Training Course on Geographic Information Systems for Land Administration and Cadastral Mapping

Professional Development Training Course Outline

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

Course Introduction

In an era defined by rapid urbanization, climate change impacts, and increasing demands on land resources, efficient **land administration** and accurate **cadastral mapping** are paramount for sustainable development. Geographic Information Systems (GIS) stand at the forefront of this transformation, offering powerful tools for spatial data capture, analysis, visualization, and management. This comprehensive training delves into the core principles and practical applications of GIS, equipping professionals with the essential skills to modernize land records, resolve disputes, optimize land use planning, and foster transparent land governance for resilient communities and economies.

Training Course on Geographic Information Systems for Land Administration and Cadastral Mapping is designed to empower land professionals with cutting-edge GIS competencies, enabling them to navigate the complexities of contemporary land challenges. Participants will gain hands-on experience with industry-standard software and methodologies, fostering expertise in **geospatial data management**, **parcel fabric modeling**, **land tenure security**, and **digital cadastre implementation**. By leveraging advanced GIS techniques, this program aims to enhance decision-making, promote equitable land distribution, and build robust, interoperable **Land Information Systems (LIS)** critical for national development and a data-driven future.

Programme Curriculum

Training Course on Geographic Information Systems for Land Administration and Cadastral Mapping

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Course Duration

10 days

Course Objectives

1. Proficiently collect, manage, and integrate diverse geospatial data sources for comprehensive land administration, including **LiDAR** and **drone imagery**.
2. Develop and manage accurate, up-to-date digital cadastral databases for **parcel mapping** and **boundary demarcation**.
3. Utilize GIS for robust land rights documentation, **blockchain integration**, and secure land registration systems.
4. Apply spatial analysis techniques for sustainable urban and rural land use zoning, **smart city planning**, and infrastructure development.
5. Conduct complex geospatial analyses including **site suitability analysis**, **network analysis**, and **multi-criteria evaluation** for land management decisions.
6. Design, implement, and maintain integrated LIS platforms for efficient land data management and dissemination.
7. Utilize satellite and **UAV imagery** for land cover change detection, **environmental monitoring**, and illegal encroachment tracking.
8. Employ GIS for visualizing conflicting claims, historical land use, and supporting fair adjudication processes.
9. Explore the application of **AI/ML for automated feature extraction**, predictive modeling in land valuation, and pattern recognition in land transactions.
10. Understand and utilize **cloud GIS platforms** for scalable data storage, real-time collaboration, and web-based mapping applications.
11. Apply best practices for geospatial data quality control, **data validation**, and topological error correction in cadastral data.
12. Understand the concepts and applications of **3D cadastre** and **digital twins** for complex property rights and urban modeling.
13. Advocate for and implement open geospatial data standards and interoperable systems for seamless data exchange across agencies.

Organizational Benefits

- Streamline land registration, titling, and mapping processes, reducing processing times and administrative burden.
- Minimize errors and discrepancies in land records, leading to more reliable land information and reduced disputes.
- Promote open access to land information and reduce opportunities for corruption.
- Provide robust spatial intelligence for evidence-based policy formulation, urban planning, and resource allocation.
- Offer clear visual evidence and historical context to resolve boundary and ownership conflicts more effectively.
- Support sustainable land use, environmental protection, and agricultural productivity through informed spatial planning.
- Automate manual processes, reduce the need for extensive field surveys, and optimize infrastructure development.
- Develop a highly skilled workforce proficient in modern GIS technologies for long-term organizational resilience.
- Facilitate adherence to national and international land administration standards and best practices.
- Improve property taxation, land valuation, and land-based revenue collection through accurate spatial data.

Target Audience

1. Land Administration Professionals.
2. Urban & Regional Planners.
3. Surveyors & Geomatics Engineers.
4. Environmental Scientists & Natural Resource Managers.
5. Legal Professionals & Land Tenure Specialists.
6. Real Estate Developers & Valuers.
7. GIS Analysts & Technicians
8. Researchers & Academics.

Course Outline

Module 1: Foundations of GIS for Land Administration

- Introduction to GIS concepts: spatial data models, coordinate systems, projections.
- Role of GIS in modern land administration and cadastral systems.
- Understanding Land Information Systems (LIS) and Spatial Data Infrastructure (SDI).
- Overview of GIS software (ArcGIS, QGIS) and data types.
- Legal and institutional frameworks of land administration.
- **Case Study:** Digitalizing land records in Rwanda using ArcGIS.

Module 2: Geospatial Data Acquisition & Management

- Sources of spatial data: satellite imagery, aerial photography, drone mapping, GPS surveys.
- Data capture techniques: digitization, georeferencing, field data collection
- Data quality control, validation, and error management.
- Designing and managing geodatabases for land records.
- Data security, privacy, and sharing protocols in land administration.
- **Case Study:** Integrating conventional survey data with satellite imagery for parcel mapping in Ghana.

Module 3: Cadastral Mapping Principles & Standards

- Understanding land parcels, boundaries, and various land tenure systems.
- Principles of cadastral surveying and mapping.
- International standards and best practices in cadastral mapping
- Symbolization, labeling, and map production for cadastral purposes.
- Maintaining cadastral map accuracy and integrity.
- **Case Study:** Implementation of a fit-for-purpose cadastre in Ethiopia.

Module 4: Parcel Fabric Management

- Introduction to ArcGIS Parcel Fabric: concepts, architecture, and workflow.
- Creating and editing parcel features, points, lines, and polygons.
- Managing historic and current parcel data, including splits and merges.
- Maintaining topological integrity and correcting geometric errors.
- Attribute management and linking cadastral data to legal records.
- **Case Study:** Modernizing parcel records using Parcel Fabric in a US county.

Module 5: Land Tenure and Property Rights Mapping

- Mapping different land tenure types: customary, statutory, public, private.
- Documenting land rights, claims, and encumbrances spatially.
- GIS for participatory mapping and community land rights recognition.
- Integrating textual land records with spatial data for comprehensive property information.
- Addressing informal settlements and land regularization through GIS.
- **Case Study:** Mapping customary land rights and formalizing tenure in Uganda.

Module 6: Spatial Analysis for Land Use Planning

- Advanced spatial query, selection, and overlay operations.
- Buffering, proximity analysis, and hot spot analysis for urban planning.
- Site suitability analysis for various land uses
- Scenario modeling for urban growth, environmental protection, and infrastructure development.
- Visualizing zoning regulations and land use restrictions.
- **Case Study:** Using GIS for master planning and zoning in a rapidly urbanizing Asian city.

Module 7: GIS for Land Valuation & Taxation

- Mapping property values and land use categories for fair taxation.
- Automated valuation models (AVM) using spatial attributes.
- Identifying properties for re-evaluation and tracking tax revenue.
- Integrating GIS with land valuation databases and financial systems.
- Analyzing market trends and property development potential.
- **Case Study:** Implementing a GIS-based property tax system in a European municipality.

Module 8: Remote Sensing for Land Change Detection & Monitoring

- Introduction to remote sensing principles and image interpretation.
- Utilizing satellite and drone imagery for land cover/land use mapping.
- Change detection techniques: identifying deforestation, urban sprawl, and illegal construction.
- Monitoring environmental degradation and natural resource depletion.

- Applications in disaster risk reduction and post-disaster assessment.
- **Case Study:** Tracking illegal mining and land degradation in the Amazon using satellite imagery.

Module 9: Web GIS and Cloud-Based Solutions

- Introduction to Web GIS: concepts, architecture, and benefits.
- Publishing and sharing GIS data and maps online.
- Developing interactive web applications for public access to land information.
- Leveraging cloud platforms for scalable GIS operations.
- Mobile GIS for field data collection and real-time updates.
- **Case Study:** Developing a national land information portal for public access in Sweden.

Module 10: AI and Machine Learning in Land Administration

- Fundamentals of AI/ML for geospatial data.
- Automated feature extraction from imagery
- Predictive analytics for land market trends and land use change.
- Machine learning for land classification and anomaly detection.
- Challenges and ethical considerations of AI in land administration.
- **Case Study:** AI-powered identification of informal settlements from high-resolution satellite imagery.

Module 11: 3D Cadastre & Digital Twins

- Concepts of 3D spatial data and modeling in land administration.
- Representing multi-story properties, underground utilities, and complex land rights in 3D.
- Introduction to Digital Twins for urban environments and infrastructure.
- Visualization and analysis of 3D cadastral data.
- Future trends and challenges in 3D land administration.
- **Case Study:** Developing a 3D cadastre pilot project for complex urban properties in the Netherlands.

Module 12: Legal & Institutional Aspects of Land Information Systems

- Legal frameworks for land information management and data sharing.
- Institutional arrangements for effective land administration.
- Policy development for sustainable land governance.
- Data privacy, security, and ethical considerations in LIS.
- Stakeholder engagement and public participation in land management.
- **Case Study:** Assessing institutional readiness for digital land administration in Kenya.

Module 13: Project Management for GIS in Land Administration

- Planning and scoping GIS projects in land administration.
- Budgeting, resource allocation, and timeline management.
- Risk assessment and mitigation strategies.
- Data migration, system integration, and quality assurance.
- Monitoring and evaluation of GIS projects.
- **Case Study:** Lessons learned from a large-scale land titling and cadastral mapping project in Indonesia.

Module 14: Emerging Technologies & Future Trends

- Blockchain for secure land registries and transactions.
- Internet of Things (IoT) for real-time land monitoring.
- Augmented Reality (AR) and Virtual Reality (VR) for land visualization.
- Big data analytics for large-scale geospatial datasets.
- Open Geospatial Consortium (OGC) standards and interoperability.
- **Case Study:** Exploring blockchain applications for land records in Georgia

Module 15: Practical Project & Capstone Exercise

- Participants work on a real-world land administration/cadastral mapping project.
- Applying learned GIS skills to a specific challenge
- Data integration, analysis, and map production.
- Presentation of project findings and recommendations.
- Review of best practices and individual feedback.
- **Case Study:** Participants apply GIS skills to solve a simulated land dispute scenario

Training Methodology

- **Lectures & Presentations**: Concise theoretical foundations and conceptual frameworks.
- **Hands-on Software Exercises**: Extensive practical sessions using industry-standard GIS software
- **Real-world Case Studies**: In-depth analysis of successful GIS implementations in land administration and cadastral mapping from diverse global contexts.
- **Interactive Demonstrations**: Live demonstrations of complex GIS workflows and functionalities.
- **Group Discussions & Problem Solving**: Collaborative sessions to discuss challenges and brainstorm solutions.
- **Practical Assignments & Projects**: Application of learned skills to real or simulated land administration scenarios.
- **Expert-Led Guidance**: Direct interaction and mentorship from experienced GIS

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

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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