

# STRANDS AND STANDARDS

## INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS



### Course Description

This course introduces fundamental concepts of geographical information systems (GIS) and the major functionality contained within professional GIS software. In course exercises, you will follow the GIS analytical process and work with a variety of tools to solve realistic problems. This course emphasizes practical GIS software skills.

<b>Intended Grade Level</b>	9-12
Units of Credit	0.5
Core Code	35.02.00.00.080
Concurrent Enrollment Core Code	None
Prerequisite	None
Skill Certification Test Number	Coming soon
Test Weight	00
<b>License Area of Concentration</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Information Technology Systems
Endorsement 2	CAD Architectural Design
Endorsement 3	N/A

## STRAND 1

Understand basic concepts of GIS and how it is used for decision making.

### Standard 1

Understand the big picture in GIS.

- Describe the difference between paper, digital, and GISmaps.
- List the three functions of a GIS.
- Identify one use of GIS in the past or present.
- Define GIS.
- Describe the geographic approach to solving problems.
- List four components of a feature.
- Explain the relationship between features and layers.
- Explain how scale on a GIS map is different from scale on a paper map.

## STRAND 2

Collect geo-spatial data

### Standard 1

Locate and collect data from different sources for a geo-spatial system or project.

- Import geo-spatial data from a CD or files on a local server.
- Locate and download geo-spatial data from local government resources.
- Locate and download geo-spatial data from FIS companies.
- Locate and download geo-spatial data from federal government resources.

### Standard 2

Understand and use a GPS to locate and collect data for a geo-spatial system or project.

- Demonstrate an understanding of the components and functioning of a GPS.
- Use a handheld GPS receiver to collect data.
- Identify the limitations of the data collected with a GPS receiver.
- Import data from a GPS receiver.
- Manipulate data from a GPS receiver for use in a GIS application.

## STRAND 3

Work with a GIS map to find features of interest, analyze patterns, and derive useful information.

### Standard 1

Get started with GIS software, explore GIS maps, and use GIS to solve problems.

- Explore a GIS map to get information about map features.
- Add geographic data to a map.
- Describe the structure of a GIS map.
- Explain how a GIS represents real-world objects.
- Change the way features are drawn on a map.
- Access feature information in different ways. Describe spatial relationships of map features.
- Describe how GIS can be used to solve problems.

## STRAND 4

**Classify, symbolize, and label map features to support data visualization and interpretation.**

### Standard 1

Work with map symbols and labels, create symbol features based on attributes, classify data, and map density and proportion.

- Choose symbols for point, line, and polygon features.
- Modify symbol properties such as color, size, and outline.
- Label map features using an attribute and by adding text.
- Symbolize features to show type, rank, or amount.
- Group features into classes and apply symbols to each class.
- Compare different methods of grouping features into classes.
- Correct visual distortion caused by differences in area.
- Show proportional amounts on a map by normalizing data.
- Symbolize features to show density.

### Standard 2

Reference data to real locations, understand coordinate systems, work with map projections.

- Name two types of coordinate systems.
- Identify components for each type of coordinate system.
- Assign coordinate system information to a dataset.
- Set display units for a data frame and measure distances on a map.
- Explain what a map projection is.
- List the major categories of map projections.
- List spatial properties that may be distorted when different map projections are applied.
- Change the map projection for a data frame and describe its effects.

## STRAND 5

**Create and edit geographic data to accurately represent real world objects.**

### Standard 1

Understand and use geographic data to accurately represent real-world objects.

- List three shapes used in vector data.
- Identify two ways that vector and raster data are different.
- Explain the difference between a feature class and a layer.
- Describe the relationship between features and records.

### Standard 2

Organize geographic data, explore geographic data, organize data into a geodatabase.

- Describe two common data models used to represent geographic data.
- List different geographic data formats.
- Determine the data source of a layer in ArcMap.
- Identify data formats in ArcCatalog.
- Create a geodatabase.
- Add data from different formats to a geodatabase.

### Standard 3

Create and edit data, editing feature shapes, edit feature attributes, create new features and attributes.

- Describe the steps in the editing process.

- Move and delete features.
- Edit the shapes of line and polygon features.
- Describe different ways to edit feature attributes.
- Create new features by digitizing.
- Create new point features from x, y coordinates.

#### **Standard 4**

Understand how remote sensing is used as a geo-spatial technology.

- Understand remote sensing & aerial photography
- Understand remote sensing & satellite imagery
- Identify features from satellite imagery
- Use data from remote sensing

### **STRAND 6**

**Perform spatial analysis using queries, geoprocessing tools, and models.**

#### **Standard 1**

Analyze geographic data.

- List the three components of an attribute query.
- List the four types of relationships you can analyze with location query.
- Define buffer and give an example of when it is used.
- Define overlay and give an example of when it is used.
- List the five steps in the geographic inquiry process.
- Apply all five steps of the geographic inquiry process to solve a problem with GIS.

#### **Standard 2**

Use the GIS analytical process, ask questions and get answers, examine and present the results.

- List the steps in a GIS analysis.
- Interpret an analysis plan that includes GIS tools, criteria, and workflow.
- Extend a layer attribute table by joining another table to it.
- Create and modify a selected set of features using a series of attribute and location queries.
- Explain the difference between attribute and location queries.
- Examine analysis results through maps, tables, and reports.
- Generate a report that presents the results of an analysis.

#### **Standard 3**

Work with geoprocessing and modeling tools, work with geoprocessing tools, creating and using models.

- Explain what geoprocessing is.
- Choose the appropriate geoprocessing tool for a task.
- Describe what a model is and how to use one.
- List some advantages of using a model.
- Create, modify, and run a model.

### **STRAND 7**

**Design high-quality maps and reports to share analysis results with others.**

#### **Standard 1**

Understanding Geographic Data

- Explain what a thematic map is.
- Describe the difference between category and quantity attributes.
- Recognize the difference between graduated colors and graduated symbols.
- Describe the purpose of a map layout.

### Standard 2

Design maps with GIS software, work with map layouts, create a presentation map.

- Understand and apply basic cartographic design principles.
- List elements that can be included on a map.
- Create a map layout.
- Create and modify a map legend.
- Add and modify decorative map elements.
- Convert feature labels to annotation.
- Apply a template to design a map layout.

## STRAND 8

Explore careers in the geo-spatial industry.

### Standard 1

Develops and uses workplace skills and behaviors

- Works independently.
- Communicates effectively and appropriately.
- Performs reliably and responsibly.
- Works with other effectively and respectfully.
- Is punctual and follows directions.
- Works cooperatively.
- Takes initiative.
- Responds appropriately to constructive criticism.

### Standard 2

Explore careers in the geo-spatial field.

- Identify careers that use geo-spatial skills.
- Identify education and/or certifications needed to work in a geo-spatial field.
- Identify geo-spatial professional organizations

## STRAND 9

Create a Geo-spatial Project.

### Standard 1

Identify, plan, complete, and publish a local geo-spatial project.

- Identify a local geo-spatial project
- Determine the time, scope, and resources needed for the project
- Plan a data inventory
- Acquire data, organize, manage, and maintain data files.
- Analyze, interpret, and model the information
- Create Maps
- Communicate, publish, and present the project.

## Performance Skills

- Expand content knowledge of geospatial concepts and location analytics.
- Read, create, and edit geographical data.
- Gain the skills necessary in today's tech-centric industry.

## Workplace Skills

The following workplace skills should be discussed, taught, and re-enforced in the course:

- Communication
- Critical Thinking
- Dependability
- Accountability
- Legal requirements/expectations

## Skill Certification Test Points by Strand

Test Name	Test #	Number of Test Points by Strand										Total Points	Total Questions	
		1	2	3	4	5	6	7	8	9	10			

