# Higher Ed Guide to Esri E-Learning for Geospatial Artificial Intelligence (GeoAI)

Overview

Geospatial artificial intelligence (GeoAI) in ArcGIS is the integration of artificial intelligence (AI), machine learning (ML), and deep learning (DL) with GIS to produce knowledge and solve geographic problems. It is a key part of spatial analysis for tasks related to clustering and pattern detection, prediction and forecasting, and information extraction from imagery, lidar, videos, and unstructured text data.
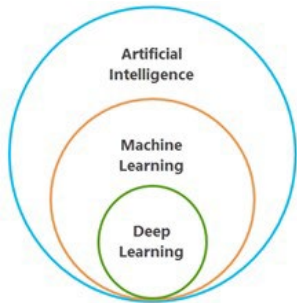
About this guide

This guide is for educators who want to use authoritative Esri web-based learning resources as part of college or university courses. Listed items are available as of **July 07, 2025**, through Esri Academy. This guide is expected to be updated annually. The information provided in this guide is subject to change without notice. New listings are shown in orange.

All items listed are web courses unless otherwise noted. Full descriptions can be found at the links provided. The complete Esri Academy catalog can be found at esri.com/training/catalog. Please email GIStraining@esri.com or call (800) 447-9778, ext. 5757 with questions about courses.

A learning plan is a set of learning content with a suggested order. You can create your own plan or copy and edit one you find. You can assign your plan to students or colleagues and track their progress. See the Esri Academy Help page (Category: Learning Plans) for more information.

You and your students may be eligible for unlimited access to the entire collection of self-paced e-Learning (web courses, training seminars, and more) if your institution has a qualifying product with a current maintenance subscription. To determine if this applies to you, contact your Esri software license administrator, check online, or email educationinfo@esri.com.

Topics in this guide

Click on a topic below to jump to that section within this guide.

Geospatial Artificial Intelligence (GeoAI)

The following resource covers concepts of GeoAI. Get an overview of GeoAI, including the definition and its value, at GeoAI.

- Understanding GeoAI in ArcGIS: Explores how organizations can leverage GeoAI capabilities across the ArcGIS system to automate workflows, create rich models of the real world, and analyze all kinds of data at scale, including imagery, 2D and 3D features, tabular data, videos, unstructured text, and time-series data. (Training seminar, 1hr.)

Machine Learning

These resources help students understand spatial problem solving in a wide range of application areas, from image classification to spatial pattern detection to multivariate prediction.

Cluster identification

The following resources introduce concepts, skills, and tools that allow you to analyze where clusters exist.

- Mapping Clusters: Introduction to Statistical Cluster Analysis: Provides foundational skills and concepts required to begin cluster analysis and to interpret results. Uses the Hot Spot and Cluster And Outlier Analysis tools. (50 mins.)
- Mapping Clusters: Hot Spot and Cluster and Outlier Analysis: Introduces the Hot Spot Analysis (Getus-Ord Gi*) tool and the Cluster And Outlier Analysis (Anselin Local Moran's I) tool and explains how they help you control your analysis. (1 hr., 20 mins.)
- Mapping Clusters: Optimized Hot Spot and Optimized Outlier Analysis: Teaches two tools that use your data to define analysis parameters and allow you to refine analysis decisions. (2 hrs.)
- Introduction to Space-Time Analysis: Describes space-time analysis and its capabilities. (25 mins.)
- Space-Time Analysis: Finding Temporal Trends: Explains how to perform emerging hot spot analysis to pinpoint trends and visualize them using space and time. (2 hrs., 10 mins.)
- Space-Time Analysis: Time-Series Clustering: Explores ways to analyze temporal data by clustering locations based on the similarity in the characteristics of their time series. (1 hr.)

   Related Learning Plan
- **Identifying Clusters Using ArcGIS**

Geostatistical interpolation

The following resources teach ArcGIS Pro interpolation workflows to create prediction surfaces.

- Spatial Interpolation Using ArcGIS Pro: Provides a summary of the different spatial interpolation methods available with the Geostatistical Analyst extension in ArcGIS Pro and teaches how to choose the right methods to create a prediction surface. (Training seminar, 1 hr.)
- Geostatistical Interpolation: Introduction: Explains key geostatistical interpolation concepts. Shows how to use ArcGIS Pro to evaluate associated data assumptions. (1 hr., 40 mins.)
- Geostatistical Interpolation: Using Empirical Bayesian Kriging and EBK Regression Prediction: Explains how ArcGIS Pro automates the most difficult aspects of building a valid kriging model. Shows how to perform exploratory spatial data analysis. Teaches how to create prediction surfaces and cross-validate the results. (3 hrs., 45 mins.)
- Geostatistical Interpolation: Reaggregating Data Using Areal Interpolation: Teaches the two main use cases of areal interpolation, which applies kriging theory to data averaged or aggregated within polygons: downscaling a source polygon dataset and using the prediction surface to fill in missing polygon data. (3 hrs., 45 mins.)
- Geostatistical Interpolation: Creating a 3D Prediction Surface: Teaches how to interpolate 3D point datasets using Empirical Bayesian kriging 3D (EBK 3D). (3 hrs., 20 mins.)

Related Learning Plans
- **Interpolating Surfaces Using ArcGIS**

Image classification

The following resources introduce powerful image classification and object detection workflows. Get an overview of the capabilities at Image Analysis and AI.
- Introduction to Image Classification: Introduces options for creating thematic classified rasters in ArcGIS. (1 hr., 15 mins.)
- Performing Unsupervised Pixel-Based Image Classification: Teaches how to identify computer-created pixel clusters to create thematic classified rasters in ArcGIS. (55 mins.)
- Performing Supervised Object-Based Image Classification: Introduces how to classify images based on user-identified objects or segments, paired with machine learning. (1 hr., 15 mins.)
- Performing Supervised Pixel-Based Image Classification: Introduces the supervised pixel-based image classification technique for creating thematic classified rasters. (1 hr., 20 mins.)
- Performing Accuracy Assessment for Image Classification: Introduces the accuracy assessment technique to test raster data products using statistical analysis to understand how well they represent the study area. (50 mins.)

Related Learning Plans
- **Image Classification Using ArcGIS**

Regression analysis

The following resources introduce the power of regression analysis in modeling, examining, and exploring spatial relationships.
- Introduction to Regression Analysis (Web course)
- Regression Analysis: Building a Regression Model Using ArcGIS Pro (ArcGIS Lab)
- Regression Analysis: Performing Random Forest Regression Using ArcGIS Pro (ArcGIS Lab)
- Downscaling a Prediction Model Using ArcGIS Notebooks and ArcGIS Pro (ArcGIS Lab)
- Geostatistical Interpolation: Using Empirical Bayesian Kriging and EBK Regression Prediction (Web course)

Related Learning Plans
- **Regression Analysis Essentials**

Deep Learning

The following resources help students build skills in deep learning, a subset of machine learning that uses several layers of algorithms in the form of neural networks.
- Deep Learning Using ArcGIS Pro: Explains how deep learning supports GIS analysis. Teaches how to use a pretrained deep learning model from ArcGIS Living Atlas of the World. (2 hrs., 15 mins.)
- Deep Learning Using ArcGIS Online: Teaches how to use pretrained deep learning models from ArcGIS Living Atlas of the World to solve everyday problems. (1 hr., 45 mins.)
- Classifying Objects Using Deep Learning in ArcGIS Pro: Teaches how to prepare and use data to train a model to detect whether buildings were impacted by a wildfire and how to apply and evaluate the accuracy of the model. (ArcGIS lab, 1 hr., 20 mins.)
- Extracting Features with Deep Learning Using ArcGIS Online: Teaches how to use ArcGIS Image for ArcGIS Online to detect buildings in imagery with deep learning. (ArcGIS lab, 35 mins.)

- [Unlocking Information from Imagery in ArcGIS](#): Explores how to use imagery workflows and deep learning for efficient, action-oriented problem-solving. (Story Map.)

Related Learning Plans
- **[Deep Learning Using ArcGIS](#)**

Learn Tutorials:
- [Extract informal settlements with SAMLoRA](#) (Learn Tutorial, 45 mins.)
- [Extract high-resolution land cover with GeoAI](#) (Learn Tutorial, 30 mins.)
- [Train a model using automated deep learning](#) (Learn Tutorial, 40 mins.)
- [Map floods with SAR data and deep learning](#) (Learn Tutorial, 45 mins.)
- [Detect objects with Text SAM](#) (Learn Tutorial, 25 mins.)
- [Detect objects with a deep learning pretrained model](#) (Learn Tutorial, 20 mins.)
- [Get ready for deep learning in ArcGIS Pro](#) (Learn Tutorial, 15 mins.)
- [Improve a deep learning model with transfer learning](#) (Learn Tutorial, 1 hr., 30 mins.)
- [Identify infrastructure at risk of landslides in ArcGIS Pro](#) (Learn Tutorial, 1 hr.)
- [Classify power lines using deep learning](#) (Learn Tutorial, 1 hr., 30 mins.)
- [Classify mangroves using deep learning](#) (Learn Tutorial, 1 hr., 15 mins.)
- [Train a model to identify street signs](#) (Learn Tutorial, 1 hr.)

NOTES

- You can view lists of new training, training pending retirement, and retired training on the [New and Retired Training Options](#) page. You will receive a message when retirements are announced. (Click to view alerts 🔔 while signed into Training.)

- If you plan to assign a MOOC to a group of students or to an entire class, please review the following resources:
    - For students: [Get Ready for an Excellent MOOC Experience](#)
    - For instructors: [Top 8 Tips for Educators Assigning Esri MOOCs to Students](#)

- To request a transfer of training history from an institutional account to another account, students should contact Esri Customer Service at service@esri.com or (888) 377-4575.