

Apprenticeship Standard – Geospatial Mapping and Science Specialist (Degree)

1. Occupation

Geospatial Mapping and Science Specialists interpret and analyse geospatial data (data relating to geographic position on the earth's surface) and use leading edge digital technology such as laser scanning, Geographic Information Systems, remote sensing and imagery. They provide data analysis and advice for mapping, satellite navigation systems (Satnavs), Global Positioning Systems (GPS), infrastructure, the identification of local, suburban or international boundaries, military, mining and a wide range of other purposes.

Specific duties are to interpret, manipulate and analyse geospatial information, data and measurement using a wide range of innovative technologies and to provide strategic advice and recommendations based on this analysis. Geospatial Mapping and Science Specialists can work in either the public or private sector and employers include consultants, contractors, rail operators, government, the military, mapping companies, suppliers of computer based mapping technology, Geographic Information Systems and Building Information Modelling, utilities companies and a range of others. This apprenticeship consists of a core and options and apprentices are required to select one option depending upon their job role.

Geospatial Mapping and Science Specialists can specialise in:

- **Geospatial engineering** involving the creation of complex layers of interconnected geographic information for urban development including roads, buildings, bridges and offshore construction
- **Hydrography** involving the surveying and charting of water, such as seabeds, harbours, lakes and rivers
- **Utilities** involving the identification and labelling of underground public utilities such as lines for telecommunication, electricity distribution, natural gas, cable television, fiber optics, traffic lights, street lights, storm drains, water mains, and waste water pipes.
- **Geospatial surveying** involving the mapping of land, boundaries and land registration

2. Entry

The entry requirement for the apprenticeship will typically be a minimum of three Alevels at Grade C or higher or their equivalent or a relevant Level 3 apprenticeship in a construction or property related discipline but the final decision is that of each employer.

3. Requirements: Knowledge, Skills and Behaviours

Core knowledge

Knowledge	What is required – Geospatial Mapping and Science Specialists will require a comprehensive knowledge and understanding of:
Cadastre (land boundaries) and land management	Field and office procedures for boundary and/or cadastral surveys. Understand legal and physical land boundaries and legal title
Advanced geospatial technology	The principles of geospatial technologies including remote sensing, laser scanning and Geographic Information Systems
Advanced mapping and measurement	Primary data capture techniques and the importance of accuracy and precision, including the use of electronic distance measurement, automatic levels, lasers and other instrumentation
Geospatial data management and analysis	How to analyse and manage geospatial data. Interpretation of plan and map data and legal documents. Holding, retrieving and security of data.
Geodesy	The principles of geodesy including co-ordinate systems, transformations, projections, datums and their importance
Health and safety	How to ensure safe and secure working environments for self and others and the principles of managing risk.

Law of land and sea	The law and regulations and the role of legal advisers relating to land and sea
Sustainability	How to embed sustainability into your work and best practice principles including the principles of 'One Planet Living', balancing economic, environmental and social objectives, minimising energy use, using sustainable consumables, use of appropriate equipment to minimise carbon emissions
Personal effectiveness	Understanding client requirements, how to supervise tasks and others, safety and conflict avoidance. How to manage projects and tasks to specified programmes, targets and budgets

Core Skills

Skill	What is required
Cadastre (land boundaries) and land management	Undertake and manage boundary and/or cadastral surveys adopting appropriate scales and selecting appropriate supporting documentation. Use and interpret aerial photography and digital imagery.
Advanced geospatial technology	Identify, assess and source datasets from a range of technologies (including laser scanning, remote sensing and Geographic Information Systems) to meet client requirements and assess quality and fitness for purpose
Advanced mapping and measurement	Use the primary data capture techniques ensuring accuracy and precision, use appropriate co-ordinate systems, datums, transformations and projections.
Geospatial data management and analysis	Analyse and manage geospatial data including plan, map and legal data and ensure security of data. Retrieve and analyse data from manual and electronic sources.
Health and safety	Ensure safe and secure working environments and manage risk appropriately
Law of land and sea	Apply law and regulations relating to land and/or sea and ensure compliance
Sustainability	Manage activities in a way that contributes positively to sustainability and implements best practice. Apply the principles of 'One Planet Living' and appropriately balance social, economic and environmental objectives.
Personal effectiveness	Respond appropriately to client requirements, supervise tasks and others, adopt a strong safety culture and ensure effective conflict avoidance. Effectively manage projects and tasks to specified programmes, targets and budgets and show independent judgement and responsibility

Behaviours

Behaviour	What is required
Provide a high standard of service	Provide the best possible advice, support or performance of agreed terms of engagement with attention to detail. Show commitment to Continuing Professional Development for self and others
Act in a way that promotes trust in the profession	Act in a professional and positive manner at all times
Treat others with respect	Treat everyone with courtesy, politeness and respect and consider cultural sensitivities and business practices
Take responsibility	Always act with skill, care and diligence and deal with any complaint in an appropriate professional manner.
Act with integrity	Always be trustworthy, open and transparent. Respect client confidentiality and provide professional, unbiased advice

Optional knowledge and skills

Apprentices to take **ONE** of the following options dependent upon their job role.

Geospatial engineering

	What is required
Knowledge	Understanding of the principles of setting out, 3 dimensional machine control, deformation monitoring (changes in shape of structures due to stresses from weight), drawings and plans
Skill	Undertake setting out (marking out plans on site) , prepare data for 3 dimensional machine control, deformation monitoring and as built surveys. Analyse construction drawings and plans to review the structural stability of proposed construction

Hydrography

	What is required
Knowledge	Understand the principles and limitations of hydrographic survey including methods of collection, analysis, quality control and processing and presentation of hydrographic data
Skill	Undertake hydrographic surveys including assessment of survey requirements, equipment specifications and suitability. Taking responsibility for the survey of a body of still or running water, related shoreline or underwater features, in accordance with client requirements and the approved specification. Analysing data collected, presenting survey findings and advising clients

Utilities

	What is required
Knowledge	Understanding of the law, regulation and geospatial data requirements to trace, identify and map underground utilities and service routes. Understanding of electrical and electromagnetic theory.
Skill	Collect appropriate, accurate, geospatial data to trace, identify and map underground utilities and service routes such as telecommunications, electricity distribution, natural gas, storm drains or water mains. Use of relevant technologies including radio frequency locators and ground penetrating radar

Geospatial Surveying

	What is required

Knowledge	Understand how to specify, plan and undertake surveys using appropriate instrumentation including a theodolite and a total station.
Skills	Identify the reasons for the survey, the client's requirements, equipment required, the area to be surveyed, the detail and accuracy required, the grid and datum the survey will relate to and how the data is to be presented. Undertake surveys using appropriate instrumentation including a theodolite and a total station. Evaluate information to meet client requirements and explain complex survey issues such as 3D modelling and visualisation, boundary issues and the impact of survey findings on construction plans to clients.

4. Qualifications

Successful apprentices will gain a BSc/BSc(Hons) in a geospatial science subject that is accredited by the Royal Institution of Chartered Surveyors or the Chartered Institution of Civil Engineering Surveyors. Apprentices without level 2 English and Maths will need to achieve this level prior to taking the end-point assessment.

5. Professional registration

The apprenticeship will provide the knowledge, skills and behaviours to apply to become Members of the Royal Institution of Chartered Surveyors or the Chartered Institution of Civil Engineering Surveyors.

6. Duration

This apprenticeship will typically be undertaken over five years.

7. Level

This Apprenticeship Standard is at Level 6.

8. Review date

This Apprenticeship Standard will be reviewed after three years.