

## **Engineering Tripos Part IIB, 4M9: Surveying Field Course, 2018-19**

### **Module Leader**

[Mr A L Johnson](#) [1]

### **Deputy Leader**

[Dr Dongfang Liang](#) [2]

### **Timing and Structure**

Long Vacation between Part IIA and Part IIB: 1 - 14 July for 2018/19 -Assessment: 100% coursework

### **Prerequisites**

Surveying experience, e.g. from IIA Engineering Area Activity or Fieldwork project.

### **Aims**

The aims of the course are to:

- give students experience in surveying to a high accuracy, on a larger scale (and at greater altitude) than is possible near Cambridge.
- allow students to develop their skills in team management and project planning

### **Objectives**

As specific objectives, by the end of the course students should be able to:

- plan the work for a complex setting-out exercise.
- know how to use high-accuracy and long-range surveying equipment.
- understand the role of GNSS in modern survey.
- know the calculation methods needed for the reduction of three-dimensional survey data.
- have experience in leading a survey team, and the planning of logistics.
- understand the effects of small errors in measurement, and how to minimise their effects.
- understand the need for long-term record keeping, and the information to be recorded.

### **Content**

This module gives students experience in surveying to a high accuracy, on a larger scale than is possible near Cambridge. The exercise includes three-dimensional position-fixing and setting-out in a hilly location, and involves the use of first-order surveying instruments and precise computation.

Throughout the course, short lectures will be given as necessary to explain the theory needed for the practical work in hand. Topics covered include: geoids, ellipsoids, projections and grids; the theory and practice of GNSS, including the verification of Geoid models; reduction of angles and distances; least-squares adjustment.

The course has a capacity of 16. If over-subscribed, a ballot will be held in May, but with preference given to Civil Engineering students.

## Examples papers

None

## Coursework

The Course runs continuously over a two week period, and includes the following:

- Exercise planning and siting of control stations;
- Fixing of control stations using GNSS;
- High-accuracy traversing and resectioning;
- Fixing of heights by precise digital levelling and trigonometric heighting;
- Long-range distance measurement;
- Three-dimensional setting out;
- Adjustment, computation and record keeping.

The output of this course will be a set of numerical calculations leading to the setting-out of one or more points in the field. Since incorrect answers will be systematically eliminated from this result, assessment will be based on the course demonstrators' estimation of each student's ability to:

- Take accurate readings efficiently with the equipment provided;
- Make a neat and decipherable record of other students' readings;
- Produce accurate and well laid-out calculations;
- Check the calculations of others;
- Plan and manage the activities of the team;
- Generally contribute to the efficiency and productivity of the team.

## Booklists

[Follow this link!](#) [3] All books required for this Module will be brought on the course

## Examination Guidelines

Please refer to [Form & conduct of the examinations](#) [4].

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## Links

[1] <mailto:alj3@cam.ac.uk>

[2] <mailto:dl359@cam.ac.uk>

[3] <https://www.vle.cam.ac.uk/mod/book/view.php?id=364101&chapterid=56221>

[4] <https://teaching26-27.eng.cam.ac.uk/content/form-conduct-examinations>