Unit 56: Spatial Data Techniques in Construction and Civil Engineering

Unit code: A/600/0236

QCF Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

This unit aims to give learners an understanding of the spatial techniques used to map land-based and spatial information, using both conventional cartography and Geographic Information Systems (GIS). Learners will also understand how to analyse existing map series and develop skills in collecting and processing data for drawing maps.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes	Assessment criteria
1 Understand the mapping of land using spatial techniques	1.1 Explain the uses of spatial data to draw simple map projections
	1.2 Discuss the coordinate systems used to reference positioning
2 Be able to collect and process data	2.1 Collect data into a suitable format
	2.2 Process data into a suitable format
	2.3 Present data in a suitable format
3 Understand the techniques used to analyse existing map series	3.1 Identify geographical features from satellite and aerial images
	3.2 Explain how areas are determined from existing maps
	3.3 Discuss the effectiveness of scaled maps
4 Be able to draft effective maps and	4.1 Draw maps and design layouts

design layouts	4.2 Use map symbols, text and colour correctly to produce aesthetically pleasing design layouts

Unit content

1 Understand the mapping of land using spatial techniques

Map projections: map properties; basic projections; classification; mathematical and geometric origin; distortion to be found in the main projections; practical applications (Ordnance Survey)

Spherical coordinates: origin and characteristics of lines of latitude and longitude; application; world reference system (relationship to Ordnance Survey national grid)

Rectangular coordinates: nature; characteristics; application; Ordnance Survey national grid (framework for survey work, national reference system; coordination of all map series); referencing of spatial data using conventional cartography and GIS techniques

2 Be able to collect and process data

Sources and collection of data: remote sensing; satellite imagery; conventional terrestrial photogrammetry; laser scans; GPS; physical surveys; socio-economic surveys; statistics

Processing data: simplification of data; generalisation of data; maps of all scales; statistical grouping techniques eg scatter diagrams

Presenting data: statistical diagrams; maps

3 Understand the techniques used to analyse existing map series

Techniques: use of satellite and aerial images and scaled maps; measurement of areas

Satellite and aerial images: conventional and digital Ordnance Survey mapping; commercial maps; examples of foreign cartography of all scales with regard to techniques to present physical and socio-economic data; three dimensional land form

Determination of areas: graphically; mathematically; mechanically; digitally; presentation of land forms in three-dimensions

Effectiveness of scaled maps: at 1:625 000; 1:50 000; 1:25 000; 1:1250; 1:500; effectiveness of each

4 Be able to draft effective maps and design layouts

Design layouts: importance of defining objectives; manipulation of irregular geographic areas; manipulation of regular components of the map

Map production: reproduction by offset litho and electronic display in GIS including suitability; adequacy of detail; aesthetics; design and output (digital versus printed)

Design: statistical diagrams; thematic maps; techniques (point symbols, choropleths, isolines); symbols; text; colour; scale