teaching Strategies

Two types of program will be offered in 2009, depending on whether students choose to travel or stay in Sydney and on whether students choose SIS or Survey projects:

- 1) SIS. Students selecting this option will be supervised by S Lim for the entire course. This option will include a 2 day field trip 28-29 March.
- 2) Survey. Students selecting this option will be supervised by B Harvey for one half of the course and M Green for the other half. Students will attend a 3 day field trip at the Berry Sport and Rec centre for cadastral boundary surveys supervised by B Harvey on 6-8 April. They will do other projects in Sydney supervised by M Green.

Berry Project: The staff will play the role of clients and specify what tasks we want students to complete. We won't give lectures or handouts describing in detail how to do the tasks. However, we will be available to give advice to students before, during and after the fieldwork. The surveys will be conducted as group work probably in Week 5. Prior to the field trip students will organise and prepare for the fieldwork, collect reference material (plans, SSM coordinates etc), study the existing cadastral plans of the area in detail and determine MGA coordinates for all boundary corners and reference marks, prepare equipment lists, organise the work roster for the fieldwork etc. Subsequent to the field trip there is on campus processing of your field data, including plan production and reports. Finally, students will be required to submit a formal documented self assessment.

### Cowan Project (for SIS stream students): Mapping Cowan Field Station

Cowan Field Station (located near the Cowan railway station) has been served as one of teaching & research grounds for School of BEES (<http://www.bees.unsw.edu.au/research/cowan.html>). One example is, UG/PG students have surveyed GIS data including fire trails, soil & vegetation data, etc. in lieu of their course assignments.

Cowan Field Station and its surrounding areas contain some interesting features, e.g. a lithograph of a big fish engraved by ancient indigenous people. There are also a number of fenced areas in which kangaroos and other species are kept for BEES' research.

This project aims to make maps of Cowan Field Station & the vicinity in order to create a webpage (.html) or an ArcGIS map document (.mxd) that can be served as guidance material to the field trip for UG students. Features to be surveyed include the railway station, shops and restaurants nearby, roads to the field, fire trails, utilities, fence boundaries, artificial buildings, ancient arts, and so on, with detailed attribute information.

This project is designed for group work of two persons, up to two groups. Each group will collect data using a PDA with ArcPad and a plug-in compact-flash type GPS receiver. Participants will learn how to use the equipment and how to design a data table that fits in the attribute information, prior to the survey. Manual editing/processing of data will be necessary after the survey.

The survey will take place at the same time of the 2-day field trip for BEES students in order to minimize admin issues such as access to the field. Normally the field trip takes place on a weekend. This year it will be held from 28-29 March. There is a minimal cost e.g. for food and cooking supplies. The exact amount will be informed at a later date, however, \$20 or so would be expected.

Cowan Field Station has no accommodation capability to cope with a number of students, so camping at the site is our choice. Participants need to bring a tent. Perhaps it is a good idea to share it with fellow students if it is big enough. After all, it will be one night. There has been a campfire in the past. Each and every time the campfire gives a wonderful moment (at least to me), so you can expect it this year too. And no word is necessary for the beautiful sunrise on the mountains next morning...

Transportation between Cowan railway station and your home will be arranged on your own. There will be shuttle drives between Cowan railway station and the field site. For more detailed information about the field trip, relevant material e.g. maps will be handed out to participants in early April.

Details of other Projects are described in section 3 below.

## 2.5 Suggested Learning Methods

Will be discussed at our class meetings and at camp. A significant aspect of this course is the group work and management by students. Part of the learning will include self assessment because it is important that professional surveyors are able to assess their abilities and performance reliably.

## 2.6 UNSW Graduate Attributes

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

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

### 3. Proposed Course Schedule

There will be a class meeting each Tuesday 10 – 11 in EE401 each week. Descriptions of the projects, site photos and maps, OHS etc will be discussed at the meeting in week 1.

#### 3.1 GIS / SIS Projects

##### Expected Tasks: Mapping Cowan Field Station

##### 1. Getting Started

The field survey is designed to collect GIS data using a set of iPaq, ArcPad and a GPS receiver. Learning how to use H/W and S/W is an essential part of this study. Therefore your learning outcomes from this component have to be included in your report. Expected learning outcomes include (but are not limited to):

- To be able to install Microsoft ActiveSync 4.x and synchronize/communicate with iPaq. This software can be downloaded from Microsoft's website. It is recommended to use your laptop computer (if available) to install the software.
- To be able to install ArcPad and get familiarized with the software usage (e.g. how to collect line features with ArcPad?).
- To be able to configure the data communication between iPaq and the GPS receiver. To be familiarized with COM port, Baud rate, data bits, parity, etc.
- To be able to check the GPS data streaming with Windows Hyper Terminal.

##### 2. Planning

It is required to identify features and attribute information to be collected. Use Google Maps for planning and get existing maps from the university library (and/or other sources). Then design data table(s). It is desirable to survey the town on Saturday 4 April, and the field station on the next day.

##### 3. Collecting Data

Features to be surveyed in the town include the railway station, shops and restaurants nearby, roads, parks, etc. Features in the field station are roads, fire trails, utilities, fence boundaries, animal species, buildings, ancient arts, and so on. Taking pictures of collected features is compulsory. These pictures will be included in the guidance system.

##### 4. Making Maps

ArcGIS will be used to make maps and layers from surveyed features. It is also necessary to digitize aerial photos obtained from Google Maps and/or the university library. Fly-thru maps are optional for a group of two people, but are compulsory for a group of three. DEM will be provided by the school. Metadata is important. Use ArcCatalogue to generate your metadata.

##### 5. Analyzing data

Surveyed features will be compared with existing maps (e.g. Google Maps, hard copy maps, etc) for data quality check. Accuracy and precision of horizontal and vertical coordinates of points, curvatures of lines, and areas of polygons will be reported.

##### 6. Making a guidance system

The proposed guidance system is to provide the directions and instructions for the field trip (from UNSW to the field station). It can be delivered as a website or ArcGIS map documents. Available information would be transportation (public or private), expected travel time, attractions (e.g. restaurants for lunch on the way), features in the field and the town, etc.

##### 7. Writing Report

Time spent for this project should be logged, and be given in the report. Literature review, processes, maps, analysis results, future works (if any), will be included in the report.

## 8. Self Assessment

Students will be required to submit a formal documented self assessment.

### 3.2 Proposed Tasks for Berry project

The students working on the Berry project will have Bruce Harvey as their 'client'. This group's field work will be conducted near Berry on the NSW south coast at the Berry Sport and Recreation Centre. The Berry group students will organise their own travel to the site. The field camp involves 3 days and 2 nights. Students will use the same cabin accommodation as in their GMAT3150 course at the Berry site.

Further administrative matters for the field camp are given in section 7 of this document. Students at Berry will work in groups of 2 or 3 for the field work. But students do not necessarily all do the same tasks. One global submission / report of all students' work is required.

The tasks have been selected to require students to think about how to tackle a problem that they might not have worked on before. They are designed to give practice at doing a rural boundary survey similar to that required by the Board of Surveying and Spatial Information, NSW. This project would be most relevant for those students considering becoming a Registered Surveyor.

- Prior to camp, students organise their accommodation and transport, collect cadastral and SCIMS search, gather reference material and maps, practice using instruments, calibrate and test instruments, plan logistics of camp, give equipment lists to store and decide how to transport it to the camp site. Find the AHD of MHWL for Broughton Creek near the Wharf Rd crossing.
- Management exercise. Students are expected to keep a record of all time spent on this course, including meetings, travel, on site and post processing. The final report should include the total hours spent by all students and a hypothetical costing of the "job". Students are expected to have meetings prior to and after camp and keep minutes and action items of those meetings.
- Do a resurvey by a combination of RTK GPS and total station surveying of the cadastral boundaries of the Berry Sport and Rec site. Pick up any cadastral marks and fences and produce a plan based on MGA.
- Mark MHWL on both sides of the adjoining river and detail survey it.
- If time permits: Astronomy (star observation) using a total station, observe to a known bright star. Take several 'shots', record time, Horizontal and zenith angles and in both faces. Use GPS to give lat and long and time. Compare results with star almanac calculated positions.

### 3.3 Proposed Tasks for M. Green's projects

Only 2 of the following 3 projects are to be selected.

- Cadastral Survey of semi-detached cottages in Arthur Street Kensington.

This was the Eco-living site and is owned by UNSW. The task is to survey the site to prepare a plan to define the external boundaries and subdivide the land and the buildings. The buildings are

separated by a Party Wall. The location of the new internal boundaries will be the subject of a set of client's instructions.

- Dam deflection survey of Manly Dam at Manly Vale

The students who select this task will be required to set up a series of marks on stable positions around the waters contained by the dam. These marks will form a mathematically strong figure and will be used to monitor very small movements in the dam wall. Dr B Harvey will give instructions in this task.

- Survey to prepare Deposited Plan of redefined Mean High Water Mark at Bayview

The aim will be to prepare a Deposited Plan to RG's requirements to redefine the MHWL along a beach shoreline at Pittwater Road Bayview. The plan will connect the current position of the MHWL into the local cadastre as well as the State coordinated marks near the site. The field survey and plan will be completed as if instructed by a client.

#### 4. Proposed Assessment in the Course

- 1) Students who select the GIS / SIS option will be assessed entirely by SL as follows:

- The supervisor assessment of individual student performance over the whole session 30%
- Overall group report 60% (= quality of writing 15% + quality of analytical/laboratory work 30% + quality of visualisation 15%) Due Week 11
- Self assessment 10% Due Week 12 (if you do not submit you get 0 for this component)

- 2) Students who select the survey option will be assessed 50% by B Harvey and 50% by M Green.

2a) Proposed marking schedule for the Berry Project which represents 50% of the total mark for the course:

Supervisors Assessment of Individual student performance over the whole session		20%
Overall Group Report	25%	Due week 11
Self assessment	5%	Due week 12 (if you do not submit you get 0 for this component)

For the Berry Project one group report should be in electronic form as a single MS Word format document that includes at least a title page, contents, summary, results, report, plans, input and output files. Spreadsheets, FIXIT3 input files and CivilCAD files where relevant can be in separate files. Field sheets (if applicable) and any other paper documents should be submitted in a folder (do not need to scan them). The report should be professionally prepared for the client and copies may be given of the report or parts of it to people outside UNSW. Details of Self assessment will be given in a separate file on the class website.

2b) Proposed marking schedule for the Sydney Projects which represents 50% of the total mark for the course, will be discussed with students later.

## 5. Course Resources

Messages and files for this course can be downloaded from the website [www.gmat.unsw.edu.au/gmat4020](http://www.gmat.unsw.edu.au/gmat4020). Monitor the site because it will be updated regularly. Username and password will be supplied in class. The website material is only for use by students enrolled in this course.

Detailed Technical Instructions for the survey camp will not be supplied. You are advised to bring class notes and text books from the prerequisite courses with you.

### 5.1 Equipment

There will not be a special survey store at camp. You complete and sign a form listing all the equipment you require, you collect the equipment from UNSW store before camp, transport it to camp, look after it at camp, and transport it back to UNSW survey store. Please aim for no loss or damage to any equipment. If there is a loss or damage report it to your supervisor.

## 6. Administrative Matters

Special Rules for the off campus site component of the course are given below.

### 6.1 Expected work load

*At UNSW, the normal workload expectations of a student are 24-28 hours per session for each unit of credit, including class contact hours, preparation and time spent on all assessable work, i.e. about 150 hours for a 6 UoC course.*

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.

Pre camp preparation	20hr
Travel To and From South Coast (if applicable)	6hr
At Camp (3 days) Field exercises & office work	36hr
Sydney based projects	24hr
Post camp processing	54hr
Total	140hr

### 6.2 Rules

Students should read the University Calendar or Student Guide for details of University Rules and special considerations. Take note of new university policy on Plagiarism.

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. Any work submitted for assessment must be entirely the student's own work. 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 assignments or practical reports are compulsory parts of the course and must be handed in by the due date. At the discretion of the course convenor, a mark of zero may 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.

### **6.3 Grievances**

In the first instance all grievances should be discussed with the lecturer involved. If the problem cannot be resolved, students should contact the School's Grievance Officer in writing.

### **6.4 Rules for practical / field classes**

OHS and weather aspects of the practical exercises at camp will be discussed in class and on site. Contact your supervisor if in doubt.

## **7. Administration instructions for the survey camp at Berry Sport & Rec Centre**

### **1. Registration Forms & Payment of Fees**

Fees for accommodation and meals at Berry are to be collected by the university prior to date to be determined. Payment to the University cashier using a copy of the form supplied separately. Exact cost will be supplied later, but as a general guide the 2 night's accommodation and 7 meals will cost about \$150 per student.

A UNSW field work form and a Dept of Sport & Rec form must both be completed by each student. No forms = no attend.

### **2. Travel Arrangements**

Students are required to organise their own transport to and from campsite. Most students usually travel by car with 2 or 3 students sharing expenses. Travel time is about 2 hours from southern Sydney suburbs, about 2½ hours from UNSW. The nearest railway station is Berry. A train leaves Central before 8am and arrives at Berry, after one change, at about 11 am. Students intending to travel by train should check the timetable themselves and contact B Harvey to arrange transfer from Berry station to the campsite. Contact the Course Coordinator for a list of MGA coordinates of the road route to Berry S&R site. Those driving from Sydney approach Berry on the main highway and turn left at the start of the main shopping area in Berry. There is an old hotel motel on the corner and a sign to Berry S&R. Travel south, across the rail line, then across a river, for about 2km from the highway. Turn left into the site (there is a sign) then proceed to the carpark.

### **3. Procedures for Checking In and Out of camp**

Contact the Lecturer at Berry S&R site at 10.30 am on the first day of camp. Do not leave the site until approved by Lecturer, at about 3pm on the last day of camp. During the camp students are allowed to leave the site, for example to go to Berry town, but must advise the lecturer before hand.

#### 4. Rules

The following rules are designed to provide a set of conditions that are conducive to the satisfactory completion of all work and the maximum safety and privacy for occupants of the camp under the prevailing circumstances.

**Surveying Equipment:** The instruments and equipment issued for the practical exercises are expensive and delicate and, if not handled with care and commonsense, can be damaged easily. Take special care when transporting equipment in cars that the equipment does not move. The need for careful handling, especially in storing away instruments, cannot be overstressed. If an instrument case cannot be closed, do not force the lid down, but leave it open and bring the instrument into the store like that. After the completion of each day's work, equipment must be secured in a safe location.

**Illness and Injury:** Should be reported to a member of staff; first-aid supplies are available.

**Damages:** As the cost of any damage to camp buildings and furniture will have to be met by the students directly with the provider, any damages should be reported to the Director.

**Smoking:** Consider the health of others. Do not smoke in buildings or in the paddocks (fire risk). If you must smoke, special areas will be indicated to you.

**Alcohol:** Responsible consumption of alcohol is permitted after a day's survey and computations. Alcohol may be brought onto the premises. Students are not allowed to drink alcohol in Berry town – we prefer you to be on site. The reasons for this can be discussed with the lecturer.

**Others:** Students are expected to behave in a professional mature manner with regard to noise, liquor, cleanliness, fire and consideration for other students and the on site staff possible other users of the site such as school students.