



## Using GIS in Traffic and Transport Infrastructure Solutions



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## Introduction:

Authorities in many developed countries now actively use Geographic Information System GIS for highways and transport management, mainly due to the benefits of falling costs and increasing ease in planning, monitoring and managing complex systems involved in transportation planning and management, accident analysis, and route planning.

The Geographic Information System GIS tools and techniques significantly aid in determining capacity enhancements, improving operations, and identifying the most strategic investments for keeping the transportation system in any country running optimally. This training course is designed not only to cover the technical aspects of how to use Geographic Information System GIS but also to develop critical spatial thinking and spatial decision-making skills.

## Targeted Groups:

- Traffic & Transportation Engineers and Professionals.
- Professionals in Urban Planning and Development.
- Project Managers in Infrastructure Solutions Consulting.
- Data Analysts, Technicians in Traffic Management Centers.
- Researchers and Consultants.
- Practitioners in Traffic and Transport Engineering.
- Traffic Safety Professionals.
- Highway and Roadway Design Engineers.

## Course Objectives:

### At the end of this course the participants will be able to:

- Have a thorough understanding of how Geographic Information System GIS can help in transportation studies.
- Identify trends in traffic operations and safety performance measures, leading to improvement in transportation safety.
- Detect root causes of traffic incidents and determine effective countermeasures.
- Evaluate the performance of segments, corridors, networks, or regions.
- Pinpoint hot and cold spots via density estimation heat mapping.
- Conduct complex spatial analysis required to plan the transportation systems of the future.
- Build dynamic and rich mapping applications.
- Gain critical spatial thinking skills and become confident in spatial decision making.

## Targeted Competencies:

- Geographical Information Systems GIS Fundamentals.
- Understanding Geographic Information System GIS Maps.
- Data Collection.
- Visualization and Data Processing.
- Geospatial Analysis and Hotspot Analysis.

## Course Content:

## **Unit 1: Geographical Information Systems GIS Fundamentals:**

- Geographic Information System GIS Applications in General
- Geographic Information System GIS Applications in Transportation Studies
- Major Functions of Geographic Information System GIS
- Relating Information from Multiple Sources
- Geographic Data and the Database
- Data Acquisition
- Data Integration
- Data Structure
- Data Modeling
- ArcMap Practice

## **Unit2: Understanding Geographic Information System GIS Maps:**

- Data Information
- Spatial data
- Geographic Information System GIS Database
- Raster vs. Vector Data
- GIS Shapefiles
- ESRI Shapefile format
- Displaying and Navigating Geographic Information System GIS Maps
- Feature Attributes
- Census Units
- The Point, Line, Polygon Data

## **Unit3: Data Collection:**

- Global Positioning System GPS
- Geographic Data Library
- Census Data
- Transportation Data and Analytics with Geographic Information System GIS
- Geospatial Crash Analysis

## **Unit 4: Visualization and Data Processing:**

- Symbolizing and Labeling Geographic Information System GIS Data
- Continuous and Categorical Data
- Classification Methods
- Normalization
- Geographic Information System GIS Data Query
- Classification
- Identify, Select, Find
- Select Features by Attributes
- Joining and Relating Tables
- Spatial Joining
- Dissolving and Clipping layers

## **Unit 5: Geospatial Analysis and Hotspot Analysis:**



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- Introduction to Spatial Analysis
- Buffering Features
- Overlaying Data
- Spatial Analysis Methods to Identify Hotspots
- Fishnet-based Analysis
- Kernel Density Estimation