GIS for Aviation and Airport Management 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

Geographic Information Systems (GIS) are revolutionizing the **aviation industry** and **airport management** by providing powerful tools for spatial data analysis, visualization, and decision-making. This comprehensive training course delves into the critical applications of GIS, equipping professionals with the essential skills to optimize **airport operations**, enhance **airspace management**, and ensure robust **aviation safety**. From **strategic planning** and **infrastructure development** to **environmental monitoring** and **emergency response**, GIS is the **digital backbone** for modern, efficient, and **resilient airports**.

The **digital transformation** of aviation demands an integrated approach to data. GIS for Aviation and Airport Management Training Course emphasizes hands-on experience with cutting-edge GIS software, empowering participants to leverage **geospatial intelligence** for improved **situational awareness**, proactive **risk management**, and data-driven **operational efficiency**. By mastering GIS, professionals can unlock new possibilities in **asset management**, **security systems**, **capacity planning**, and **sustainable aviation practices**, ultimately contributing to a safer and more streamlined global air travel ecosystem.

Programme Curriculum

GIS for Aviation and Airport Management Training Course

Introduction

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Course Duration

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Course Objectives

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

1. Understand core GIS concepts, spatial data models, and coordinate systems for aviation applications.
2. Utilize GIS to design and optimize **flight paths**, manage **restricted airspace**, and enhance **air navigation services**.
3. Employ GIS for efficient **airport master planning**, **runway design**, and **terminal expansion**.
4. Implement GIS for **perimeter security**, **surveillance systems**, and **emergency preparedness planning**.
5. Leverage GIS for **ground movement management**, **aircraft tracking**, and **resource allocation**.
6. Use GIS for **noise contour mapping**, **pollution monitoring**, and **sustainable airport development**.
7. Develop GIS databases for **asset tracking**, **maintenance scheduling**, and **facility management**.
8. Utilize GIS for **incident management**, **disaster recovery**, and **crisis communication**.
9. Perform advanced **spatial analysis**, **geostatistics**, and **predictive modeling** for aviation insights.
10. Understand the interoperability of GIS with **BIM**, **CAD**, and **air traffic control (ATC)** systems.
11. Create interactive **web mapping solutions** and **geospatial dashboards** for airport stakeholders.
12. Interpret **satellite imagery** and **aerial photography** for airport mapping and monitoring.
13. Adhere to **ICAO standards** and **aeronautical information management (AIM)** guidelines using GIS.

Organizational Benefits

- Streamlined workflows, optimized resource allocation, and reduced delays.
- Proactive threat identification, rapid incident response, and comprehensive situational awareness.
- Optimized maintenance, efficient land use, and data-driven investment decisions.
- Access to real-time, integrated spatial data for informed strategic and tactical choices.
- Easier adherence to international aviation standards and environmental regulations.
- Effective planning for future growth and infrastructure expansion.

- Improved communication and shared understanding through interactive maps and dashboards.
- Better environmental management and reduced ecological footprint.
- Adoption of cutting-edge technology for modern airport management.

Target Audience

1. Airport Planners and Managers
2. Air Traffic Controllers
3. Aviation Security Personnel
4. Infrastructure and Facilities Managers.
5. Environmental and Sustainability Officers.
6. GIS Analysts and Specialists.
7. Emergency Response Teams.
8. Airline Operations Personnel.

Course Outline

Module 1: Introduction to GIS and Aviation Fundamentals

- What is GIS? Core concepts, components, and applications in aviation.
- Understanding spatial data: Vector, raster, and imagery data types relevant to airports.
- Introduction to common GIS software platforms (e.g., ArcGIS Pro, QGIS).
- Georeferencing and coordinate systems in an airport context.
- **Case Study:** Mapping Airport Boundaries and Key Facilities for Initial Spatial Inventory.

Module 2: Spatial Data Acquisition and Management for Airports

- Sources of aviation geospatial data: Aeronautical charts, satellite imagery, LiDAR, survey data.
- Data collection techniques: GPS, drones (UAS), mobile GIS for field operations.
- Designing and building airport geodatabases for efficient data storage.
- Data quality control, validation, and maintenance for continuous accuracy.
- **Case Study:** Integrating Drone-Acquired Imagery for Runway Inspection and Obstacle Detection.

Module 3: Airspace Management and Obstacle Clearance Surfaces (OCS)

- Defining and visualizing airspace classifications using GIS.
- Mapping and analyzing Obstacle Limitation Surfaces (OLS) around airports.
- Utilizing GIS for vertical obstruction analysis and safeguarding flight paths.
- Managing Temporary Flight Restrictions (TFRs) and special use airspace.
- **Case Study:** Assessing Building Heights for Compliance with Airport Safeguarding Regulations.

Module 4: Airport Layout Planning and Design

- Applying GIS for site suitability analysis for new airport development or expansion.
- Planning runway and taxiway configurations, including capacity analysis.
- Optimizing terminal layouts, parking areas, and ground transportation networks.
- Visualizing airport master plans in 2D and 3D environments.
- **Case Study:** Simulating Various Terminal Expansion Scenarios to Optimize Passenger Flow and Capacity.

Module 5: Airport Infrastructure and Asset Management

- Creating a comprehensive GIS inventory of airport assets (runways, buildings, lighting, utilities).
- Implementing GIS for pavement management systems and maintenance scheduling.
- Tracking and managing underground utilities and infrastructure networks.
- Integrating GIS with Enterprise Asset Management (EAM) systems.
- **Case Study:** Developing a GIS Dashboard for Real-Time Monitoring of Runway Lighting System Status and Maintenance Needs.

Module 6: Aviation Security and Emergency Management

- Using GIS for airport perimeter security, access control, and surveillance zone mapping.
- Developing and visualizing emergency evacuation plans and assembly points.
- Mapping critical incident locations and coordinating emergency response teams.
- Integrating GIS with real-time sensor data for enhanced situational awareness during crises.
- **Case Study:** Simulating a Runway Incursion Scenario to Evaluate Response Times and Resource Deployment.

Module 7: Ground Movement and Airside Operations

- Tracking aircraft and ground vehicles on the airfield using real-time GIS data.
- Optimizing taxi routes and minimizing ground delays through spatial analysis.
- Managing aircraft parking positions and gate assignments with GIS.
- Visualizing ground support equipment (GSE) movement and positioning.
- **Case Study:** Analyzing Aircraft Pushback and Taxi-Out Times to Identify Bottlenecks and Improve Efficiency.

Module 8: Environmental Management and Sustainable Aviation

- Mapping aircraft noise contours and assessing their impact on surrounding communities.
- Monitoring air quality, water resources, and wildlife habitats around airports.
- Utilizing GIS for land use compatibility planning and environmental mitigation strategies.
- Assessing the carbon footprint of airport operations and identifying reduction opportunities.
- **Case Study:** Developing a GIS-Based Model to Predict Noise Exposure Changes from New Flight Procedures.

Module 9: Aeronautical Information Management (AIM) with GIS

- Understanding ICAO's transition from AIS to AIM and the role of GIS.
- Managing aeronautical data (e.g., aerodrome charts, navigation aids) in a spatial database.
- Ensuring data integrity, accuracy, and timely dissemination of aeronautical information.
- Publishing aeronautical information products using GIS.
- **Case Study:** Creating a Digital Aerodrome Mapping Database (AMDB) Compliant with ICAO Standards.

Module 10: Spatial Analysis and Modeling for Aviation

- Performing proximity analysis, buffer zones, and overlay operations for decision support.
- Conducting network analysis for optimal routing of vehicles and personnel.
- Implementing site selection models for new facilities or operational hubs.
- Utilizing spatial statistics for trend analysis and forecasting in aviation.
- **Case Study:** Identifying Optimal Locations for New De-icing Pads Based on Aircraft Traffic and Environmental Factors.

Module 11: 3D GIS and Visualization for Airports

- Creating 3D models of airport infrastructure and terrain for enhanced visualization.
- Performing viewshed analysis and line-of-sight assessments for security and ATC.
- Integrating Building Information Models (BIM) with GIS for comprehensive facility management.
- Developing interactive 3D scenes for planning and stakeholder engagement.
- **Case Study:** Visualizing a Proposed Terminal Expansion in 3D to Assess Visual Impact and Design Aesthetics.

Module 12: Web GIS and Mobile Applications in Aviation

- Designing and deploying interactive web mapping applications for airport operations.
- Creating mobile GIS apps for field data collection, inspections, and maintenance tasks.
- Developing dashboards for real-time monitoring of key airport performance indicators.
- Sharing geospatial information securely with internal and external stakeholders.
- **Case Study:** Building a Web-Based Dashboard to Monitor Real-Time Gate Occupancy and Aircraft Turnaround Times.

Module 13: GIS for Drone (UAS) Integration and Urban Air Mobility (UAM)

- Mapping and managing drone flight corridors and no-fly zones around airports.
- Utilizing GIS for drone operation planning, mission execution, and data capture.
- Assessing infrastructure requirements for future Urban Air Mobility (UAM) operations.
- Integrating UAS data with existing airport GIS databases for comprehensive analysis.
- **Case Study:** Designing a Safe Drone Delivery Route to an Aircraft on the Ramp While Avoiding Active Airspace.

Module 14: Data Integration and Interoperability

- Integrating GIS with CAD systems for design and engineering workflows.
- Connecting GIS with airport operational databases and management systems.
- Understanding data standards and formats for seamless information exchange.
- Automating data workflows and geoprocessing tasks for efficiency.
- **Case Study:** Combining CAD Drawings of a New Hangar with GIS Data for Integrated Facility Management.

Module 15: Future Trends in GIS for Aviation

- Exploring the role of Artificial Intelligence (AI) and Machine Learning (ML) in geospatial analysis for aviation.
- The concept of a "Digital Twin" for airports and its implementation using GIS.
- Big data analytics in aviation and how GIS facilitates spatial insights.
- Emerging technologies: Augmented Reality (AR) and Virtual Reality (VR) for airport visualization.
- **Case Study:** Discussing the Potential of AI-Powered GIS for Predictive Maintenance of Airport Runways.

Training Methodology

This training course employs a blended learning approach to ensure maximum participant engagement and knowledge retention. The methodology includes:

- **Instructor-Led Presentations:** Clear and concise delivery of theoretical concepts and industry best practices.

- **Hands-on Practical Exercises:** Extensive use of leading GIS software (e.g., ArcGIS Pro, QGIS) for practical application of learned skills.
- **Real-World Case Studies:** In-depth analysis of successful GIS implementations in aviation and airport management, fostering critical thinking.
- **Group Discussions and Collaborative Activities:** Encouraging knowledge sharing, problem-solving, and peer learning.
- **Demonstrations:** Live demonstrations of complex GIS workflows and functionalities.
- **Q&A Sessions:** Opportunities for participants to clarify doubts and discuss specific challenges.
- **Project-Based Learning:** Participants will work on a culminating project applying GIS techniques to an aviation scenario.
- **Post-Training Support:** Access to online resources, discussion forums, and instructor support for continued learning.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

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

Start Date	End Date	Location	Price
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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