GEOGRAPHIC INFORMATION SYSTEMS (GIS) APPLICATIONS IN TRANSPORTATION SYSTEMS ENGINEERING AND PLANNING



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TRAINING CENTER

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Introduction

Transportation decisions are spatial by nature: where to place a junction, which corridor needs widening, which neighbourhood has no transit access, and which route carries the highest crash risk. Geographic Information Systems turn those questions into layered, queryable evidence. This Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning Training Course gives transport engineers, planners, and analysts a complete working method for applying GIS in their field. Participants learn spatial data models, network datasets, geocoding, accessibility analysis, crash mapping, and scenario visualisation. Furthermore, the course connects spatial analysis to modelling output, public consultation, and investment decisions.

Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning Course Objectives

- Apply spatial data models: vector, raster, and attribute tables.
- Build and manage transportation network datasets and topology.
- Geocode addresses, stops, and crash locations with accuracy checks.
- Perform origin-destination and accessibility analysis for services.
- Map crash data, identify hotspots, and support safety interventions.
- Integrate traffic count, volume, and speed data in map layers.
- Use network analysis for routing, service areas, and catchment mapping.
- Apply buffer, overlay, and proximity analysis to corridor planning.
- Design transport GIS maps and dashboards for decision makers.
- Apply GIS data standards, metadata, and quality control practice.

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Course Methodology

- Facilitated sessions built on real road networks, crash data, and transport layers.
- Hands-on labs in geocoding, network building, and spatial analysis.
- Case workshops on corridor studies, crash hotspots, and transit accessibility.
- Map production and cartographic design exercises.
- Group exercise on a transport GIS project with a decision brief.

Who Should Take This Course

- Transportation engineers and traffic planners.
- Urban and regional planners.
- Road safety analysts and crash data officers.
- Public transport planning and operations staff.
- GIS analysts and geospatial technicians.
- Infrastructure and municipal data officers.

Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning Course Outlines

Day 1: GIS Foundations and Spatial Data for Transport

- GIS components: data, software, people, and methods.
- Spatial data models: vector, raster, and tabular attributes.
- Coordinate systems, projections, and datum transformation.

- Transport data sources: road centrelines, networks, and satellite imagery.
- Data capture, digitising, and attribute assignment.
- Data quality, topology checks, and error correction.
- Metadata standards and documentation practice.

Day 2: Network Datasets and Geocoding

- Building transportation network datasets with connectivity rules.
- Turn restrictions, one-way streets, and hierarchy classes.
- Geocoding addresses, stops, stations, and postcodes.
- Geocoding quality assessment and rematch workflows.
- Linear referencing for road segments and assets.
- Route and stop data integration for public transport.
- Network maintenance and version control.

Day 3: Spatial Analysis for Transport Planning

- Buffer, overlay, and proximity analysis for corridors.
- Accessibility analysis and catchment area mapping.
- Service area and isochrone generation for transit and emergency response.
- Origin-destination flow mapping and desire lines.
- Land use and transport interaction mapping.
- Demographic and equity analysis for service planning.
- Scenario comparison and impact mapping.

Day 4: Road Safety, Asset, and Operational Mapping

- Crash data mapping, cluster detection, and hotspot analysis.

- Severity weighting and risk scoring on maps.
- Conflict point identification at junctions.
- Road asset inventory mapping and condition data.
- Traffic count, volume, and speed data visualisation.
- Pavement management and maintenance prioritisation maps.
- Corridor improvement tracking and monitoring.

Day 5: Presentation, Dashboards, and Governance

- Cartographic design for transport maps.
- Web maps, dashboards, and interactive layers for stakeholders.
- Presenting spatial evidence to decision makers and the public.
- Data sharing, licensing, and privacy considerations.
- Integration with transport models and simulation output.
- Maintenance routines, updates, and data governance.
- Building a transport GIS capability roadmap.

Conclusion

By successfully completing the Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning Training Course, participants will have acquired a solid working knowledge of spatial data models, transportation network datasets, geocoding and linear referencing, accessibility and flow analysis, crash hotspot mapping, asset mapping, and map-based communication. They will leave able to answer transport questions with spatial evidence, target safety and service interventions where the data points, and present findings on maps decision makers can read. Gentex Training Center delivers this programme with transport and GIS practitioners who apply these methods in live projects.

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FAQs for the Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning course

Q1 What is the "Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning" course about?

It is a five-day programme on applying GIS to transport engineering and planning. It covers spatial data models, transportation network datasets, geocoding, accessibility and flow analysis, crash hotspot mapping, asset mapping, and map-based communication.

Q2 What are the key benefits of the "Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning" course?

Participants answer transport questions with spatial evidence instead of intuition, target safety and service investment where crash and access data actually point, and present findings on maps the public and decision makers understand. They also gain data standards and governance that keep layers reliable over time.

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Q3 What skills will I gain from the "Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning" course?

You will gain spatial data modelling and transport layer management, network dataset building with geocoding and linear referencing, accessibility, flow, and crash hotspot analysis, and cartographic design with dashboard and governance practice.

Q4 What tools, methods, or standards are covered in the "Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning" course?

The course works with vector and raster spatial data models with attribute tables, coordinate systems and projections with datum transformation, road centreline and network data capture with topology checks, network dataset connectivity rules with turn restrictions and one-way streets, geocoding and rematch workflows, linear referencing for road segments and assets, buffer, overlay and proximity analysis, accessibility and catchment mapping, service area and isochrone generation, origin-destination flow mapping with desire lines, crash cluster detection and severity weighting, road asset inventory and condition mapping, traffic volume and speed visualisation, cartographic design standards, web maps and dashboard layers, and metadata and data governance practice.

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Q5 How is the "Geographic Information Systems (GIS) Applications in Transportation Systems Engineering and Planning" course applied in real-world practice?

Teams apply it when selecting a corridor for widening, mapping crash hotspots for a safety programme, measuring transit accessibility for a neighbourhood, mapping road assets for maintenance planning, comparing development scenarios, and preparing consultation maps for a public meeting.