# Advanced GIS Workshop I & II

Course Objectives

This is an advanced course on theories and application of GIS techniques for spatial analysis. This workshop is comprised of a hands-on series of activities for those who want to expand their knowledge of using GIS. This workshop will include exercises using: geostatistical analysis (using Geostatistical Analyst), spatial analysis & suitability modeling (using Spatial Analyst & Geoprocessing wizard) and performing change detection analysis (using map algebra). Each student who successfully completes this course will have developed the skill to process GIS data for advanced GIS analysis. This workshop assumes at least Intermediate GIS knowledge. If you are not sure if you qualify, please read the Beginner and Intermediate GIS information to see if you are comfortable with those topics first.

Module I: Advanced Habitat Suitability Model

Learning Objectives

- ➢ Build the folder structure and the Geodatabases for the Lynx Project
- ➢ Create a Custom Toolbox
- ➢ Add Source data to a project database
- ➢ Get your data into Shape
- ➢ Work with ModelBuilder
- ➢ Create a submodel
- ➢ Add Submodels to an existing model
- ➢ Run a model from its dialog box

Case Study: Habitat suitability for endangered lynx
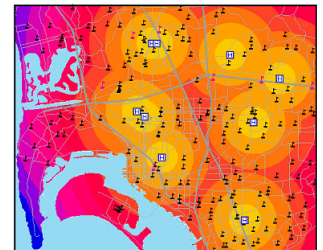
Module II: Advanced Spatial Analysis

Learning Objectives

- ➢ Distance Analysis
- ➢ Cost Surface Analysis
- ➢ Integration of time series data with GIS

Case Study: Distance analysis to improve local air and rescue service response time in San Diego
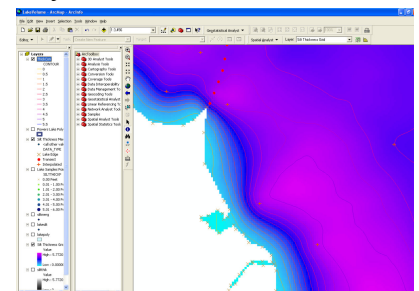
Case Study: Cost surface analysis for power lines

Case Study: Time series analysis of rainfall and flow data in ArcHydro Guadalupe River basin
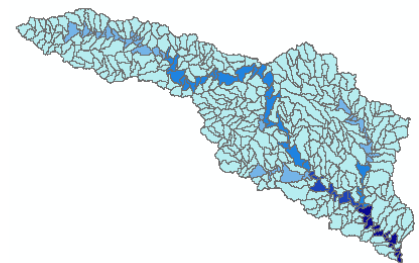
Module III: Geostatistical Analysis

Learning Objectives

- ➢ Geostatistical Analyst Part I
- ➢ Geostatistical Analyst Part II
- ➢ Using Inverse Distance Weighted (IDW)
- ➢ Use Global Polynomial
- ➢ Use Local Polynomial and Radial Basis Functions
- ➢ Use Kriging
- ➢ Use Co-Kriging
- ➢ Ordinary Kriging Methods

Case Study: Exploring air quality data for CA using geostatistics

Module IV: Advanced Point Data Integration

Learning Objectives

- ➢ Estimate Density
- ➢ Estimate Density Using Attributes
- ➢ Random Sample Selection Tool
- ➢ Extracting Point Data from Raster
- ➢ Correlation with Environmental Variables Seasonal Optimal Habitat Determination for CPU Recommendation
- ➢ Graphing Seasonal Habitat Data
- ➢ Seasonal Comparison of Fish Habitat Maps
- ➢ Creation of Sea Surface Temperature Gradient
- ➢ Fish Abundance Mapping
- ➢ Zonal Statistics
- ➢ Integration in Excel for Statistical Analysis
- ➢ Deriving Volumes Using ArcGIS Spatial Analyst

Fisheries Case Studies

Case Study: Deriving volumes from a Lake in ArcGIS
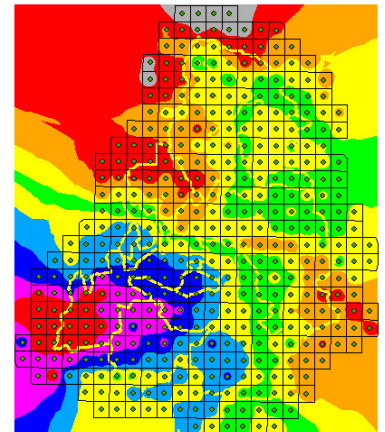
Module V: Advanced Data Integration

Learning Objectives

- ➢ Use interpolation to represent point water quality data
- ➢ Use interpolation to represent rainfall patterns

Case Study: Water quality analysis for Hillsborough River, FL

Case Study: OneRain Spatial Interpolation Charlie Creek, FL