UNIT 2, Lesson 1

Teacher’s name

Date

Class Number/Room

Spatial Analysis in ArcGIS

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| **OVERVIEW** | **Materials** |
| Engagement: Reading exercise: Chapter 5 of *The ArcGIS Book* digital textbook.Exploration: Student reading and exercises from *Discovering GIS and ArcGIS* textbook.Explanation: Review slides on spatial queries and analysis.Elaboration: Student exercise on performing spatial queries and basic analyses within ArcGIS Desktop.Evaluation: Completion of technical exercise on performing spatial analyses with sample data within ArcMap. | * Video and player
* Projector
* Personal computers with Internet access
* ArcGIS for Desktop software
* *Discovering GIS and ArcGIS* textbook
* *The ArcGIS Book* digital textbook
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| **Objective/Goals** | **Prerequisites** | **Outcome** |
| Students will:1. Revisit the types of selections available in Select by Location.
2. Become familiar with frequently used pattern and cluster analyses.
3. Be introduced to the Spatial Analyst extension and key functionality.
 | Introduction to GIS | Students should review the basic concepts and types of spatial analyses and be introduced to the Esri Spatial Analyst extension.  |
| **PLAN** | **Key Points for Teaching:** Key vocabulary:* Spatial analysis
* Spatial autocorrelation
* Moran’s I
* Hot spot analysis
* Spatial statistics
* Search distance
* Intersect
* Contain
* Centroid
* Spatial join

An Example of Spatial Analysis (Story Map):<https://storymaps.arcgis.com/stories/4652abf7dfea4bd9aaec0c32a3ff27fe> |
| **Engagement (15 min)** Reading exercise: *The ArcGIS Book* Chapter 5, The Importance of WhereStudents will read Chapter 5 from *The ArcGIS Book,* which discusses the power of spatial analysis for problem solving and the types of analyses and tools that can be used for spatial data.The Esri Story Map on Spatial Analysis could also be explored by students (individually or as a class) and used as the basis of class discussion:<https://storymaps.arcgis.com/stories/4652abf7dfea4bd9aaec0c32a3ff27fe> |
| **Exploration (20 min)** Students should read the introduction to Chapter 8 of the *Discovering GIS and ArcGIS* textbook and complete the following exercises:* 8.1: Getting Started
* 8.2: Making Basic Measurements
* 8.3: Using Spatial Joins for Analysis
* 8.4: Using Select by Location for Analysis
* 8.5: Using Spatial Queries for Further Analysis
* 8.6: Printing or Sharing Your Results
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| **Explanation (15 min)** Instructor demonstration on the use of spatial queries to create selection sets. Spatial query operations:* Features that intersect the source layer feature(s)
* Features within a distance of the source layer feature(s)
* Features contain the source layer feature(s)
* Features completely contain the source layer feature(s)
* Features identical to the source layer feature(s)
* Features that touch the boundary of the source layer feature(s)
* Features that share a line segment with the source layer feature(s)
* Features that are crossed by the outline of the source layer feature(s)
* Features that have their centroid within the source layer feature(s)

Differentiate between using the 2D and 3D options for the operations listed above.Spatial joins:* Finding the nearest feature
* Finding what is inside of polygons
* Finding what intersects features

Differentiate between spatial queries and spatial joins. |
| **Elaboration (30 min)**Students should complete a technical exercise on performing spatial queries and performing basic spatial analyses within ArcGIS Desktop. This exercise should be completed with data that is specific to Homeland Security or emergency management, and should focus on using spatial queries and spatial joins.A problem should be presented to the students that asks them to do the following:* Review the type of data to be analyzed.
* Identify the problem to be solved or question to be answered.
* Select the appropriate type of analysis based on the data and purpose of the analysis.
* Complete the analysis using the proper selection tool or query type.
* Review and interpret the results of the analysis.
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| **Evaluation (10 min)**Students should be evaluated on their completion of the technical exercise on using various types of spatial queries to perform basic spatial analyses. **Homework:** Reading exercise: Chapter 5 of *The ArcGIS Book* digital textbook.  |