Introduction to GIS Using ArcGIS®

STUDENT EDITION

Copyright © 2017-2025 Esri

All rights reserved.

Course version 14.2. Version release date September 2025.

Printed in the United States of America.

The information contained in this document is the exclusive property of Esri. This work is protected under United States copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by Esri. All requests should be sent to Attention: Director, Contracts and Legal, Esri, 380 New York Street, Redlands, CA 92373-8100, USA.

Export Notice: Use of these Materials is subject to U.S. export control laws and regulations including the U.S. Department of Commerce Export Administration Regulations (EAR). Diversion of these Materials contrary to U.S. law is prohibited.

The information contained in this document is subject to change without notice.

Commercial Training Course Agreement Terms: The Training Course and any software, documentation, course materials or data delivered with the Training Course is subject to the terms of the Master Agreement for Products and Services found at the following website: esri.com/TrainingTerms. The license rights in the Master Agreement strictly govern Licensee's use, reproduction, or disclosure of the software, documentation, course materials and data. Training Course students may use the course materials for their personal use and may not copy or redistribute for any purpose. Contractor/Manufacturer is Esri, 380 New York Street, Redlands, CA 92373-8100, USA.

Esri Marks: Esri marks and product names mentioned herein are subject to the terms of use found at the following website: <u>esri.com/EsriMarks</u>.

Other companies and products or services mentioned herein may be trademarks, service marks, or registered marks of their respective mark owners.

Table of Contents

Esri resources for your organization

Course introduction

Course introduction
Course goals
Installing the course data
Icons used in this workbook

1 Welcome to GIS

Lesson introduction
What is ArcGIS?
GIS capabilities
Exploring GIS capabilities
Types of GIS maps
The Map Viewer user interface

Exercise 1A: Explore a web map

Sign in to ArcGIS Online

Search for a web map

Navigate a web map

The ArcGIS Pro user interface

Exercise 1B: Explore a map in ArcGIS Pro

Sign in to ArcGIS Pro

Open an ArcGIS Pro project

Navigate a map

Lesson review

Answers to lesson 1 questions

2 GIS data

Lesson introduction
GIS components
Tabular data
Examine location information in a table

Vector data

Raster data

Basemaps versus operational layers

Choosing basemaps or operational layers

Representing real-world objects

Data collection methods

Searching for geographic data in ArcGIS

Exercise 2: Explore data collection

Open an ArcGIS Pro project

Create a new map

Add layers from ArcGIS Online

Add layers from ArcGIS Living Atlas of the World

Add a stand-alone table to the map

Create features from a stand-alone table

Lesson review

Answers to lesson 2 questions

3 Managing GIS data

Lesson introduction

Data management with geodatabases

Adding data to a map

Metadata

Exercise 3A: Explore data management

Open an ArcGIS Pro project

View the properties of a layer

Use the Catalog pane to organize data

Review metadata

Web layers

Using web layers

Sharing data in ArcGIS

Exercise 3B: Share data in ArcGIS

Share data as a web layer

View a web layer in ArcGIS Online

Lesson review

Answers to lesson 3 questions

4 Exploring coordinate systems

Lesson introduction

Relative versus absolute location

Exercise 4A: Compare location results

Add a map to a project

Identify locations using addresses

Identify locations using coordinates

Compare location results

Coordinate systems

Map projections and distortion

Local projected coordinate systems

Locating coordinate system information

Exercise 4B: Work with coordinate systems in ArcGIS Pro

Prepare your ArcGIS project

Examine the coordinate system of a map

Examine the coordinate system of a layer

Compare a map with a different coordinate system

Examine on-the-fly projection

Lesson review

Answers to lesson 4 questions

5 Mapping and visualization

Lesson introduction

Configuring a map

Layer display in Map Viewer

Exercise 5A: Configure a map in Map Viewer

Open an existing web map

Change symbology

Use scale ranges to control visibility

Examine pop-ups

Add labels

Layer display in ArcGIS Pro

Exercise 5B: Configure a map in ArcGIS Pro

Open an ArcGIS Pro project

Change symbology

Use scale ranges to control visibility

Add labels

Change layer transparency

ArcGIS Pro layout elements

Exercise 5C: Explore layouts in ArcGIS Pro

Examine the Wild Basin layout

Examine the NYC Subways layout

Lesson review

Answers to lesson 5 questions

6 Spatial analysis

Lesson introduction

What is spatial analysis?

The spatial analysis workflow

Answering questions with spatial analysis

Identifying types of analysis

Performing analysis in Map Viewer

Exercise 6A: Use Map Viewer for spatial analysis

Save a copy of a web map

Add data to a web map

Run an analysis tool

Review the analysis results

Performing analysis in ArcGIS Pro

Exercise 6B: Use ArcGIS Pro for spatial analysis

Copy an existing map

Add data to a map

Create buffer polygons

Run an intersect analysis

Review analysis results

Use Scene Viewer to explore 3D analysis

Lesson review

Answers to lesson 6 questions

7 Putting GIS to use

Lesson introduction

The geographic approach

Explore applying the geographic approach

Sharing analysis results with ArcGIS

How will you use GIS?

Exercise 7: Identify shelter locations using ArcGIS

Prepare an ArcGIS Pro project

Change basemap imagery

Add data to the map

Perform analysis

Change symbology

Share as a web map

View a map in ArcGIS Online

View a web app

Lesson review

Answers to lesson 7 questions

Appendices

Appendix A: Data license agreement

Appendix B: Acknowledgments

Appendix C: Answers to lesson review questions

Appendix D: Additional resources

Appendix E: Lesson stories