HEC-HMS Applications Training Course

Professional Development Training Course Outline

Category	Construction Institute	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

HEC-HMS Applications Training Course is designed to develop advanced skills in hydrologic modeling, rainfall-runoff simulation, watershed management, flood forecasting, climate resilience, and sustainable water resources planning. Through practical applications, participants learn to integrate GIS technology, remote sensing data, climate datasets, terrain analysis, and hydraulic modeling workflows to solve modern water challenges.

The course emphasizes hands-on learning, scenario-based modeling, and industry case studies covering urban drainage planning, reservoir operations, extreme rainfall analysis, flood risk assessment, and watershed conservation projects. Participants will gain expertise in model calibration, sensitivity analysis, uncertainty assessment, hydrological forecasting, and decision-support modeling aligned with current trends in smart water management, digital transformation, climate adaptation, and resilient infrastructure development. By completing this training, professionals will be equipped to apply HEC-HMS confidently in consulting, government, research, and environmental engineering projects.

Programme Curriculum

HEC-HMS Applications Training Course

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Course Objectives

By the end of the **HEC-HMS Applications Training Course**, participants will be able to:

1. Understand the fundamentals of advanced hydrologic modeling and watershed simulation.
2. Develop complete HEC-HMS models for rainfall-runoff transformation and streamflow prediction.
3. Apply GIS-based watershed delineation and spatial analysis techniques.
4. Process and analyze meteorological, precipitation, and climate datasets.
5. Perform model calibration, validation, and performance optimization.
6. Use HEC-HMS for flood forecasting and extreme event analysis.
7. Evaluate impacts of climate change and hydrological variability.
8. Integrate HEC-HMS workflows with digital elevation models (DEM) and geospatial technologies.
9. Design sustainable solutions for urban stormwater and watershed management.
10. Conduct hydrologic risk assessment and flood mitigation planning.
11. Apply advanced techniques for reservoir simulation and water resources planning.
12. Interpret modeling results for engineering decision-making and policy support.
13. Develop professional capability in smart water systems and climate-resilient infrastructure planning.

Target Audience

1. Hydrologists and Water Resources Engineers
2. Civil and Environmental Engineers
3. Flood Risk Management Professionals
4. GIS and Remote Sensing Specialists
5. Consultants in Hydrology and Infrastructure Development
6. Government Water Resource Authorities
7. Researchers and University Academics
8. Environmental Planners and Climate Adaptation Specialists

Course Modules

Module 1: Fundamentals of Hydrologic Modeling and HEC-HMS Environment

- Introduction to **HEC-HMS architecture, applications, and modeling concepts**
- Understanding watershed processes-precipitation, infiltration, runoff, and routing
- Overview of **modern hydrological simulation approaches**
- Setting up projects, datasets, and model components
- **Case Study:** Developing a basic rainfall-runoff model for a river catchment

Module 2: Watershed Delineation and GIS Integration

- Watershed analysis using **GIS and digital elevation models (DEM)**

- Catchment boundary extraction and stream network development
- Integration of spatial datasets into HEC-HMS
- Terrain processing and geospatial workflow optimization
- **Case Study:** GIS-based watershed modeling for flood-prone regions

Module 3: Precipitation Analysis and Meteorological Data Processing

- Preparation of rainfall and climate datasets
- Rainfall frequency analysis and storm event modeling
- Working with observed and satellite-based precipitation products
- Creating meteorological models in HEC-HMS
- **Case Study:** Extreme rainfall simulation for urban flood assessment

Module 4: Hydrologic Parameter Development and Model Construction

- Selecting loss methods-SCS Curve Number, Green-Ampt, and initial deficit methods
- Applying transform methods for runoff generation
- Developing basin models and meteorological models
- Parameter estimation and engineering assumptions
- **Case Study:** Watershed runoff prediction for infrastructure design

Module 5: Model Calibration, Validation, and Performance Evaluation

- Calibration techniques using observed streamflow data
- Model optimization and parameter sensitivity analysis
- Statistical performance indicators-NSE, RMSE, and correlation analysis
- Managing uncertainty in hydrological predictions
- **Case Study:** Calibration of HEC-HMS model for flood forecasting applications

Module 6: Flood Simulation, Climate Change, and Risk Assessment

- Modeling extreme flood events using HEC-HMS
- Climate change scenario integration
- Assessing future hydrological impacts
- Supporting flood hazard mapping and resilience planning
- **Case Study:** Climate-driven flood risk assessment for vulnerable communities

Module 7: Reservoir, River Routing, and Water Resources Applications

- Reservoir operation modeling using HEC-HMS
- River routing techniques and flow management
- Simulation of storage and release scenarios
- Applications in water supply and flood control planning
- **Case Study:** Reservoir optimization study for sustainable water management

Module 8: Advanced Applications, Automation, and Professional Project Development

- Advanced HEC-HMS workflows for engineering projects
- Integration with GIS, remote sensing, and decision-support systems
- Developing professional hydrological reports
- Best practices for consulting and research applications
- **Case Study:** Complete watershed management project using HEC-HMS

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

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	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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