Training Course on Geographic Information Systems (GIS) for Public Health and Epidemiology

Professional Development Training Course Outline

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

Course Introduction

This advanced training course delves into the transformative power of **Geographic Information Systems (GIS)** in revolutionizing **public health** and **epidemiological research**. Participants will gain cutting-edge expertise in leveraging **spatial data analytics**, **geospatial intelligence**, and **predictive modeling** to address complex health challenges. We emphasize practical, hands-on application of advanced GIS tools and techniques, empowering health professionals to conduct sophisticated spatial analyses, identify disease hotspots, optimize resource allocation, and inform evidence-based public health interventions. Training Course on Geographic Information Systems (GIS) for Public Health and Epidemiology is designed to elevate your analytical capabilities, fostering a deeper understanding of the **geospatial determinants of health** and enabling proactive strategies for **disease surveillance** and **population health management**.

The curriculum moves beyond foundational GIS concepts, focusing on **advanced spatial statistics**, **environmental health modeling**, and **GIS in emergency response**. We explore the integration of diverse **big data** sources, including **social determinants of health**, **remote sensing imagery**, and **real-time public health data**, to create comprehensive **health equity maps** and **risk assessment models**. Through real-world **case studies** and **hands-on exercises** using industry-standard and open-source GIS software, participants will develop the skills to design, implement, and evaluate impactful public health programs. This training is crucial for professionals seeking to lead innovative **geospatial public health initiatives** and drive data-driven decision-making in an increasingly interconnected world.

Programme Curriculum

Training Course on Geographic Information Systems (GIS) for Public Health and Epidemiology

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Course Duration

10 days

Course Objectives

1. Apply sophisticated **spatial statistical methods** to analyze disease patterns and **health disparities**.
2. Proficiently integrate and manage diverse **public health big data** from various sources.
3. Utilize GIS for comprehensive **environmental exposure mapping** and **risk modeling**.
4. Build and validate **spatial predictive models** for disease outbreaks and health outcomes using **machine learning**.
5. Design and optimize **real-time disease surveillance systems** and **outbreak analytics**.
6. Assess **healthcare accessibility** and identify **underserved populations** using advanced **network analysis**.
7. Leverage **satellite imagery** and **remote sensing data** for **environmental epidemiology** and **vector control**.
8. Develop dynamic, **web-based GIS dashboards** for effective **health data visualization** and communication.
9. Implement best practices for **geocoding health data** while ensuring **patient privacy** and data security.
10. Apply **spatial regression techniques** to uncover relationships between health outcomes and **socioeconomic factors**.
11. Develop **geospatial strategies** for targeted **public health interventions** and resource allocation.
12. Employ GIS for the **spatial evaluation** of public health program impact and reach.
13. Understand the application of GIS in analyzing **climate-sensitive diseases** and **environmental health impacts**.

Organizational Benefits

- Rapidly identify and respond to **disease outbreaks** and emerging public health threats through **real-time spatial intelligence**.
- Strategically deploy limited **public health resources** to areas of greatest need, improving efficiency and impact.
- Identify and address **health disparities** by understanding the **geospatial determinants of health** and targeting interventions effectively.
- Provide robust **spatial evidence** to inform public health policies, planning, and program development.
- Anticipate future health challenges and proactively implement preventative measures using advanced **predictive analytics**.
- Facilitate clearer communication of complex health information to stakeholders and foster inter-agency collaboration.
- Equip teams with advanced **spatial analytical skills** to conduct impactful **epidemiological research**.

Target Audience

1. Epidemiologists and Public Health Researchers
2. Health Data Analysts and Scientists
3. Public Health Program Managers and Policy Makers
4. Environmental Health Specialists
5. Geographic Information Systems (GIS) Professionals in Health Sector
6. Disaster Preparedness and Emergency Response Personnel
7. Medical Geographers and Social Scientists focused on Health
8. Graduate Students and Academics in Public Health or related fields with a GIS background.

Course Outline

Module 1: Advanced GIS Fundamentals for Health Analytics

- Review of advanced GIS concepts: topology, projections, coordinate systems, and data models.
- Advanced geodatabase design and management for public health data.
- Working with large-scale, multi-source geospatial datasets.
- Introduction to scripting for GIS automation
- Case Study: Designing a comprehensive geodatabase for national infectious disease surveillance.

Module 2: Spatial Data Acquisition and Preparation for Epidemiology

- Advanced techniques for data collection: mobile GIS, crowdsourcing, and drone imagery integration.
- Data cleaning, validation, and quality assurance for health datasets.
- Geocoding strategies for patient data and sensitive health information.
- Integration of census data, socio-economic indicators, and health surveys.
- Case Study: Preparing diverse datasets for a spatial analysis of health disparities in urban settings.

Module 3: Advanced Spatial Statistics for Disease Analysis

- Exploratory Spatial Data Analysis (ESDA): Moran's I, Geary's C, and Getis-Ord Gi*.
- Spatial autocorrelation and its implications for epidemiological inference.
- Cluster detection and hotspot analysis: SaTScan, Anselin Local Moran's I.

- Introduction to geographically weighted regression (GWR) and spatial regression models.
- Case Study: Identifying and characterizing COVID-19 transmission hotspots using spatial statistics.

Module 4: Environmental Health and Exposure Mapping

- Modeling environmental exposures: air pollution, water contamination, and land use.
- Proximity analysis and buffer zone creation for environmental risk assessment.
- Integration of environmental monitoring data with health outcomes.
- Vulnerability assessment mapping: identifying populations at risk from environmental hazards.
- Case Study: Mapping lead exposure risk in children based on housing characteristics and environmental data.

Module 5: GIS for Disease Surveillance and Outbreak Response (Advanced)

- Designing and implementing real-time disease surveillance dashboards.
- Spatial-temporal analysis of disease outbreaks and epidemic curves.
- Contact tracing and spatial network analysis for infectious diseases.
- Resource allocation and logistical planning during public health emergencies.
- Case Study: Using GIS to track and manage the spatial spread of a novel influenza strain.

Module 6: Healthcare Access and Service Planning

- Advanced network analysis for calculating travel times and accessibility to healthcare facilities.
- Identifying healthcare deserts and areas with unmet medical needs.
- Optimizing placement of new health clinics and mobile outreach units.
- Analyzing patient flow patterns and referral networks.
- Case Study: Optimizing the location of vaccination centers to maximize population coverage.

Module 7: Predictive Modeling in Public Health

- Introduction to machine learning algorithms for spatial prediction
- Building and validating predictive models for disease incidence, prevalence, and mortality.
- Risk stratification and identifying populations susceptible to specific health conditions.
- Uncertainty and sensitivity analysis in spatial predictive models.
- Case Study: Predicting areas at high risk for diabetes based on lifestyle, environmental, and demographic factors.

Module 8: Remote Sensing for Public Health and Epidemiology

- Sources and types of remote sensing data relevant to public health
- Image processing techniques for extracting environmental variables.
- Applications in vector-borne disease ecology
- Monitoring environmental changes impacting human health
- Case Study: Using satellite imagery to identify areas prone to malaria transmission based on vegetation and water bodies.

Module 9: Health Equity and Social Determinants of Health

- Mapping and analyzing social determinants of health
- Measuring health disparities and inequities using spatial indices.
- Intersectionality of social and environmental factors on health outcomes.

- Community asset mapping and resource identification.
- Case Study: Mapping the spatial distribution of chronic disease prevalence in relation to socioeconomic status and access to healthy food environments.

Module 10: GIS for Emergency Preparedness and Disaster Response

- Damage assessment and rapid needs assessment using geospatial tools.
- Logistics and supply chain management during humanitarian crises.
- Shelter allocation and population displacement tracking.
- Public health communication and risk mapping during emergencies.
- Case Study: Utilizing GIS for post-earthquake health impact assessment and resource coordination.

Module 11: Advanced Cartography and Visualization for Public Health

- Principles of effective health map design and communication.
- Creating interactive web maps and storytelling with GIS.
- Data visualization techniques for complex epidemiological data.
- Ethical considerations in mapping sensitive health information.
- Case Study: Developing an interactive online map communicating HIV prevalence and service availability to the public.

Module 12: GIS and Public Health Policy & Planning

- Integrating GIS into public health policy development and evaluation.
- Using geospatial evidence for advocacy and resource mobilization.
- Scenario planning and impact assessment of policy interventions.
- Communicating spatial insights to non-technical audiences and policymakers.
- Case Study: Informing urban planning policies to promote active transportation and improve public health outcomes.

Module 13: Geospatial Big Data and Cloud GIS in Health

- Introduction to big data architectures for public health
- Leveraging cloud-based GIS platforms for large-scale analysis
- Real-time data streams and sensor integration for health monitoring.
- Data governance, privacy, and security in big spatial health data.
- Case Study: Analyzing population mobility data from mobile phones to understand disease spread during a pandemic using cloud GIS.

Module 14: Emerging Trends in GIS for Public Health

- Artificial Intelligence and Machine Learning in spatial epidemiology.
- The Internet of Things (IoT) and pervasive sensing for health data.
- Virtual Reality (VR) and Augmented Reality (AR) for health visualization.
- Ethical implications of advanced geospatial technologies in public health.
- Case Study: Exploring the use of AI-driven image analysis for early detection of environmental health risks.

Module 15: Capstone Project: Advanced Public Health GIS Application

- Participants apply learned skills to a real-world public health challenge.
- Project design, data acquisition, spatial analysis, and visualization.
- Presentation of findings and recommendations to a panel of experts.

- Peer review and collaborative problem-solving.
- Case Study: Participants choose a public health issue (e.g., vaccine hesitancy, chronic disease burden) and develop a comprehensive GIS-based intervention strategy and evaluation framework.

Training Methodology

This advanced training course employs a **blended learning approach** combining **interactive lectures**, **demonstrations**, and extensive **hands-on practical exercises**. The methodology is designed to foster a deep understanding of concepts and practical application of skills:

- **Instructor-Led Sessions:** Expert-led discussions on theoretical foundations and advanced methodologies.
- **Software Proficiency:** Intensive hands-on training using industry-standard GIS software and relevant statistical packages
- **Case Study Analysis:** In-depth analysis of real-world public health and epidemiological challenges addressed using GIS.
- **Practical Exercises & Labs:** Guided exercises and independent lab sessions to reinforce learning and build practical skills.
- **Group Work & Discussions:** Collaborative problem-solving and sharing of experiences among participants.
- **Capstone Project:** A culminating project allowing participants to apply their knowledge to a self-selected public health problem, culminating in a presentation and report.
- **Feedback and Q&A:** Continuous opportunities for questions and personalized feedback from instructors.

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

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

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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