Course introduction

Introduction
Course goals
Additional resources
Installing the course data
Icons used in this workbook
Understanding the ArcGIS Platform

1 Getting started with spatial analysis

Lesson introduction
What is spatial analysis?
Proximity analysis
Overlay analysis
Statistical analysis
Temporal analysis
The spatial analysis workflow
Frame the question
Exercise 1: Apply the spatial analysis workflow to solve a problem
  Frame the question
  Explore the data
  Choose methods and tools
  Perform the analysis
  Examine the results
  Share the results in a report
Lesson review

2 Planning and preparing for analysis

Lesson introduction
Planning for analysis
Analysis methods
Raster data considerations
Preparing points for raster analysis
Data quality
Standardizing spatial reference
Working with geoprocessing environments and documentation
Data preparation for raster analysis: Interpolation
Exercise 2: Prepare data for a site selection analysis
  Explore the data
  Create the study area boundary
  Make environment settings
  Clip the roads to the study area
  Reduce extent of elevation raster to the study area
  Convert zoning polygons to raster
  Create a raster containing only agricultural zoning
3 Performing proximity analysis

Lesson introduction
What is proximity analysis?
When to use proximity analysis
Categories of proximity analysis
How do ArcGIS tools measure proximity?
Buffering at a world scale
Data type and proximity analysis
Calculating decibel levels with raster proximity analysis
Exercise 3: Use proximity analysis for emergency planning
   Allocate resources to each school
   Determine straight-line distances between hospitals and schools
   Calculate flight times for air ambulances
   Identify traffic control areas
   Identify roads within each traffic control area

Lesson review

4 Performing overlay analysis with vector data

Lesson introduction
What is overlay analysis?
Overlay techniques
Performing overlay
Apportioning attributes
Overlay with Use Ratio Policy
Exercise 4: Use overlay analysis to assess risk of tornado damage
   Explore the data
   Determine critical facilities in the tornado path
   Estimate road damage
   Create a new model
   Add an iterator
   Make a feature layer
   Overlay parcels with the tornado path
   Add a field to store property loss
   Calculate damage values
   Summarize total property damage
   Prepare the model to run as a tool
   Run the model and view results
   Share the model as a geoprocessing package
   Test the geoprocessing package

Lesson review
5 Performing overlay analysis with raster data

Lesson introduction
What is raster overlay?
Deriving surfaces from raster sources
Deriving rasters from vector sources
Locating a vineyard using raster overlay
Binary overlay analysis
Weighted overlay analysis
Weighted overlay workflow
A typical raster overlay question
Reclassification
Considerations for reclassification
Assigning weights
Exercise 5: Locate a vineyard using raster overlay
  Open the map and explore data
  Derive a slope surface from elevation
  Derive a distance from highways surface
  Examine raster cell values
  Manually reclassify the elevation raster
  Reclassify distance using remap file
  Reclassify slope using remap file
  Overlay rasters using Raster Calculator
  Modify weights and rerun Raster Calculator
  Use the Raster Calculator to combine cells ranked 4 and 5
Lesson review

6 Analyzing spatial patterns

Lesson introduction
What is a spatial pattern?
Exploring descriptive statistics
Mean center
Standard deviational ellipses
Working with data distributions
The Average Nearest Neighbor tool
The Spatial Autocorrelation tool
Hot spot analysis
Exploring patterns
Exercise 6: Analyze 911 incident distribution using spatial statistics
  Explore the data
  Run the Average Nearest Neighbor tool
  Run the Spatial Autocorrelation tool
  Perform hot spot analysis to aggregate incidents and locate hot spots
  Perform hot spot analysis on response times for 911 incidents
Lesson review

7 Analyzing temporal patterns

Lesson introduction
What is temporal analysis?
Working with time-aware data
Incorporating time in your analysis
Temporal analysis of piracy incidents
Temporal patterns and spatial statistics
Measuring statistics over time
Space-time analysis
Grouping analysis
Exercise 7A: Analyze temporal patterns in piracy data
   Visually analyze patterns in the data
   Use the time slider to analyze incidents by date
   Analyze temporal patterns
   Create time series animation
Exercise 7B: Space-time cluster analysis
   Explore incident data
   Aggregate incident data
   Create a space-time window
   Perform space-time hot spot analysis
Exercise 7C: Perform grouping analysis
   Visually analyze 911 data
   Run multivariate grouping analysis
   Run grouping analysis by weekday

Lesson review

Appendixes

Appendix A: Esri data license agreement
Appendix B: Answers to lesson review questions
   Lesson 1: Getting started with spatial analysis
   Lesson 2: Planning and preparing for analysis
   Lesson 3: Performing proximity analysis
   Lesson 4: Performing overlay analysis with vector data
   Lesson 5: Performing overlay analysis with raster data
   Lesson 6: Analyzing spatial patterns
   Lesson 7: Analyzing temporal patterns