Educator Guide

For the Get to Know GIS (for Secondary Students) Learning Plan
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Taking the courses

To complete the web courses in the Get to Know GIS (for Secondary Students) learning plan, students must be able to access two resources:

- Esri Training website (to access the web courses)
- Your school’s ArcGIS Online organization (to access the GIS application)

Adults may use standard procedures to access and obtain user accounts for Esri Training and ArcGIS Online. For students of minor age, however, you may need to choose options that protect students’ personal information.

Accessing the web courses

When you launch one of the courses in the Get to Know GIS (for Secondary Students) learning plan, you have the option to sign in or to access the course anonymously (without signing in).

Anonymous access is the simplest option and the one that we recommend for minor students. With anonymous access,

- Students will not be prompted to sign in to Esri.com. Esri will not have personal information about students.
- Students who pass the course quizzes or exam will NOT receive the usual certificate of completion. In this case, you may want to find a different way for students to show you that they have passed the exam or to assess their learning.

You, the educator, and other adults might prefer to sign in to Esri.com when you take a course. When you sign in, we can track your progress through the course, and you can receive a certificate of completion that will be saved in your training history.

If you choose to have students sign in to Esri.com to access a course, keep these points in mind:

- You can take steps to enable students to use their ArcGIS Online organization credentials to sign in to Esri Training. (The ArcGIS Online organization
administrator can “Enable Esri Access” for each student account.) In this case, we recommend that you set up “generic” ArcGIS Online user accounts that do not include students’ personal information. You can read more about what is meant by a “generic” account and how to create them in the document, [ArcGIS Online Organizations for Schools and Clubs](#), page 12, and starting on page 26.

- Course certificates will show a student’s generic user name, not their actual name.

- Course certificates are associated with an Esri-enabled account until the ArcGIS Online account is no longer Esri-enabled, and the account is deleted. This means that if you reassign generic user accounts to other students, they will have access to any course certificates that a previous student earned. And, unless the password is changed, the previous student could continue using the ArcGIS Online and Esri accounts.

### Accessing ArcGIS Online

This document assumes that you have already set up an ArcGIS Online organization for instructional use.

#### About ArcGIS Online for Schools

ArcGIS Online is a cloud-based GIS for using, creating, and sharing maps and apps. An ArcGIS Online organizational subscription is included in the [ArcGIS for Schools Bundle](#). The bundle of mapping software is available at no cost for instructional use to individual U.S. K12 schools, school districts, and states directly from Esri. Beyond the U.S., the bundle is available to schools worldwide through Esri’s network of international distributors.

Information about setting up and administering an ArcGIS Online organization is available in these resources.

- ArcGIS Online Help, in the **Administer** section
- [ArcGIS Online Organizations for Schools and Clubs](#) (in the [Esri K12 GIS Organization resource portal](#))
- [Teach with GIS: Implementation Guide for your Classroom](#)
Students will need to sign in to their ArcGIS Online organization to save their maps and access certain GIS tools and resources. The following table indicates which courses in the learning plan use ArcGIS Online and for what purposes.

<table>
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<tr>
<th>Course title</th>
<th>Why an ArcGIS Online organization user account is needed</th>
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<tr>
<td>Exploring GIS Maps</td>
<td>Save work</td>
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**Note:** Adults can use an ArcGIS Online public account to complete all courses except *Using GIS to Solve Problems*. Course exercises in *Using GIS to Solve Problems* require GIS analysis tools that are available only to ArcGIS Online organization members. (Refer to the following Course Teacher Tips section for more information.)
Course Teacher Tips

The information in this section pertains to the courses included in the Get to Know GIS (for Secondary Students) learning plan:

- Exploring GIS Maps
- Getting Information from a GIS Map
- Using GIS to Solve Problems
- Telling Stories with GIS Maps
- Putting Your GIS Skills to Work

The learning plan itself is simply a way to organize the courses. No Esri certificate is issued for completing the learning plan.

Tips for all courses

The following information pertains to all the web courses in the learning plan.

- The web courses are self-paced. Students may work independently to complete the material.

- We suggest that you complete the courses yourself before assigning them to students. You can test the computing environment, make sure that students have the prerequisite skills, and devise ways to introduce the material, engage students in discussion, and so on.

- Course exercises do not depend on completion of exercises in another course.

- The courses include videos. If students are working in a classroom environment, you may want to encourage students to use a headset or earbuds. Alternatively, you can arrange to watch the videos as a class.

- Keep in mind that the internet is a dynamic environment. While Esri strives to keep courses up to date, occasionally a link may break or an ArcGIS Online interface may change.

- Each course includes a short multiple-choice exam or set of short quizzes. Exams or quizzes are intended to be a self-check to aid in learning, not a
rigorous assessment. A student can leave the exam to look up an answer, but they should open the course page in a new browser tab. Otherwise, when they return to the exam, it may show different questions.

- If signed in, students receive a digital certificate of completion when they pass a course exam or quizzes. They can view or download the certificate from their My Learning Activity page.

**Note about course design format updates in 2020**

Over several months, beginning in July 2020, each course will be updated to a new design format. When published, the new course will simply replace the previous version.

- Students accessing a course anonymously will always see the most current course.

- Students who sign in and enroll in a course will receive an alert message in their training account up to 30 days before the expected publishing date.
Exploring GIS Maps

Course description

In this course, students learn basic facts about maps and geographic information systems (GIS). Relatable examples convey how GIS maps and tools can help them and others understand the world, perform critical tasks, and make smarter decisions. Exercises have students explore satellite image maps of the United States and make their first map using a web-based GIS called ArcGIS Online.

Vocabulary

basemap: A map depicting locational reference information, such as landforms, roads, landmarks, and political boundaries.

feature: A representation of a real-world object on a map.

GIS: Geographic information system. GIS uses interactive maps to analyze data and help answer questions about the world.

layer: A collection of related features in a GIS map. The features in a layer usually have the same theme, geometry, and set of attributes.

For example, a GIS layer might use lines (geometry) to represent streets (theme) and include the name of each street (attribute).

scale: The ratio or relationship between a distance or area on a map and the corresponding distance or area on the ground. Scale is commonly expressed as a fraction or ratio.

Example: A scale of 1:1,000,000 means that 1 unit on the map equals 1 million units on the earth. In other words, 1 inch on the map shows 1 million inches on the earth (about 189 miles).

spatial analysis: The process of examining the locations, attributes, and relationships of features in spatial data to address a question or gain useful knowledge.
Activities for continued learning

To continue learning about GIS after completing the course, consider sharing these activities with your students.

Watch a video

- View The Science of Where: Unlocking Data’s Full Potential.
- View See What Others Can’t.
- View Episode 1 on the Pennsylvania State University Geospatial Revolution site (13 minutes).
- View What is Location Intelligence?
- View Let Science Speak - Dr. Dawn Wright, Esri Chief Scientist.

Practice your skills

Keep exploring Imagery and other basemaps on ArcGIS Online. For practice, mark some places with map notes, and then save your map.

Are you wondering what places to look for? To get started, consider the following ideas:

- The place where you or your parents were born
- A town or city you would like to visit
- Your favorite entertainment venue
- A country on the other side of the world
- A place that is unlike where you are right now
- The bottom of the ocean
- The home stadium of your favorite sports team
- A place that you have read about
Getting Information from a GIS Map

Course description

GIS maps are interesting to look at, but they are more than just maps. GIS maps are windows into a database. In this course, students learn to access the data connected to map features to answer questions about the world.

Vocabulary

attribute: Nonspatial information about a geographic feature in a GIS, usually stored in a table and linked to the feature by a unique identifier. For example, attributes of a river might include its name, length, and the amount of solid matter, or sediment load, carried by the river and measured at a gauging station.

attribute table: A database or tabular file containing information about a set of geographic features, usually arranged so that each row represents a feature and each column represents one feature attribute. In a GIS, attribute tables are often joined or related to spatial data layers. You can use the attribute values in those tables to find, query, and symbolize features.

field: A column in a table that stores the values for a single attribute.

legend: The description of the types of features included in a map. Legends often use graphics of symbols or examples of features from the map with a written description of what each symbol or graphic represents.

style: An organized collection of predefined colors, symbols, properties of symbols, and map elements.

symbol: A graphic that represents a geographic feature or class of features. Symbols can look like what they represent (trees, railroads, theaters), or they can be abstract shapes (points, lines, areas) or characters. Symbols are usually explained in a map legend.

thematic map: A map designed to convey information about a single topic or theme, such as population density or geology.
Activities for continued learning

To continue learning about GIS after completing the course, consider sharing these activities with your students.

Practice your skills

Explore attribute tables and layer styling using attributes in ArcGIS Online. Use one of the maps you made in this course to try the following ideas:

- Use the Hot Spots style for earthquakes. See how the map looks with different basemaps.
- Find the place where you live, and then measure the distance from that location to the nearest tectonic plate boundary or strong earthquake on the map.
- Open the attribute table for Major Cities, and then sort the table to locate the top 10 cities in the world by population.
- Style the Cascades Volcanoes layer using the Type attribute. Does the map show a pattern?

Explore an ArcGIS Online tutorial story map

To learn more about the topic of the course, explore one of the following tutorial story maps:

- How to Smart Map: Heat Maps
- How to Smart Map with Clustering
- How to Smart Map: Relationships
Using GIS to Solve Problems

Course description

Asking geographic questions is part of everyday life. However, many geographic questions are complex and require the power of a computer—and GIS technology—to answer them.

This course introduces a five-step process for investigating geographic questions. In the exercises, students use ArcGIS Online tools to solve a realistic community problem.

Student user account privileges

Course exercises use ArcGIS Online analysis tools. To complete the exercises, student user accounts require a Publisher role or a custom role that includes these privileges:

- Publish hosted feature layers
- Spatial analysis

Vocabulary

**buffer**: An area (polygon) that covers a given distance from a point, line, or area feature.

**filter**: A GIS operation that hides (but does not delete) features in a map or attribute table. Filters also define a subset of features for analysis.

**geoprocessing**: A GIS operation used to manipulate GIS data. A typical geoprocessing operation takes an input dataset, performs an operation on that dataset, and returns the result of the operation as an output dataset.

**geoprocessing tool**: An ArcGIS tool that can create or modify spatial data. Geoprocessing tools perform functions including analysis (examples: find locations, buffer, find hot spots), data management (examples: dissolve boundaries, merge layers), and data conversion (example: export data).

**query**: A request to select features or records from a database. A query is often written as a statement or logical expression.
service credits: The currency for ArcGIS Online. ArcGIS Online consumes service credits when you use certain functions, such as spatial analysis, routing, and geocoding. Service credits are also referred to simply as credits.

spatial analysis: The process of examining the locations, attributes, and relationships of features in spatial data to address a question or gain useful knowledge.

workflow: A set of tasks carried out in a certain order to achieve a goal. For example, GIS tools may be used in a certain order to carry out an analysis.

**Activities for continued learning**

To continue learning about GIS after completing the course, consider sharing these activities with your students.

**Watch a video**

- Listen to students from Lurgan, Ireland, tell how they used ArcGIS to investigate lingering divisions in their community and find ways to grow peace. Lurgan Schools: The Differences We Share.
- Learn how two high school students from Hawaii are making a difference with GIS: Mentoring the Next Generation.

**Practice your skills**

Build your skills with ArcGIS Online analysis tools. For example, make a copy of your Grenshaw mural study map and try the following tasks:

- Create a half-mile buffer around the Existing Murals layer (using the Create Buffers tool).
- Find the suggested mural sites near elementary schools (you define the criteria).
- Find hot spots of suggested mural sites.

Practice your mapping skills by changing the style of one or more of the results layers you created.
Telling Stories with GIS Maps

Course description

Story maps are a popular way to share information. They combine GIS maps with text, photos, and sometimes video to present a topic as a web app. In this course, students explore different kinds of story maps and learn to create their own.

Option to share story maps

The second course exercise includes an optional step for students to share their story maps with their classmates. To support this option, you (the teacher) must create a group for this purpose. Then, you must add the students as members of the group.

- When creating the group, the following options are suggested:
  - Choose status as private or organization (not public).
  - Make members contributors.
- When inviting users (students), use the option to add members of the organization immediately, without requiring confirmation. Otherwise, if you are using generic student accounts, invitation emails will be sent to your administrator email, and each one will require a response.
- Refer to the ArcGIS Online Help (Share tab) for details about creating and managing groups.

Allowing students to share their story maps includes the following benefits:

- Students learn a workflow for sharing their work with others, which is a key feature of ArcGIS Online.
- You (the teacher) have a way to easily review student work.
- If time permits (perhaps after students complete the course exam), students have an opportunity to see, react to, and discuss each other’s stories. They can practice giving and receiving constructive feedback.
Vocabulary

**web app:** A software program that delivers information to the user through the World Wide Web, usually in a web browser. Story maps are web apps.

Activities for continued learning

To continue learning about GIS after completing the course, consider sharing these activities with your students.

**Note: Esri’s story mapping product is in transition.** Esri Story Maps, which is the template-based product used in this course, is now referred to as “classic story maps.” Esri Story Maps is gradually being replaced by a new story map builder, ArcGIS StoryMaps.

**The two products have different websites.** The links below generally point to the classic story maps pages. However, students might enjoy trying out the new story map builder, so links are provided for that web page, too.

Practice your skills

Experiment with your Three Adventures story map.

1. On ArcGIS Online, click Content, go to My Content, and then open the TellingStoriesWithMaps folder.
2. Click the More Info button next to the Modified date, and then choose View Item Details.
3. From the item page, click Configure App.
   - On the General tab, try adding a Splash Screen.
   - On the Theme tab, try changing the header, button, or panel colors.
   - On the Options tab, try adding other tools, such as Display Layer List, Legend, Measure Tool, or Overview Map.
4. Click Save, and then click Launch to open the web app and look at the changes.
Explore more story maps

- Examine Exploring New York City’s Vibrant Street Art Scene.
- Examine The Kingdom of Copper story map, and read an interview with the story map author, in the blog article, Digging into archaeological research through digital storytelling.
- Go to the classic story maps Gallery and search a topic that interests you.

Do a lesson to learn a new story map technique

- Create a swipe story map (PDF) comparing high school graduation rates with unemployment rates
- Create a spyglass story map (PDF) comparing key locations in Washington, D.C., in 1851 and 2016.
Putting Your GIS Skills to Work

Course description

GIS is more than a fun tool to explore maps—it is an actual career. This course is intended to get students thinking about their future. In this course, students will find out where GIS professionals work, what they do, and how their educational choices prepare them for different types of jobs.

Vocabulary

**geospatial technology**: A set of technological approaches, such as GIS, photogrammetry, and remote sensing, for acquiring and manipulating geographic data.

**metadata**: Information that describes the content, quality, condition, origin, and other characteristics of data or other pieces of information.

Activities for continued learning

To continue learning about GIS and careers after completing the course, consider sharing these activities with your students.

**Watch another geospatial career video**

View more geospatial career videos on Explore Careers in GIS, produced by Virtual Job Shadow in partnership with Esri. In addition to the videos in the course, videos are available for these GIS careers:

- Climate scientist
- App developer
- Helicopter pilot - firefighter
- Conservationist
- Health geographer
- Civil engineer
- Volcanologist
- Research geographer
- GIS agricultural analyst
- GIS Developer/Drone pilot

View the video Let Science Speak – Dr. Dawn Wright, Esri Chief Scientist.
Explore more GIS job and career websites

Explore attribute tables and layer styling using attributes on ArcGIS Online. Use one of the maps you made in this course to try the following ideas:

- The GIS Jobs Clearinghouse
- GISjobs.com
- Geojobs.org
- O*NET OnLine (GIS search; geospatial search)
- GIS Lounge
- AAG career page (American Association of Geographers)
- URISA career page (Urban and Regional Information Systems Association)

Research scholarships in geospatial technology

Look for scholarships for geospatial technology studies on websites such as CollegeScholarships.org.