

Liverpool John Moores University

Title: SITE SURVEYING IN CONSTRUCTION
Status: Definitive
Code: **4508ICBTQS** (128327)
Version Start Date: 01-08-2021

Owning School/Faculty: Civil Engineering and Built Environment
Teaching School/Faculty: ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level: FHEQ4 **Credit Value:** 15 **Total Delivered Hours:** 77
Total Learning Hours: 150 **Private Study:** 73

Delivery Options

Course typically offered: S2 and Non Std S2 (S2 for Jan)

Component	Contact Hours
Lecture	45
Practical	15
Tutorial	15

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1.1	Investigate Report (1500 words)	30	
Exam	AS3	Written Exam (Closed Book)	50	2
Practice	AS1.2	Practical Exam	20	

Aims

To understand the principles land surveying and setting out: methods of obtaining orientation, the subsequent field measurements for the purpose of producing site drawings and hence the calculation of land areas and earthwork of volumes, setting out points using line-of-sight and satellite techniques, alongside an understanding of the software available. To introduce methods of obtaining orientation and position by

intersection and resection. To demonstrate how total stations and GNSS receivers, can capture data for use in software packages to produce contoured plans, sections, areas and volumes.

Learning Outcomes

After completing the module the student should be able to:

- 1 Identify the principles of site surveying.
- 2 Use a range of levels, tapes and total stations to determine distances, heights, angles and coordinates.
- 3 Demonstrate the knowledge of land surveying through a Survey camp and use gathered data to produce contour plans, longitudinal and cross sections, and to determine areas of land and volumes of earthworks.
- 4 Use standard computer software packages to post-process survey data and deliver appropriate spatially referenced information.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Investigate Report	2	3	4
Written Exam	1		
Practical Exam	2	3	4

Outline Syllabus

The National Grid system of the Ordnance Survey and other coordinate systems. Standard maps and plans, scales and symbols. Linear measurement: errors in using steel tapes, change of standard length, semi-permanent adjustments to Electromagnetic Distance Measurement (EDM) instruments (for temperature, pressure, curvature of the Earth).

Safety and Risk Assessment in surveying operations.

Vertical Control: Set up, use and adjustment of levelling instruments. Ordnance.

Bench Marks and heighting techniques. Accuracy checks. Ordnance Bench Mark (OBM), Temporary Bench Mark (TBM), levelling large areas (grid and radial methods), direct and indirect methods of contouring.

Applications: Computation and drawing of contours, longitudinal sections and cross sections. Determination of areas of land and volumes of earthworks.

Orientation and Position: Resection and intersection techniques.

Setting out: Field positioning of spiral transition curves and parabolic vertical curves on highways; the underground transfer of bearings for tunnels and pipelines. Control of spread of error (working from the whole to the point), procedure for coordinated setting out, appropriate accuracy, procedures and practices for setting out ground works, upper floors, road construction, drainage and sewerage works, embankments and cuttings.

Angular measurement: errors and methods for reducing errors, reduction of angular

measurement, horizontal and vertical angles, computation of true horizontal length (from slope distance and angle of inclination).

Distinction between open, link and closed traverse: traverse for area control, factors affecting choice of traverse stations, whole circle bearings, distinction between grid, true and magnetic north, coordinate system, Ordnance Survey (OS), grid references, angular closing error and correction, Bowditch correction for misclosure errors.

Electronic and laser instruments: electronic reading levels, electronic logging of field data, laser construction levels, laser alignment levels, EDMs, Global Positioning Systems (GPS), digital terrain modelling.

Raw data and translation for cartographic detail/setting out: levelling, plotting contours by graphic interpolation, plotting of cross-sections from contoured plans, area measurement (manual, mechanical, electronic methods),

Setting out: computation of deflection angles, distances for coordinated setting out.

Surveying computer software: software for capturing data in the field, dedicated software for setting out, built -in capabilities of total station instruments, commercial software and programmed spreadsheets to facilitate repetitive surveying calculations, Geographical Information Systems (GIS) and OS digital data.

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

By a series of lectures and theoretical approach to identify Site Surveying principles for various types of civil engineering works.

In-class practical sessions and tutorials to familiarize various techniques & methods of using different site surveying instruments.

Outbound survey practical sessions with the guidance of field experts to understand site surveying & levelling procedures, data collection and reporting to produce various engineering details of civil engineering projects.

Self-managed studies to understand Site Surveying principles for various types of civil engineering works.

A recommended resource list - indicating key reading, virtual and physical learning assistance, is provided to help enable students to undertake self-directed study.

Notes

N/A