



Applied Geostatistics and Kriging Software Training Course

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Overview

Applied Geostatistics and Kriging Software Training Course is a one-week course for GIS analysts, geologists, engineers, planners, and spatial data analysts, who leave with a Spatial Estimation and Validation Portfolio. Participants prepare spatial samples, examine spatial autocorrelation, model variograms, configure kriging, compare interpolation methods, quantify prediction uncertainty, validate estimates, and produce defensible maps and reports. The course emphasizes decisions supported by diagnostics rather than software defaults. Agile Leaders Training Center develops applied geostatistics and kriging capability.

Who Should Attend

- Spatial analysis functions responsible for preparing, exploring, and modeling location-based measurements
- Geoscience functions responsible for estimating mineral, reservoir, soil, or groundwater properties
- Environmental functions responsible for mapping contamination, exposure, habitat, or monitoring observations
- Engineering and planning functions responsible for interpreting spatial surfaces in project decisions
- Data functions responsible for validating geospatial models and communicating uncertainty

The course assumes participants can work with tabular and mapped spatial data in GIS software, and leaves out introductory GIS navigation, remote-sensing classification, advanced stochastic simulation, and software programming.

Departments and Industries

The course supports departments and industries that estimate conditions between sampled locations.

- Geographic information systems, spatial analytics, and digital mapping
- Geology, mining, petroleum, and groundwater functions
- Environment, agriculture, land management, and natural resources
- Engineering, infrastructure, utilities, and urban planning
- Research, quality assurance, and technical consulting

Learning Objectives

By the end of this course, participants will be able to:



- Prepare spatial samples and diagnose distribution, trend, and outliers
- Analyze spatial autocorrelation with empirical semivariograms
- Build and compare fitted variogram models and search neighborhoods
- Apply deterministic interpolation and ordinary or universal kriging
- Evaluate predictions through cross-validation and uncertainty measures
- Produce defensible estimation maps and technical reports

Course Agenda

Day 1: Prepare and Explore Spatial Data

- Spatial Sample Data Readiness Checklist
- Coordinate Reference and Measurement Review
- Distribution, Transformation, and Outlier Diagnostics
- Trend Surface and Directional Pattern Analysis
- Exploratory Spatial Data Analysis Record

Day 2: Model Spatial Dependence

- Spatial Autocorrelation Concept Map
- Empirical Semivariogram Construction Method
- Nugget, Sill, and Range Interpretation
- Anisotropy and Directional Variogram Analysis
- Variogram Model Fitting Decision Log

Day 3: Build Spatial Predictions

- Inverse Distance Weighting Benchmark Surface
- Ordinary Kriging Model Configuration
- Universal Kriging Trend Configuration
- Search Neighborhood and Sector Design
- Prediction and Standard Error Surface Generation

Day 4: Validate and Communicate Estimates

- Leave-One-Out Cross-Validation Procedure
- Mean Error and Root Mean Square Error Review
- Observed-versus-Predicted Diagnostic Plot
- Interpolation Method Comparison Matrix
- Uncertainty Map and Reporting Protocol



Day 5: Practice Geostatistical Decision Support

- Exercise: Diagnose a Spatial Sampling Dataset
- Exercise: Fit and Challenge a Variogram Model
- Exercise: Compare IDW and Kriging Surfaces
- Exercise: Validate Predictions and Map Uncertainty
- Capstone: Spatial Estimation and Validation Portfolio

Practical Exercises

The course uses suggested activities based on environmental, mining, groundwater, agriculture, and infrastructure datasets.

- Suggested activity: inspect coordinates, distributions, outliers, trends, and sampling density before modeling.
- Suggested activity: construct directional semivariograms and record justified nugget, sill, range, and anisotropy choices.
- Suggested activity: configure competing interpolation models and compare cross-validation diagnostics.
- Suggested activity: create prediction and uncertainty maps with an evidence-based technical recommendation.

FAQs

Who suits applied geostatistics and kriging software training, and what does it assume?

GIS, geoscience, environmental, engineering, planning, and spatial-data functions suit the training; it assumes practical experience handling tabular and mapped spatial observations in GIS software.

How does applied geostatistics differ from general GIS analysis training?

Applied geostatistics models spatial dependence, predicts values between samples, and quantifies uncertainty, while general GIS analysis covers a wider range of mapping, overlay, proximity, network, and data-management tasks.

What is a semivariogram used for in kriging analysis?

A semivariogram describes how similarity between observations changes with separation distance and direction, supporting selection of the spatial correlation model and kriging weights.



How are kriging predictions validated?

Kriging predictions are validated by withholding observations, predicting their values, comparing predictions with measurements, and reviewing bias, error magnitude, standardized diagnostics, spatial patterns, and model sensitivity.

Why should spatial prediction uncertainty be mapped?

Spatial prediction uncertainty should be mapped because an estimated surface alone can hide where sampling support is weak and where decisions require caution, additional samples, or a different model.

Conclusion

Participants take back a Spatial Estimation and Validation Portfolio containing data checks, exploratory findings, variogram decisions, interpolation configurations, validation diagnostics, prediction surfaces, uncertainty maps, and a technical recommendation. It changes software-led interpolation into a traceable analytical workflow. The portfolio supports review, comparison, reporting, and defensible use of spatial estimates.



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