COURSE DETAILS

Units of Credit: 6
Contact hours: Average 5 hours per week
Class: Friday, 9:00 – 13:00, Room CE201

Course Coordinator and Lecturer: Craig Roberts
Email: c.roberts@unsw.edu.au
Office: CE 414, phone: 9385 4464

Lecturer: Craig Roberts
Email: c.roberts@unsw.edu.au
Office: CE 412

Demonstrator: Yincai Zhou
Email: y.zhou@unsw.edu.au
Office: CE 2

INFORMATION ABOUT THE COURSE

This course builds on previous 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 convenor for advice and permission to enrol in this course.


This course changes considerably each year with new projects to challenge and educate students.

HANDBOOK DESCRIPTION


OBJECTIVES

The objectives of the course are to broaden and deepen your knowledge and experience of data acquisition and surveying instrumentation, field methods, and surveying software, by conducting your own surveys at a site remote from the UNSW campus or on it. The aim is to involve you in management aspects of field surveys as well as gaining more experience in measurement, fieldwork 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. This course is a capstone course in your degree.

Linking the objectives with the program outcome attributes and the assessment strategies for this course:

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Program outcome attributes</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broaden and deepen surveying or geospatial knowledge and experience</td>
<td>Undertake field surveys without detailed instructions</td>
<td>Quality of survey results, Quantity of survey results Report</td>
</tr>
<tr>
<td>Management of surveys</td>
<td>Group work organised and lead by students. Ability to ‘cost’ the projects based on time spent on the tasks</td>
<td>Discussed and described in reports</td>
</tr>
<tr>
<td>Design</td>
<td>Design and plan the survey, test the</td>
<td>Discussed and described in reports</td>
</tr>
</tbody>
</table>
design by implementation

Self-Assessment | Each student to write a report that evaluates their performance in the course | A small component of the final mark is based on a student's self-assessment report.

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

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

TEACHING STRATEGIES

Different types of projects will be offered each year. Some projects may appeal more to students interested in Cadastral and Control Surveying, and others to Laser scanning, UAV mapping and GPS/GNSS projects. Students will be given the chance to decide which of the projects they will do at the week 1 class (see below). Once the project has been selected, the teams of students will be expected to work closely with the project supervisor, who will monitor progress, and give advice on what assessment tasks will be submitted.

The staff will play the role of client and specify what tasks we want students to complete. We won't give lectures or handouts describing in detail how to do the tasks. So the course is considerably different to GMAT3150. However, staff will be available to give advice to students before, during and after the fieldwork.

Learning methods will be discussed at our class meetings and in the field. 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 engineers are able to assess their abilities and performance reliably.

The CE201 computer lab has been booked from 9am each Friday during session and a 5 hour timeslot has been set for the course so that extended field work can be carried out without clashing with other classes. Students should meet the supervisor at 9am in the lab each Friday and describe their planned activities for the day (or make separate prior arrangements). It is possible to do field or computer lab work on other days as well as the timetabled class, or perhaps instead of the Fridays, provided the supervisor agrees.

EXPECTED LEARNING OUTCOMES

By the end of this course you will have some experience at tackling new projects and working as part of a team. In 2016 you will also have acquired some significant experience with some of: UAV mapping and model production, terrestrial laser scanning and georeferencing, GPS/GNSS control surveys, leap frog EDM height traversing, cadastral searching, modelling and fieldwork. Further outcomes are listed or described in the previous section on objectives.

ASSESSMENT

There is no final examination in this course.

Group reports are required.

Each student should include a time sheet indicating the time spent on this course – in much the same way as a business would use to charge a client for work on a project. It should include travel and meeting time. Students should not spend more than 150 hours on the course. However students should not ‘waste’ time doing idle activities merely to accumulate time for the project. Students will be required to submit a formal documented self-assessment on their participation in this course. Students who spend too few hours on this course have probably not contributed significantly; that affects their own learning and the group’s output. The main reason for including time sheets in the course is because some parts of industry report that some graduates are not experienced at recording total time spent on a project and the consequences for budgeting, and quoting for future projects.

As a management exercise, the final reports should include a hypothetical costing of the “job”. Students are expected to have group meetings regularly and keep minutes and action items of those meetings. Students are to prepare all
necessary WH&S documentation and to submit this to the course coordinator. Examples can be found on the UNSW website or perhaps students have some examples from their current part time employers.

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.

**ASSIGNMENTS**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Date</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First group report (scan), due before 4pm Friday week 7 (22 April)</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>2. Second group report (UAV), due before 4pm Friday week 8 (29 May)</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>3. Third group report (cadastral), due before 4pm Friday week 12 (27 May)</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>4. Self-assessment, due before noon Tuesday week 13 (31 May)</td>
<td></td>
<td>10%</td>
</tr>
</tbody>
</table>

Feedback for all reports will be given as soon as possible after submission.

The reports 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, FIXIT4 input files, laser scan databases, Geodata files or CivilCAD files where relevant can be in separate files. Name the files clearly. Field sheets (if applicable) and any other paper documents should be scanned for submission. 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 the Self-assessment task will be given in a separate file on the class website.

*Late work will be penalised at the rate of 10% per day after the due time and date have expired.*

**COURSE PROGRAM**

During the week 1 class students will choose group members and which parts of the Projects (described below) they will work on. There will be activities to perform in week 1 including reconnaissance for a site visit, discussion of the project, division of responsibilities and a new team meeting, so please do attend on time.

The timetabled class is Friday 9am - 1pm in CE201 each and every week. The 5 hour timeslot on Fridays is intended so that you can do fieldwork and or lab work for this project on some days (not necessarily every week) without interruptions from other classes. Of course you are encouraged to spend some other time on meetings, calculations, report writing, etc. Descriptions of the projects, site photos and maps, WH&S forms, etc., will be discussed at the meeting in week 1.

There is no class on Friday week 4 (March 25) because that is a public holiday. The recess week in 2015 is between weeks 4 and 5.

The field surveys will be conducted as group work. Students within a group do not necessarily all do the same tasks. For example, one student might take on management duties and organise logistics while other students concentrate on design, pre-fieldwork calculations and preparations, etc. It is up to the groups to ensure all students contribute appropriately, as discussed in ENGG1000. The course coordinator may assign different marks to individual students, at his discretion, based on student activity in the field and in the lab.

**PROJECTS weeks 1 - 12**

These projects will be supervised by Craig Roberts and Yincai Zhou. Further details will be provided on the class Moodle site and during in class discussions between students and supervisor.

Students wishing to collect survey equipment from our survey store must give a detailed written list of requirements to the supervisor before the end of Wednesday for use on a Friday. There is no person permanently in the survey store so students will need to organise times of collection and return of equipment carefully. The supervisor will not be able to come and go from the store frequently during the day or at short notice.

**Proposed Projects:** Laser scan of weighbridge building, 3D UAV site map and cadastral model of the Helensburgh waste facility.

1) **Laser scan of weighbridge building.** Establish control around weighbridge building and design method to bring in MGA and AHD coordinates using CORSnet-NSW RTK. Check AHD with local SCIMS height control (perhaps using leap frog EDM height traversing techniques. Design a laser scan of the building, perform the survey, georeference the building and produce a model either using Cyclone software or AutoCAD. Determine
a method to import the laser scanned model into the UAV 3D model in software. (Optional: Convert the model to STL format and arrange to printout with a 3D printer on-campus.)

2) **3D UAV site map.** Search survey marks around Helensburgh Waste facility using SIX. Design location and density of proposed ground control points (GCPs) for UAV model using Leica Viva GNSS to confirm quality of marks. Liaise with pilot Yincai Zhou on flight pattern with consideration of size of terrain and resolution of final product. Perform fieldwork for control and UAV flights with assistance of pilot Yincai Zhou. Determine any distortions in control network between CORSnet-NSW derived coordinates and SCIMS control.

3) **Prepare a cadastral model of the Helensburgh waste facility.** For this part of the project students will learn searching of historical cadastral plans of the site. These plans will be carefully interpreted and input into a cadastral model using the Geodata software. Ian Harper and Mike Elfick from Geodata will offer their expertise to assist students with the input and cadastral decision making required to build a cadastral model with all the available plan information. This model will be used in the field to try to find original cadastral marks in the field.

**Proposed week-by-week activities:**

Note these week-by-week activities may change at the agreed discretion of the group. If there are down times in the early weeks of the project, students should commence cadastral searching in preparation for the cadastral modelling part of the project.

**Week 1:** Explanation of projects, agreed division of responsibilities, preparation of documentation (WH & S, time sheets), desktop reconnaissance, planning for laser scanning on UNSW campus in week 2.

**Week 2:** Laser scan of small building on campus, download and preparation of 3D model using cyclone software. Practice using Leica Viva GNSS survey gear. Practice leap frog EDM height traversing on campus. Plan logistics for site visit to Helensburgh for week 3.

**Week 3:** Site visit commencing with site induction from Wollongong Council. Perform UAV survey and with appropriate control. Perform Laser scanning of weighbridge building with site control. Perform leap frog EDM height traverse to bring in AHD control.

**Week 4:** Public holiday

**Week 5:** Perform UAV survey and with appropriate control (in case of poor weather in week 3). Perform Laser scanning of weighbridge building with site control. Perform leap frog EDM height traverse to bring in AHD control. Search for SCIMS control and determine distortion in network.

**Week 6:** Compute laser scan model. Compute UAV 3D site model. Compute height of AHD control.

**Week 7:** Write up reports on project 1 & 2. Interviews with supervisor. Commence searching for cadastral plans and SCIMS control in preparation for cadastral modelling.

**Week 8:** Commence cadastral modelling with invited experts Ian Harper and Mike Elfick. Load software, learn manual entry of plans, model adjustment etc.

**Week 9:** Further plan searching and cadastral modelling

**Week 10:** Site visit to search for cadastral evidence based on cadastral modelling conducted previously.

**Week 11:** Project write up. Prepare basic plan of redefinition and prepare for lodgement in LandXML with invited experts.

**Week 12:** Project write up, time sheets and self-assessment.

**RELEVANT RESOURCES**

- Materials from previous GMAT courses that you have studied
- Additional materials provided on Moodle.
- To use survey equipment from our survey store, please prepare a written equipment list for your supervisor.
prior to the day you require the equipment. The list must specify the time and date that equipment will be collected and the time and date that it will be returned back to the 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.

**DATES TO NOTE**

Refer to MyUNSW for Important Dates available at: https://student.unsw.edu.au/dates

**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 ADVICE**

For information about:
- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC and SurvSoc

Refer to Academic Advice on the School website available at: http://www.engineering.unsw.edu.au/civil-engineering/resources/academic-advice

Craig Roberts 22 Feb 2016