Higher Ed Guide to Esri E-Learning for Imagery and Remote Sensing

Overview

This guide is for instructors who want to use authoritative Esri web-based learning resources as part of college or university courses. Listed items are available as of July 6, 2023, and are expected to be available through at least September 30, 2023. New listings are 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. The information provided in this guide is subject to change without notice. Please email GIStraining@esri.com or call (800) 447-9778, ext. 5757 with questions about courses.

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.

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 site Help (Category: Learning Plans) for more information.

TECHNOLOGY

ArcGIS foundation

The following resources cover foundational concepts and skills to give students a basic familiarity with ArcGIS Pro software. Some courses also use ArcGIS Online.

- The free *ArcGIS Pro Terminology Guide* is recommended for all students of ArcGIS Pro.
- GIS Basics (2 hrs., 35 mins.) Presents fundamental components and capabilities of GIS and how ArcGIS can help organizations address business needs.
- ArcGIS Pro Basics (50 mins.) Introduces tools to integrate, visualize, analyze, and share data.
- Integrating Data in ArcGIS Pro (1 hr., 15 mins.) Teaches basic skills to add various types of data to a file geodatabase to support a planned project.
- ArcGIS Online Basics (1 hr., 50 mins.) Presents basic ArcGIS Online terms and capabilities.

CAPABILITIES

Get started

- Getting Started with Imagery and Remote Sensing (3 hrs., 20 mins.) Provides a high-level overview of remote sensing and imagery concepts. Explores a wide range of imagery applications to prepare students for imagery analysis.
- **Imagery in Action (MOOC; 6 weeks; September 20 – November 6, 2023)** Explores cutting-edge imagery applications and workflows using ArcGIS Pro, ArcGIS Online, and ArcGIS Image Analyst.

Managing imagery

- Managing Raster Data Using ArcGIS (2 hrs.) Teaches how to organize raster data within a mosaic dataset in preparation for visualization and analysis.
- Working with NetCDF Data in ArcGIS Pro (2 hrs.) Teaches how to incorporate NetCDF format scientific data and models into common GIS workflows.
- Extracting Raster Surfaces from Lidar Data in ArcGIS Pro (Video, 6 mins.) Discover how to derive a variety of raster surfaces from a lidar point cloud as well as beneficial applications.

Visualization and exploitation

- Displaying Raster Data in ArcGIS (3 hrs., 15 mins.) Covers techniques to display and symbolize rasters and imagery, modify raster properties, and apply appearance functions.
- Visualizing Multidimensional Data Using Voxels in ArcGIS Pro (ArcGIS lab, 2 hrs., 5 mins.) Use Ecological Marine Unit voxel data to visualize dimensions of water temperature and salinity in areas with coral reefs.

Analyzing imagery

Tools and techniques

- Getting to Know ArcGIS Image Analyst (Document, 13 pages) Essential workflows for getting started with the ArcGIS Image Analyst Extension in ArcGIS Pro.
- Processing Raster Data Using ArcGIS Pro (2 hrs.) Teaches efficient ways to process raster data and extract information products on-the-fly using raster functions in ArcGIS Pro.
- ArcGIS: Introduction to Deep Learning (Video, 42 mins.) Shows ways that deep learning can be approached using pre-trained deep learning models and AI-infused apps and solutions.
- ArcGIS Deep Learning Tools for Imagery (Training Seminar; 1 hr.) Explores the deep learning capabilities of ArcGIS. Shows a workflow to create a land-cover map using ArcGIS Notebooks.
- Deep Learning Using ArcGIS Image for ArcGIS Online (1 hr., 45 mins.) Teaches how to use pretrained deep learning models from ArcGIS Living Atlas to solve everyday problems.
- Deep Learning Using ArcGIS Pro (2 hrs., 15 mins.) Explains how Deep Learning supports GIS analysis. Teaches how to use a pretrained deep learning model from ArcGIS Living Atlas.
- Automating Workflows Using ArcGIS Pro Tasks (4 hrs.) Teaches how to create and share ArcGIS Pro tasks to increase productivity.
- Building Geoprocessing Models Using ArcGIS Pro (2 hrs., 30 mins.) Introduces the steps to create, validate, and run geoprocessing models that automate ArcGIS analysis workflows.

  Related Learning Plan
  - **Imagery and Remote Sensing Fundamentals**
  - **Deep Learning Using ArcGIS**

Image analysis applications

- Change Detection Using Imagery (2 hrs., 30 mins.) Covers improving the appearance of imagery, NDVI and NBR analysis, and digitizing features to quantify areas of change.
- Performing Change Detection Using Raster Functions in ArcGIS Pro (ArcGIS lab, 25 mins.) Perform raster analysis to see how the extent of mangrove forests has changed over time.
- Making Predictions from Multidimensional Data Using ArcGIS Image for ArcGIS Online (ArcGIS lab, 2 hrs., 20 mins.) Create a tiled imagery layer from a netCDF file containing multidimensional sea surface temperature data. Analyze data to predict coral bleaching.

Image classification

- Introduction to Image Classification (1 hr., 15 mins.) Introduces options for creating thematic classified rasters in ArcGIS.

- Performing Supervised Pixel-Based Image Classification (1 hr., 20 mins.) Introduces the supervised pixel-based image classification technique for creating thematic classified rasters.
- Performing Unsupervised Pixel-Based Image Classification (55 mins.) Teaches how to identify computer-created pixel clusters to create thematic classified rasters in ArcGIS.
- Performing Supervised Object-Based Image Classification (1 hr., 15 mins.) Introduces how to classify images based on user-identified objects or segments, paired with machine learning.
- Performing Accuracy Assessment for Image Classification (50 mins.) Shows how to test raster data products using statistical analysis to understand how well they represent the study area.
- Classifying Objects Using Deep Learning in ArcGIS Pro (ArcGIS lab, 1 hr., 20 mins.) Train a model to detect whether buildings were impacted by a wildfire.
- ArcGIS 3D Analyst: Lidar Classification and Feature Extraction (Video, 43 mins.) Covers best practices for processing airborne lidar to classify and extract DEMs, DSMs, buildings, and power lines.
- Working with the ArcGIS Solution for 3D Basemaps (ArcGIS lab, 1 hr., 25 mins.). Use a point cloud dataset to create a 3D scene with building roof forms and attribute. Convert the data to a multipatch feature class that can be shared.

Related Learning Plan

- **Image Classification Using ArcGIS**

Suitability modeling

- Suitability Modeling: Introduction (2 hrs., 40 mins.) Teaches how to define a problem in terms of an analysis goal and suitability criteria, plus how to prepare data for a suitability model.
- Suitability Modeling: Creating a Simple Suitability Model (2 hrs., 35 mins.) Learn to create a suitability model that produces an easy-to-interpret binary result.
- Suitability Modeling: Creating a Weighted Suitability Model (4 hrs., 15 mins.) Learn to create a weighted suitability model. Learn to use sensitivity and error analysis to evaluate results.

Related Learning Plan

- **Finding the Best Place**

Mapping imagery

- Creating Python Scripts for Raster Analysis (1 hr.) Discusses creating a raster object, accessing its properties, and using them in your Python scripting.

Mapping imagery with drones

The following e-Learning courses cover key skills and concepts for working with drones and drone-captured imagery.

- Getting Started with Site Scan for ArcGIS (50 mins.) Presents the capabilities and features of cloud-based Site Scan for ArcGIS, including drone flight planning.
- Creating Imagery Products with Site Scan for ArcGIS (1 hr., 25 mins.) Covers workflows for creating and examining imagery products and sharing them to ArcGIS Online.
- ArcGIS Drone2Map Basics (2 hrs., 20 mins.) Explores the capabilities ad workflows that ArcGIS Drone2Map provides for creating accurate digital representations of physical objects and places.
- Getting Started with ArcGIS Drone2Map (1 hr., 30 mins.) Covers how to capture, import, and validate ArcGIS Drone2Map drone imagery for geospatial needs.
- Inspect Assets Using ArcGIS Drone2Map (1 hr.) Shows how to use the ArcGIS Drone2Map Inspection template to organize the drone flight path, photos, and inspection notes.
- Creating 3D Products Using ArcGIS Drone2Map (2 hrs.) Teaches how to create 3D point clouds, 3D texture meshes, and 3D PDFs from drone-captured still imagery.

- Using Tile-Based Processing in ArcGIS Drone2Map (ArcGIS lab, 55 mins.) Perform tile-based processing using Drone2Map and share the resulting True Orthomosaic as a tile layer for review.
- Working with Full Motion Video in ArcGIS (3 hrs., 45 mins.) Explains the basics of FMV; use FMV for simple spatial analysis and temporal analysis, and learn how to disseminate analytical results.

Related Learning Plan

- **Drone Mapping Using ArcGIS**

ADDITIONAL INSTRUCTIONAL MATERIALS

Introduction to Imagery and Remote Sensing is a body of instructional materials produced by Esri to aid the development of university-level curricula for introducing imagery and remote sensing with the use of ArcGIS software. The materials include interactive web apps, lab exercises based on real-world scenarios, and overview slides.

ArcGIS Imagery Workflows is a library of authoritative resources within the ArcGIS documentation that includes an extensive gallery of tutorials, help articles, and best practices for using imagery and rasters.

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 View Messages 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.