High-Resolution Satellite Imagery Applications Training Course

Professional Development Training Course Outline

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

Course Introduction

Remote sensing has emerged as a **transformative technology**, offering unparalleled insights into our planet's dynamic processes. High-resolution satellite imagery (HRSI) stands at the forefront of this revolution, providing **granular spatial data** critical for diverse applications across numerous sectors. This intensive training program delves into the theoretical foundations and practical applications of HRSI, equipping participants with the essential skills to **acquire, process, analyze, and interpret** this valuable geospatial information. From environmental monitoring to urban planning and disaster management, mastering HRSI unlocks a new dimension of **data-driven decision-making** and **geospatial intelligence**.

Training Course on High-Resolution Satellite Imagery Applications is designed to empower professionals with cutting-edge techniques for leveraging HRSI. We will explore advanced image processing workflows, **machine learning for image classification**, and **geospatial analytics** using industry-standard software. Through hands-on exercises and real-world case studies, participants will gain practical experience in extracting actionable insights from satellite data, enabling them to address complex challenges and drive innovation within their respective fields. The curriculum emphasizes **practical skill development**, ensuring participants are ready to apply their newfound knowledge immediately in their professional roles.

Programme Curriculum

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Course Objectives

Upon successful completion of this training, participants will be able to:

- Comprehend the principles of remote sensing, satellite sensors, and high-resolution imagery characteristics.
- Apply radiometric, atmospheric, and geometric corrections to satellite imagery for enhanced accuracy.
- Utilize supervised and unsupervised classification techniques, including **machine learning algorithms**, for land cover mapping.
- Identify and quantify temporal changes in landscapes using multi-temporal satellite data.
- Apply advanced spatial analysis tools to derive meaningful insights from HRSI.
- Seamlessly integrate HRSI with Geographic Information Systems (GIS) for comprehensive spatial analysis.
- Identify and implement HRSI for diverse fields such as **urban planning, agriculture, environmental monitoring, and disaster management**.
- Evaluate the quality and suitability of various HRSI datasets for specific applications.
- Gain proficiency in popular open-source software for HRSI processing and analysis.
- Understand and interpret spectral characteristics of different land features.
- Design and execute customized HRSI processing workflows for specific project requirements.
- Effectively communicate HRSI-derived insights through compelling maps and reports.
- Understand emerging trends in satellite technology, AI, and cloud-based geospatial platforms.

Organizational Benefits

- Empowering teams with **data-driven insights** for strategic planning and operational efficiency.
- Optimizing the utilization of resources in agriculture, forestry, and urban development.
- Strengthening **disaster preparedness and response** capabilities through real-time monitoring.
- Reducing the need for expensive and time-consuming field surveys through remote data acquisition.
- Gaining a leading edge by leveraging cutting-edge geospatial technology for market analysis and site selection.

- Supporting **environmental conservation** and sustainable land management practices.
- Streamlining workflows and automating tasks related to spatial data analysis.
- Fostering a culture of innovation by integrating advanced remote sensing capabilities into various departments.

Target Audience

- GIS Professionals & Analysts.
- Urban Planners & Developers.
- Environmental Scientists & Conservationists.
- Agriculturalists & Agronomists.
- Disaster Management & Emergency Response Personnel
- Researchers & Academics.
- Government Officials.
- Consultants & Business Analysts

Course Outline

Module 1: Fundamentals of Remote Sensing & HRSI

- Introduction to Remote Sensing.
- Satellite Systems & Sensors.
- Spatial, Spectral, Temporal, Radiometric Resolution.
- Data Formats & Sources
- Ethical Considerations.
- **Case Study**: Analyzing the evolution of satellite technology from early missions to modern constellations for enhanced resolution and revisit times.

Module 2: Image Preprocessing & Enhancement

- Radiometric Correction
- Atmospheric Correction
- Geometric Correction & Georeferencing
- Image Enhancement Techniques
- Image Mosaicking & Tiling
- **Case Study**: Preprocessing satellite imagery to create a clean, georeferenced base map for a rapidly urbanizing area, highlighting challenges like cloud cover.

Module 3: Visual Interpretation & Feature Extraction

- Elements of Image Interpretation
- On-screen Digitization
- Feature Extraction Techniques
- Creating Basemaps & Thematic Layers
- Quality Control & Validation
- **Case Study**: Interpreting HRSI to identify informal settlements and monitor their growth in an urban fringe, assisting in infrastructure planning.

Module 4: Image Classification: Supervised Techniques

- Introduction to Image Classification.
- Training Data Collection
- Classification Algorithms
- Accuracy Assessment

- Post-Classification Processing.
- **Case Study**: Classifying agricultural land into different crop types using HRSI and ground truth data for precision farming applications.

Module 5: Image Classification: Unsupervised & Object-Based

- Unsupervised Classification.
- Evaluating Unsupervised Results.
- Object-Based Image Analysis (OBIA).
- Feature-Based Classification
- Integrating OBIA with Machine Learning
- **Case Study**: Using OBIA to differentiate between building types and impervious surfaces in an urban environment for urban heat island analysis.

Module 6: Change Detection Analysis

- Types of Change Detection
- Multi-Temporal Data Preparation.
- Quantifying Land Cover Change
- Detecting Environmental Degradation
- Temporal Trajectory Analysis.
- **Case Study**: Analyzing deforestation rates in a protected area over a decade using Landsat and Sentinel imagery to inform conservation strategies.

Module 7: HRSI in Urban Planning & Management

- Urban Growth Monitoring.
- Infrastructure Mapping & Assessment.
- Land Use/Land Cover (LULC) Mapping
- Urban Heat Island Analysis
- Site Suitability Analysis.
- **Case Study**: Utilizing HRSI to map informal settlements and assess access to basic services for targeted urban development interventions.

Module 8: HRSI in Agriculture & Food Security

- Crop Health Monitoring
- Precision Farming
- Yield Prediction.
- Soil Moisture & Nutrient Mapping.
- Irrigation Management
- **Case Study**: Implementing a precision agriculture plan for a large farm, using drone and satellite imagery to optimize irrigation and fertilizer application, leading to increased yields.

Module 9: HRSI in Environmental Monitoring & Conservation

- Forestry & Carbon Sequestration
- Water Resources Management
- Biodiversity & Habitat Mapping.
- Coastal Zone Management
- Pollution Monitoring.
- **Case Study**: Monitoring the health of a coral reef system using HRSI to identify bleaching events and track recovery, informing marine conservation efforts.

Module 10: HRSI in Disaster Management & Humanitarian Aid

- Pre-Disaster Planning
- Real-time Damage Assessment.
- Emergency Response Mapping
- Post-Disaster Recovery Monitoring.
- Refugee Camp Monitoring
- **Case Study**: Using HRSI to assess the extent of flooding after a major storm, identify affected communities, and plan evacuation routes and aid distribution.

Module 11: Introduction to SAR Imagery & Applications

- Principles of Synthetic Aperture Radar (SAR)
- SAR Data Characteristics.
- SAR Data Processing.
- Applications of SAR.
- SAR-Optical Integration.
- **Case Study**: Detecting land subsidence or uplift in an urban area using InSAR (Interferometric SAR) techniques, crucial for infrastructure safety.

Module 12: Cloud-Based Platforms & Big Data Analytics

- Google Earth Engine (GEE)
- Cloud-Based Processing
- Scripting for Geospatial Analysis.
- Big Data Challenges & Solutions.
- Scalable Geospatial Workflows.
- **Case Study**: Performing regional-scale land cover classification for an entire country using Google Earth Engine, demonstrating the power of cloud processing for big data.

Module 13: Advanced Machine Learning for HRSI

- Deep Learning Fundamentals
- Object Detection & Semantic Segmentation.
- Training Deep Learning Models
- Transfer Learning.
- AI for HRSI Automation
- **Case Study**: Developing a deep learning model to automatically detect and count vehicles in HRSI for traffic analysis and urban mobility studies.

Module 14: Integrating HRSI with GIS

- GIS Data Models.
- Geodatabase Design.
- Spatial Queries & Joins.
- Network Analysis
- 3D Visualization of HRSI.
- **Case Study**: Integrating HRSI with existing GIS layers to create a comprehensive urban infrastructure map, enabling more efficient asset management.

Module 15: Project Implementation & Best Practices

- Project Planning & Scoping
- Data Acquisition Strategies.
- Quality Assurance & Control (QA/QC).

- Reporting & Visualization.
- Ethical Considerations & Data Security
- **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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