



Civil Engineering

GIS, Mapping, and Spatial Analysis

Course Introduction

The course will comprise general and specific roles and applicability of how GIS & Mapping can optimize operation and maintenance. This course will tackle different relative disciplines and corresponding issues like; GIS & GPS Functionality, Geographic Coordinate System & Scale, Projected Coordinate Systems, Acquiring Data & Data Collection, Mapping Methodology, and International Case Studies & Best Practices World Wide. Moreover, this course will cover the GIS role in field force automation (FFA) and control/monitoring systems.

Target Audience

- Chief Engineer
- Civil Engineer
- Commissioning Engineer
- Construction Engineer
- Drilling Engineer
- Fire Protection Engineer
- Piping Engineer
- Piping Stress Engineer
- Planning Engineer
- Reservoir Engineer
- Structural Engineer
- Welding Engineer

Learning Objectives

- Understand and gain experience on how GIS and mapping can work.

- Particularly, in the optimization of the operation, regular maintenance, predictive maintenance, proactive maintenance, pipeline and piping inspection, repair in a manner that follows international best practices, and being aware of the kind of tools appropriate for each corresponding task.
- The course will cover the most advanced techniques used in data collection, data processing & handling, state-of-the-art GIS, and mapping modules applied in that context.
- Furthermore, the course will cover also cutting-edge technology applied in the geo-database and spatial analysis affiliated with slandered attributes.
- Noteworthy, the GIS role in the field force automation (FFA) and control/monitoring systems will be explained. Moreover, significant best practices and tangible case studies will be discussed in detail as well.

Course Outline

• DAY 01

Module (01) Introduction to GIS Functionality:

- What is GIS?
- GIS Components
- Characteristics of Spatial Data
- Data Modelling techniques
- Different Modelling Algorithms
- Different Techniques of Manipulation and Analysis
- Databases & Attributes
- Spatial Data Infrastructure (SDI)
- GIS Application Areas.

• Day 02

Module (02) Introduction to GPS Application:

- What is the Global Positioning System (GPS)?
- How GPS Works?
- Different Types and Accuracy Levels of Receiver(s)
- User Segment
- Sources of GPS Errors
- Sources of Signal Interference

- Good Satellite Geometry
- Map Datum
- Real-Time Differential GPS
- GPS Wide Area Augmentation System (WWAS)
- GPS/GIS Functionality

Module (03) Geographic Coordinate System & Scale

- Working with Data in Different Geographic Coordinate Systems
- Choose an Appropriate Geographic Transformation
- Map Projections and Scale Proper

• Day 03

Module (04) Projected Coordinate Systems

- Types of Map Projections
- Projecting Coordinates
- Projections and Distortion
- Classifying Projections According to the Properties They Preserve
- Reasons for Using a Specific Projected Coordinate System
- Choose an Appropriate Projection

Module (05) Geodatabase 6.1.Spatial Data Formats

- 6.2.Geodatabase Data Structure
- 6.3.Personal Vs. Enterprise Geodatabase
- 6.4.Components of Geodatabase.. 6.5.Building Geodatabase
- 6.6.Specific Scheme and Attributes

• Day 04

Module (06) Acquiring Data & Data Collection

- Different Types of Data Collection Methodology
- Different Types of Data Sources
- Different Types of Data Formats
- Data considerations
- Data Collection Instrumentation & Various Techniques
- Data Collection Verification
- Data Collection Quality Control (QC) & Quality Assurance (QA)
- Best Practise in Data Collection

Module (07) Mapping Methodology

- How to Prepare an Image Map
- Data Types and Data Conversions
- Raster Formats & Vector Format
- Vector Feature Types & Classification
- Spatial Data Criteria
- Feasibility Checking
- Real-Time Mapping in Integration with Collection of Data & Surveying Techniques and Advanced Methodology
- Real-Time GPS and Handhelds Different Techniques of Data Collection in Relation to GIS Mapping
- Mapping QS & QA and Field Verification Survey by GPS
- Prepare Database & Multiuser Geodatabase

• Day 05

Module (08) The Role of the GIS/Mapping in Optimizing Operations

- Role of the GIS in Optimizing the Operation
- Role of the GIS in optimizing Control & Inspection
- Maintenance According to GIS Map/System
- Role of the GIS in Predictive, Proactive, and Regular Maintenance
- Role of the GIS in Network Spatial Asset Inventories & Management
- Enterprise Geo-Database of "As Built Drawing"
- International Case study: Preparation of Base-map & As Built Drawing & Survey and Investigation, Collect GPS data of Transmission and Distribution Network.
- International Case studies

Confirmed Sessions

FROM	TO	DURATION	FEEs	LOCATION
May 12, 2025	May 16, 2025	5 days	4250.00 \$	UAE - Dubai
Dec. 29, 2025	Jan. 2, 2026	5 days	4250.00 \$	UAE - Abu Dhabi
July 21, 2025	July 25, 2025	5 days	4950.00 \$	Italy - Rome