Training Course on Geographic Information Systems for Forestry and Wildfire Management

Professional Development Training Course Outline

Category	GIS	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Geographic Information Systems (GIS) have emerged as indispensable tools for **modern geotechnical engineering**, revolutionizing how professionals analyze, visualize, and manage complex spatial data. Training Course on GIS for Geotechnical Engineering bridges the gap between traditional geotechnical practices and cutting-edge **geospatial technologies**, empowering engineers to make more informed and efficient decisions. By integrating diverse **geological, hydrogeological, and subsurface investigation data** within a dynamic spatial framework, GIS facilitates **comprehensive site characterization, risk assessment, and infrastructure planning**, ultimately leading to safer, more sustainable, and cost-effective geotechnical solutions.

The course delves into the practical applications of GIS, moving beyond theoretical concepts to provide hands-on experience with industry-standard software and real-world **case studies**. Participants will learn to leverage GIS for tasks such as **3D geological modeling, slope stability analysis, groundwater flow visualization, and construction project management**. This program is designed to enhance the **digital proficiency** of geotechnical professionals, enabling them to unlock the full potential of their data and contribute to advanced **geotechnical design and analysis** in an increasingly data-driven world.

Programme Curriculum

Training Course on Geographic Information Systems for Forestry and Wildfire Management

Introduction

Training Course on Geographic Information Systems for Forestry and Wildfire Management offers a critical foundation for professionals navigating the complexities of modern environmental challenges. Leveraging **geospatial intelligence** and **remote sensing technologies**, participants will gain actionable insights into **forest monitoring, natural resource assessment, and proactive**

wildfire risk mitigation. This program emphasizes hands-on application and data-driven decision-making, crucial for **sustainable forestry practices** and enhancing **ecological resilience** in a rapidly changing climate.

Equipping participants with **cutting-edge GIS tools** and analytical methodologies, this course bridges the gap between theoretical knowledge and practical implementation in the field. From **high-resolution satellite imagery analysis** for **deforestation detection** to **spatial modeling** for **fire behavior prediction**, attendees will master techniques vital for **conservation planning, biodiversity mapping, and emergency response optimization**. This specialized training is designed to cultivate experts who can leverage **location intelligence** to safeguard vital forest ecosystems and communities against escalating wildfire threats, promoting a future of **resilient landscapes** and **effective natural resource governance**.

Course Duration

10 days

Course Objectives

Upon completion of this course, participants will be able to:

1. Understand core Geographic Information Systems (GIS) concepts and their transformative applications in forestry and wildfire management.
2. Utilize satellite imagery and aerial data for advanced forest inventory, vegetation mapping, and land cover classification.
3. Employ spectral indices and geospatial analysis to monitor forest health, detect pests and diseases, and assess ecosystem vitality.
4. Identify deforestation hotspots, track illegal logging, and quantify forest degradation using time-series geospatial data.
5. Accurately estimate forest biomass and carbon sequestration potential using GIS and remote sensing for climate change mitigation.
6. Develop and apply spatial models to assess wildfire risk, identify high-hazard zones, and predict fire behavior.
7. Integrate real-time data and location intelligence for enhanced wildfire detection, emergency response planning, and resource allocation.
8. Analyze post-fire landscapes to map burn severity, assess ecological impact, and guide restoration efforts.
9. Utilize GIS for biodiversity mapping, habitat suitability analysis, and designing effective conservation strategies.
10. Apply precision forestry techniques for optimized timber harvesting, sustainable silviculture, and resource management.
11. Use GIS to analyze watershed health, monitor soil erosion, and plan riparian zone restoration in forest areas.
12. Automate GIS processes and create efficient geospatial workflows for recurring tasks in forestry and wildfire operations.
13. Effectively visualize and communicate complex spatial data and analytical findings to diverse stakeholders for informed policy and decision-making.

Organizational Benefits

- Improved strategic and operational decisions based on precise **geospatial data** and advanced **spatial analytics**.

- Optimized resource allocation, reduced operational costs, and minimized losses from **wildfires** through proactive planning and rapid response.
- Higher fidelity in **forest inventory**, **land use mapping**, and **environmental monitoring**, leading to more reliable data.
- Better prediction and mitigation of **wildfire threats**, leading to enhanced safety for personnel and communities.
- Strengthened ability to meet environmental regulations and reporting requirements related to **forest conservation** and **carbon accounting**.
- Promotion of **sustainable forestry** and **natural resource management** through data-driven approaches.
- Improved inter-agency and stakeholder coordination through shared **geospatial intelligence platforms**.
- Upskilling of staff, leading to a more competent and technologically adept workforce capable of addressing complex environmental challenges.

Target Audience

1. Forestry Professionals.
2. Wildfire Fighters & Managers.
3. Environmental Scientists & Consultants.
4. Conservationists.
5. GIS Analysts & Specialists.
6. Natural Resource Managers
7. Government Policy Makers
8. Researchers & Academics.

Course Outline

Module 1: Introduction to GIS and Remote Sensing for Natural Resources

- Understanding Geospatial Concepts
- Remote Sensing Fundamentals
- GIS Software Overview.
- Data Acquisition & Management
- **Case Study:** Examining how the U.S. Forest Service uses foundational GIS data for national forest planning.

Module 2: Spatial Data Acquisition and Pre-processing

- Georeferencing & Projections.
- Image Processing & Enhancements.
- Digital Elevation Models (DEMs).
- Data Integration.
- **Case Study:** Pre-processing Sentinel-2 imagery for **forest cover mapping** in the Amazon Basin.

Module 3: Forest Inventory and Mapping

- Forest Stand Delineation.
- Tree Species Identification.
- Forest Biomass Estimation.
- Canopy Height Modeling (CHM).

- **Case Study:** Conducting a **timber volume inventory** for a commercial forest using GIS and satellite data in Canada.

Module 4: Land Use/Land Cover Change Detection

- Classification Techniques.
- Change Detection Algorithms.
- Time-Series Analysis.
- Accuracy Assessment
- **Case Study:** Monitoring **deforestation rates** in Borneo due to palm oil expansion using Landsat time-series.

Module 5: Forest Health Monitoring

- Vegetation Indices (NDVI, EVI).
- Pest and Disease Outbreak Mapping.
- Drought Stress Assessment.
- Forest Fire Scar Mapping.
- **Case Study:** Detecting and mapping the spread of bark beetle infestations in coniferous forests using aerial imagery and GIS.

Module 6: Wildfire Risk Assessment and Mapping

- Fuel Load Mapping
- Topographic Influences.
- Weather Data Integration.
- Human Ignition Factors
- **Case Study:** Developing a **wildfire risk index map** for a national park in Australia based on fuel, topography, and historical fire data.

Module 7: Wildfire Behavior Modeling and Prediction

- Fire Behavior Principles.
- GIS-based Fire Spread Models.
- Scenario Planning.
- Hotspot Detection & Monitoring.
- **Case Study:** Predicting the likely path and intensity of a simulated wildfire using **weather forecasts** and **fuel models** in California.

Module 8: Wildfire Emergency Response and Management

- Incident Command System (ICS) & GIS.
- Damage Assessment Mapping.
- Evacuation Planning.
- Resource Tracking & Deployment.
- **Case Study:** Supporting the **emergency response** to a large-scale wildfire in Portugal with **real-time GIS dashboards** for resource allocation.

Module 9: Post-Fire Rehabilitation and Recovery

- Burn Severity Mapping.
- Erosion Risk Assessment.
- Revegetation Planning.
- Hydrological Impact Assessment.

- **Case Study:** Using **NDVI change detection** to monitor vegetation recovery and plan rehabilitation in a post-fire landscape in the Western U.S.

Module 10: Biodiversity and Wildlife Habitat Management

- Habitat Mapping & Classification.
- Species Distribution Modeling (SDM).
- Wildlife Corridor Design.
- Protected Area Management
- **Case Study:** Mapping critical habitat for an endangered species and designing a **conservation network** in South Africa.

Module 11: Sustainable Forest Management and Certification

- Precision Silviculture.
- Harvest Planning Optimization networks.
- Forest Certification Standards.
- Carbon Monitoring for REDD
- **Case Study:** Implementing a **sustainable forest management plan** for a certified timber company using GIS for yield predictions and environmental safeguards.

Module 12: Advanced Spatial Analysis Techniques

- Network Analysis.
- Suitability Analysis.
- Geostatistical Analysis.
- Spatial Regression.
- **Case Study:** Conducting a **site suitability analysis** for new fire lookout towers based on visibility, accessibility, and risk.

Module 13: Geospatial Data Automation and Scripting

- ModelBuilder in ArcGIS.
- Python for GIS (ArcPy/PyQGIS)
- Batch Processing.
- Custom Tool Development
- **Case Study:** Developing a Python script to automate the **calculation of burn severity indices** from satellite imagery.

Module 14: Web GIS and Data Sharing

- Introduction to Web GIS.
- Publishing Web Maps.
- Geospatial Data Portals
- Mobile GIS Applications
- **Case Study:** Developing a **public-facing web application** to display **real-time wildfire perimeters** and evacuation information.

Module 15: Future Trends and Emerging Technologies

- LiDAR in Forestry
- UAVs (Drones) for Forest Monitoring.
- Machine Learning & AI in GIS.
- Big Data & Cloud GIS.

- **Case Study:** Exploring the use of **AI for automated wildfire detection** from satellite imagery and its implications for early warning systems.

Training Methodology

- **Interactive Lectures & Presentations:** Core concepts and theoreti

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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