ArcGIS Online is an online platform that allows you to use, create, and share maps, data, and stories. ArcGIS Online is easy to collaborate with ArcGIS Desktop, ArcGIS Enterprise, ArcGIS Web APIs, and ArcGIS Runtime SDKs.

1) GET SETUP
   I. Make sure that you have an ArcGIS Online account created. If you are not affiliated with the University of Arizona, you will need to setup an ArcGIS Developers account at http://developers.arcgis.com. Once you have a Developers account setup, you will be able to use it in both ArcGIS Online and ArcGIS for Developers.
      If you are affiliated with the UA, simply go to the UAGIS ArcGIS Online site here: https://uagis.maps.arcgis.com/
   II. Click on the Sign In button near the top right corner of the page.
   III. Click the Using Your University of Arizona Account button to sign in using your NetID credentials. If your sign-in fails, it may be because you already have an ArcGIS Online account.

2) Workshop Data
   Download the workshop data: https://arizona.box.com/v/IntroToArcGISOnline

3) SITE LAYOUT
   I. Review site layout
      a. Menus across the top. For those with a University of Arizona associated account it will be:
         Home, Gallery, Map, Scene, Groups, Content, and Organization.

         Gallery will allow you to view web maps, scenes, and applications that have been created by members of your organization or maps from the Esri Living Atlas
         Map will bring you to either a new Map, or your last used Map
         Scene will bring you into a new Scene or your last saved Scene
         Groups will simply show you what ArcGIS Online groups you are affiliated with
         Content will display the content that you have created or imported into the ArcGIS Online cloud
         Organization, if you see it, will provide a list of all persons in your Organization and
allow you to browse their content

II. Go to Content
   a. The left side will allow you to browse your folders and filter your contents by type. You can organize your layers using folders listed on the left.
   b. All contents in your 🏡 folder will be displayed on the right.
      - Note the columns: Title and Modified. Type, Share Settings, Favorites and More Options are also accessible here.
   c. Create a new folder by clicking on New. Give it the name Intro to ArcGIS Online and click Ok.

4) IMPORTING AND SEARCHING FOR DATA
   In this tutorial we have provided three different layers with different data types (points, lines, and polygons).

   I. Add the workshop data you downloaded to your computer
   II. Make sure that you are in the Intro to ArcGIS Online folder
   III. Click on +Add Item, from my computer
   IV. Click on Choose File, select bike_rte.zip
   V. Select the type of contents from the dropdown list (shapefile)
   VI. Make sure the box: Publish this file as a hosted layer is checked
   VII. Type in a Title (e.g. Bike Routes Tucson 2016) and any Tags (e.g. Tucson, Bikes, Routes). Then click on Add Item. Wait for data to be added and a feature layer to be created.

   NOTE: Titles require strict alphanumeric when you’re initially setting up the title, but you can add punctuation marks after the fact when editing it.
   NOTE: You must have tags when publishing layers

   VIII. Go back to Content and add the rest of the other data provided
         a. BBandSBLeagues.geojson
            i. TITLE: Baseball and Softball Districts Tucson 2016
            ii. TAGS: Tucson, Baseball, Softball
         b. RainLog_June2016.csv
            i. TITLE: Rain Log Data Tucson 2016
            ii. TAGS: Tucson, Precipitation

   NOTE: Make sure that the Latitude and Longitude fields are set

   IX. Add Data to a new Map
       a. Click on Map at the top of the screen to open a map. This will open a blank map, or, if you have a saved map, your last saved map.
       b. Click on the Add button near the top left corner of the page and select Search for Layers. Make sure the selection is set to In: My Content.
       c. Add the following layers by click add next to each:
          i. Bicycle Routes, Tucson, 2016
iii. Rainlog Data, Tucson, 2016

Note: You can also search for layers to add to your map by setting the selection to In: My Organization, ArcGIS Online, etc.

d. Click on the Details button to the left of Add. Make sure Content is selected to show your layer.

5) STYLE LAYERS AND POP-UPS

You’ll notice that as you hover over each layer in the Contents list, a list of buttons will appear that allow you access properties for the layer: Show Legend, Show Table, Change Style, Filter, Perform Analysis, and More Options.

Show Legend: Will show you the style features for the layer being displayed
Show Table: Will show you the attributes table for that layer
Change Style: Allows you to change the way in which features are displayed
Filter: Access and create filters for which data in the layer is displayed
Perform Analysis: Generate new layers from this layer using a variety of analytical tools
More Options: Access additional layer options (including configuring pop-ups)

I. For the RainLog Data layer, hover over it and click on the Show Table button. This displays the feature attributes for each point in the layer. We can see three columns for 795 features (Precip, Latitude, and Longitude). We want to style each point by the Precip (precipitation) value for each feature. X in the upper right of the table to close it.

II. Changing Style
a. Click on the Change Style button under the RainLog Data layer
b. Under 1. Choose an attribute to show, use the drop down to select Precip. The Precip attribute for each layer is a number that indicates the amount of precipitation recorded at each location.
c. With Precip selected, click on the Select button inside the Counts and Amounts (Color) box. This will color the points in the layer based on the value of the Precip number for each feature. Next, click on Options to access the styling options.
   i. To change the color gradient, point size, or outline color, click on Symbols. With the SHAPE tab selected, change the shape to the diamond and the symbol size to 20px. Under the FILL tab select a new color ramp. Under the OUTLINE tab, set the color to red. Click OK to close the symbols settings
   ii. Click on the Classify Data check box to group data to colors based on a set of classes. Set the number of classes to 5.
   iii. When you are happy with your style click Ok and then Done to save the styling for that layer.

NOTE: Style options change depending on whether the layer is a line, point, or polygon.
III. **Pop-ups**

By default, when you click on a feature (an individual point, line, or polygon) in your map, a pop-up will appear to identify the attributes for that feature. These are the same attributes that are displayed in the attribute table with the **Show Table** button. However, we can customize how the pop-ups appear and what data they display.

a. Next to the **Bicycle Routes** layer click on the ... **More Options** button and select **Configure Pop-up** from the dropdown.

   Here you can edit the Pop-up Title to something more readable, change what attributes you’d like to display in the pop-up, customize attribute displays, and add images and customized charts to the pop-up.

b. Click on the **Configure Attributes** link to open up a new frame that will allow you to select which attributes to display.

c. Uncheck **FID**, **BIKERTCD**, and **PC_UID**. Only **STREET**, **NAME_BKwy**, and **BIKERTEDS** should be displayed. Click **OK** to close the frame.

d. Try changing the title and click **OK** when you are finished. Now click on a bike route feature in your map to see how your pop-up has changed.

   *Note that you can also add images or charts to your popup.*

e. Click **OK** again to close the **Configure Pop-up** frame.

f. Now click on a bike route feature in your map to see how your pop-up has changed.

6) **ANALYZING DATA**

I. **GeoEnriching Data**

ArcGIS Online contains a considerable amount of demographic data that you can use to enrich your features. An enrichment analysis will allow you to create a new layer that has the same feature as your input layer, but with additional demographic attributes for the population that resides in that area.

a. When you hover over the **Baseball and Softball League Zones, Tucson, 2016** layer, the layer options will appear. Click on **Perform Analysis**.

b. In the listing of available analysis types click **Data Enrichment** and then **Enrich Layer**.

c. In the Step 2 section, click on **Select Variables**.

d. Here we can use a whole variety of demographic data provided by the US Census and by Esri to add attributes to our features; in this case polygons. In the **Data Browser** frame that appears, click on **Age**.

e. Three popular options appear that are most commonly used. Alternately, we can browse sub-groups in 1 year or 5 year increments, or we can click on the **Show all Age Variables** at the bottom to really dive into specifics. We’ll click on the **5 Year Increments** button.

f. Using the arrow to the left of 2017 **Age: 5 Year Increments (Esri)** to display all subgroups. Click on the checkboxes next to the age groups for 5-9, 10-14, and 15-19.

g. Near the top of the frame click on the first button to return to the Data Browser main menu. Click on the **Households** button.

h. Under the Popular Variables, check the box next to **2017 Average household Size (Esri)**. Click **Apply** to close the frame. All the demographic variables that were
selected now appear listed on the left.

**NOTE:** In our case, because we’re using polygons which already have an area, we don’t need Step 3 in the analysis tool (Define areas to enrich). However, if we were trying to enrich points or lines, we’d see that option here.

i. In Step 4 (Result layer name) specify a name for the new feature layer that will be created. Name the new layer that will be created if you like, or leave the default provided.

**NOTE:** The *Use current map extent* checkbox will limit the analysis to the feature that are currently displayed on the area viewed map.

**NOTE:** Clicking on the *Show credits* option near the bottom will display how many credits that this particular configuration of the analysis will use. These 26 records enriched with these 4 variables will use 1.04 credits.

j. Finally, click *Run Analysis*. The operation will take a few seconds to a few minutes to complete, but when finished we will see the new layer in our layer listing. Uncheck the listing for the un-enriched input layer (Baseball and Softball Districts Tucson 2016 and then click on one of the polygons on the map to show its pop-up attributes. The additional attributes listed for that polygon area will show in the pop-up. Alternately, click on the *Show Table* button below the layer to bring up the full attribute table for the layer and all its features.

II. **Filter Data**

Filtering Data for a layer will allow us to limit the data within the layer that is shown. When filters are applied, any analysis tools that are run will only use the data that hasn’t been filtered out.

a. Beneath the *Bike Routes* layer click on the *Show Table* button to view all the attributes for all the points. The top of the attribute table shows that there are 13,239 individual features in this layer. Also notice the description for each route under BIKERTE_DS. Some are listed as “Shared-Use Path”

b. Now click the *Filter* button for this layer under the layer name. This will bring up a new frame allowing us to specify the filter we would like to apply.

c. In the field dropdown list, change the selection to BIKERTE_DS. Next, make sure that the operator is set to *is*, and select the radio button next to *Unique*. This will give us a drop down of unique values to choose for this layer. Click on the menu and select *Shared-Use Path*.

d. Click *Apply* to apply the filter. This filter restricts the data is that viewed to only the features who have the “Shared-Use Path” value of the BIKERT_DS attribute. Notice how the number of features listed in the attribute table has dropped down to only 2,121 from 13,239.
**NOTE:** Applying the filter restricts the data available for viewing for that feature layer. If we were to create a new map and add that layer, the same filter would be applied.

III. **Interpolate Data**
Data interpolation is an analytical tool that will allow us to take values at individual points or lines and create estimates based on those values to create a continuous area. In this case, we will estimate rainfall across Tucson using only values read at point locations.

   a. In the search bar in the top right corner of your screen where it says “Find address or place”, type in **Tucson** and hit Enter on your keyboard. This will zoom us to the greater Tucson area.
   b. Click on the **Preform Analysis** button below the RainLog Data layer
   c. From the analysis toolset, select **Analyze Patterns** and the **Interpolate Points**
   d. Ensure that the RainLog dataset has been selected in the dropdown, and choose the **Precip** field as the field to interpolate data from.
   e. Toggle the optimization toward speed and give the resulting output layer a new unique name (e.g. Ben’s Interpolated Rain Log Data).
   f. Using the search box in the upper right hand corner, type in **Pima County** and hit enter to zoom to a scale that Pima County is visible at.
   g. Before we run the analysis, leave the **Use current map extent** checked and click on the **Show credits** link to bring up a credits estimate. In our case, this will be around .4 credits for close to 400 records.
   h. Click **Run Analysis** to run the tool and create the new layer. The analysis may take up to a minute to finish.

When complete, a new polygon layer will have been added to the map showing rainfall estimates over the whole area. Explore the newly created layer by clicking on it to show the layer attributes in pop-ups.

Take a moment to rearrange your layer order, change layers style and transparency, and configure pop-ups for your map. When you’re happy with how your map looks, click on the **Save** button near the top-center of the screen to save the map. You’ll need to give it a title (e.g. Ben’s Intro To ArcGIS Online Workshop Map), several tags to help make it searchable, and a brief description of what you’re showing. Click **SAVE MAP**.

7) **CREATING AND EDITING DATA**
Beyond just importing or searching for data that already exists, we sometimes want to create new data ourselves. We’ll need to head over to ArcGIS Developers to do so.

   I. Open a new tab in your browser and go to [https://developers.arcgis.com](https://developers.arcgis.com) and login with the same account and password that you used for ArcGIS Online
   II. Click **Dashboard** on the top toolbar
   III. Click on the **Create a New Layer** button to the right of the Layers category, near the middle of the page
   IV. Click **Create an Empty Layer**
V. Give the new layer a title (e.g. “Houses I Know”) and some tags. Click **Geometry**.
VI. Select **points** and leave the Spatial Reference as is. Click **Fields**.
VII. In the fields listing, we can specify the attribute fields that we would like the layer to have. Where it says “Field Name” type in **OCCUPANT**, leave the data type set to **String**, and click **Add Field**. Create a new field called **NUM_STORIES** with a data type of **Integer**.
VIII. Click **Settings**. Make sure **Enable editing** is checked under the Permissions Settings. Click **Create Layer** at the bottom of the page. This will create a new empty layer in your account that you can access from your **Contents**.
IX. Return to your browser tab that has your ArcGIS Online map open and add the layer. Uncheck the display box for all other layers.
X. Just above the layer listing next to the **Basemaps** selection, click on **Edit**. This will show the “Add Features” for your new layer. Click on **New Features**.
XI. Now browse around Tucson to find your house and click on its location to add a new feature for it. Enter the Information for “OCCUPANT” and “NUM_STORIES”. Click **CLOSE**
XII. Repeat the previous two steps a few more times so that you have few new features in your layer.
XIII. When you’re finished adding new feature click on **Details** to return to your layer listing and view the attribute table for your new layer. Save the map.

8) SHARING YOUR MAP
Maps that we have saved can also be shared publicly, within your organization only, or even within specific groups within your organization.

I. Near where the **Save** button was, click **Share**.
II. A new frame will open with your sharing options. Here you can select who to share it with and how you want to share it: via URL, Facebook, or Twitter. Alternately, you can Embed it in an existing site, or create a Web Application with it.

*NOTE: If you have layers in your map that are not also shared, a prompt will appear asking you to share those layers also. This is to ensure that your map will display properly to those that you share it with. If you were able to share your map without allowing the layers to be shared also, the map would appear blank to others who would view it.*

9) CREATE A WEB APPLICATION
ARCGIS Online will not only allow you to create Maps to display, interpret, share and analyze your data, but also allow you to create Presentations and Web Applications from your Maps. Web Applications provide end-users of your product to interact with your data in creative and engaging ways that are otherwise not possible with a simple map.

I. Return to **Content** and back into the **Intro to ArcGIS Online** folder
II. Click on the **Create** dropdown menu, under the **App** menu choose **Using A Template**
III. The frame that opens will show you a whole host of templates that you can use to interactively display your data. To learn more about each and see examples click here. Click on Compare Maps/Layers on the left side

IV. Look for the option for a Story Map Swipe and Spyglass. Click on it to select it and then Create Web App.

NOTE: Clicking download will open up that templates GitHub page where you can access the code base to deploy the application on your own website or server.

V. Give the new App the title “My First App”. Give a few tags like “Tucson” and “Rainfall”. Click Done

VI. The next frame will want to connect your app with a saved map. Click on the search button to search for your map. It will be listed under Content. Click it to select it. Then hit Next

VII. We can select a Vertical bar or Spyglass layout. It has defaulted to Vertical bar, but let’s try Spyglass instead. Click Select this layout under Spyglass and hit Next

VIII. Next, it will ask us if we’d like to display a layer within the spyglass or an entirely different web map. We’ll just use a layer in our current map. Let’s choose our RainLog Data layer and hit Next

IX. The next frame will let us select the configuration we’d like for our layout. Check and uncheck a few boxes to see how the layout changes in the picture on the right. We’ll keep the defaults checked for Description, Legend, and Pop-ups. Hit Next

X. Now, we’ll give our map a title. You can name it whatever you’d like. Also give the spyglass a title. Since our spyglass will be showing the RainLog Data collection points, just type in RainLog Measurement.

XI. Finally, hit Open the App. The Web Application will be created based on the setting you specified. To change any of those setting, simply click Settings in the top-center.

NOTE: Your web application is based on how you have the map you linked it to configured. Any layers that aren’t displayed in your map won’t show and the stylings are controlled from your map as well. To change any of those setting go back to your saved map and configure it to how you’d like it to be displayed in the Web Application.

XII. Type in additional information in the text box on the left side of the screen and remember to save your new web application. It can be shared with others by URL, Twitter, and Facebook using the links in the top-right corner of the screen.

Additional Resources:

- ArcGIS Online Help
- ArcGIS Online Web Application Templates
- More Tutorials on GitHub (provide by Esri)
- ArcGIS Online Credits Estimator
University of Arizona GIS & Geospatial Data LibGuide

University of Arizona Spatial Data Explorer