**Introduction to Geographic Information Systems (GIS)**

**Week 08**

*Geocoding* is the process of assigning Lattitude/Longitude to places based on their address. In the first part of this exercise, we will look at data that doesn’t have a base map to join with, but does have address data (e.g. address, state, county, city, zip). Many GIS development environments (e.g. ArcMap, Google Maps, etc.) will perform this operation “on the fly” if the format of the data is correct.

The second part of the exercise will demonstrate how to work with data that is Latitude/Longitude based. While we will not do this in class, using handheld GPS units is a major application of GIS, whether in the field observing, collecting scientific data or using them to report on real-time events (natural disasters, etc.). Once the Lat/Long points are downloaded from a GPS Unit, the process for adding the point layer is slightly different.

There is an extra credit exercise worth 10 points. It’s a bit experimental, requiring you to use your smartphone and google maps to gather latitude/longitude points.

There are 3 videos for the main assignment and 1 video for the extra credit.

* Note: All export maps should be in Layout mode with color, Title, Scale Bar, North Arrow and Legend.
* Note: Make sure you change layer names (e.g. New York Roads, Westchester Museums, etc.)

**Geocoding**

The steps for this exercise include:

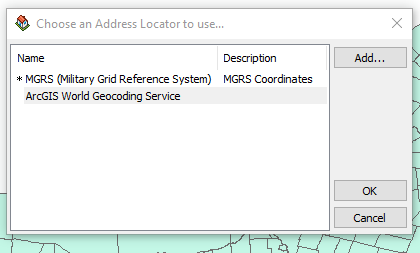
* Bringing base maps into ArcMap
* Add the Excel data file with address information (no *Join*)
* Connect to a *Geocoder*,
* *Geocode* the data file.

**Geocoding Addresses “on the fly” with ArcMap**

1. In the documents section for this week is a spreadsheet that contains the names and addresses New York State Parks in the “Taconic Region”. I created the spreadsheet being careful to:
   1. Have the address, city, state and zip in separate fields
2. Open a new map in ArcMap. Initialize the Coordinate System and set the Relative Path setting.
3. To your Week08 Folder, download and unzip the New York State Towns (county subdivisions) and Roads base maps from the Tigerline site (you have done this before). URL: <https://www.census.gov/cgi-bin/geo/shapefiles/index.php>. Select year: 2010

NOTE: For Roads select “Primary and Secondary” (otherwise it goes to “by-county”)

1. Start up ArcMap and add the Towns and Roads basemap.
2. Save the map as *WestchesterParks.mxd*
3. Add *NYSTaconicRegionParks.xlsx* to the map.
4. The data you want will be in “Sheet1$” or “NYS Tacanic Region Parks”
   1. Connect to the Geocoder in ArcGIS Online
   2. Right-Click the NYSTaconicRegionParks
   3. Select Geocode Addresses
   4. Select the ArcGIS World Coding Services; Select OK

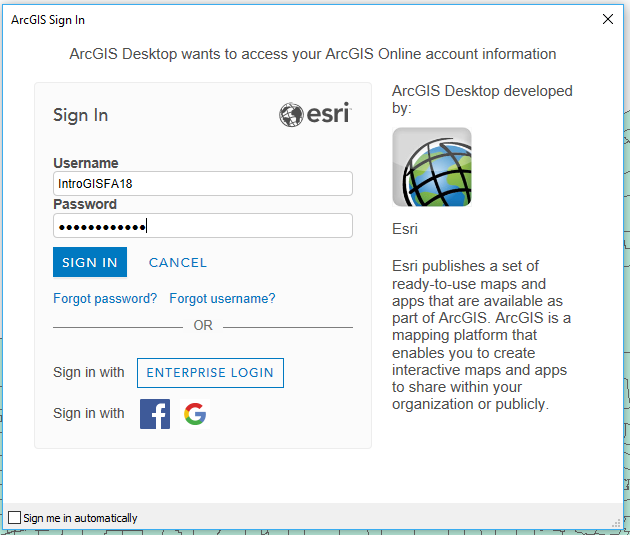


* 1. Log into ArcGIS Online

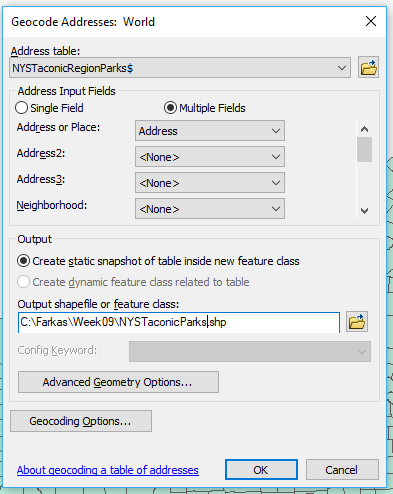
User-id: *IntroGIS-FA19*

Password: *IntroGIS!FA19*

(user-id/password different in the image)



* 1. The Geocoding dialog box will come up. If the columns of the address fields are appropriately named, there is no need to change/identify them.
  2. In the dialog box, navigate to your Week08 folder and change the name to NYSTaconicParks.shp.



* 1. When the Geocoding completes, the points will be added to the map (lower right).

1. Zoom into the Taconic Region
   1. Modify the symbology to make the symbols stand out (size, color, shape).
2. In “Layout” Mode
   1. Add the appropriate map features (North Arrow, etc.).
   2. Set to Portrait or Landscape depending on the look of the map
   3. Set a background color to the map.
   4. Export the map as *YourlastnameNYSParkGeocode-01.jpg*.
   5. Save the map.
3. Not all the parks are in Westchester County, and we want to create a map that highlights the ones that are:
   1. Using *Selection by Attribute select* Westchester Towns *(“COUNTYFP” = ‘119’*).
   2. Create a layer from the selected towns (rename “Westchester Towns”)
   3. Make sure the Parks layer is on top of the Westchester Towns layer which is on top of the NYS Towns layer
   4. Now select the parks that are within Westchester County using *Select by Location*. You’ve done this in a previous exercise.
   5. Once the Westchester parks are selected (I think there are 3), create a separate layer for them (call it WestchesterParks). *You will lose credit if you don’t do this*.
4. Remove all the selections leaving a map zoomed into the region showing ALL the parks and the Westchester parks with a different color (since they are a separate layer.  *You will lose points if you still have the “blue” selections showing.*
5. *NOTE: this process involves creating a new layer of the selected parks in Westchester County. For full credit you must show the selected parks as a layer and a few of the parks outside of Westchester. The symbology for each will be different and the Legend will reflect both layers.*
6. Save the map (.mxd) and export an image of the map (jpg) naming it YourlastnameNYSParkGeocode-02.jpg.

**On your own.**

1. Remove all except the Towns and Roads Layers
2. Save a new map “as” *NYSTaconicParksGeocode.mxd*
3. Navigate to a list of Public Libraries in New York State

URL: <https://publiclibraries.com/state/new-york/>

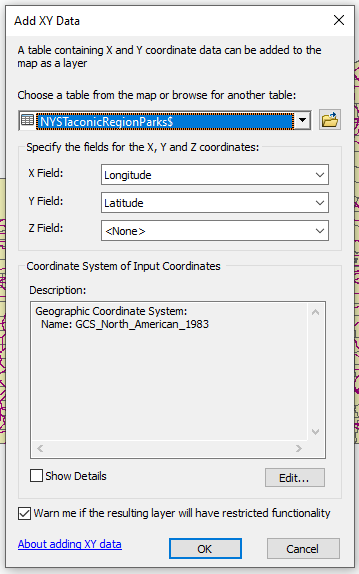
1. Cut and paste the list into an Excel spreadsheet and clean up the spreadsheet
2. Create a geocoded map of the Libraries and show the Westchester ones (same as the previous exercise)
   1. Using the Westchester Towns layer, select the Libraries in Westchester
   2. Create a layer for these features (with different symbology)
3. Export the map as a jpg zoomed in show some features within and outside of Westchester (include North Arrow, etc.) – *YourlastnameLibraries.jpg*
4. Save the map.

**Using Coordinates/GPS**

Sometimes the data doesn’t have addresses to Geocode, but does contain location:

* Data file with Latitude and Longitude
* GPS points

1. Create a new map in ArcMap.
2. Add the New York State Counties and Roads to the map
3. Save the map as *YourlastnameWestchesterParksCoordinates.mxd*
4. Download the Taconic Parks with Coordinates Excel file from Blackboard
5. To bring into ArcMap
6. File->Add Data-> Add XY-Data
7. Set the Latitude and Longitude fields to the ones in the file (“Latitude, Longitude).
8. Select OK



1. Modify the symbology of the points to make them more readable
2. In Layout View add Color, Title, etc. Adjust the orientation if necessary to make the map more readable.
3. Export a .jpg of the new map (*WestchesterParksCoordinates.jpg*).
4. Save the map

**Extra Credit (10 points)**

We will use our smartphones (IOS or Android) to capture locations and put them on the map. Note that there are better ways to do this (using a GPS unit, GPS App, or web-based app (such as ESRI Survey123). For now, we’ll keep it simple and hopefully fun.

1. Open up the Google Maps app on your smartphone (Android or IoS). If you down have it you may have to download and install
2. Travel to 10 landmark locations (features) in New York State (they can be in your neighborhood) and capture their Latitude and Longitude. You can keep it simple by walking around your neighborhood. Sample landmarks include restaurants, post offices, libraries, Bus Stops, etc.
3. When stopped at a landmark or selecting a landmark, touch and hold the location on the map
4. A pin will appear
5. The display depends smartphone, but record the Lat/long and a name or description for each one. The video has an example for IoS
   1. In IoS, I copied the Lat/Long, placed in an Email and when were created, sent to myself and transferred to a “cleaned-up” spreadsheet.
6. Create a new map in ArcMap.
7. Add the New York State Counties and Roads to the map
8. Save the map as *WestchesterParksGPS.mxd*
9. Add the spreadsheet to your map (Add XY-Data)
10. Modify the symbology of the points to make them more readable
11. In Layout View add Color, Title, etc. Adjust the orientation if necessary to make the map more readable.
12. Export a .jpg of the new map (*YourlastnameGPS.jpg*).
13. Save the map

**What is due this week (8/29/2019)**

Upload a single word document in the Assignment link with the following images:

*YourlastnameNYSParkGeocode-01.jpg*

*YourlastnameNYSParkGeocode-02.jpg*

*YourlastnameLibraries.jpg*

*WestchesterParksCoordinates.jpg*

*YourlastnameGPS.jpg*

Name the word file *yourlastnameWeek08Geocode*