

BIOL 4460/5460 and GEOL 4460 Introduction to GIS

ASSIGNMENT 1 - TOUR OF GIS – INTRODUCTION TO ArcGIS PRO

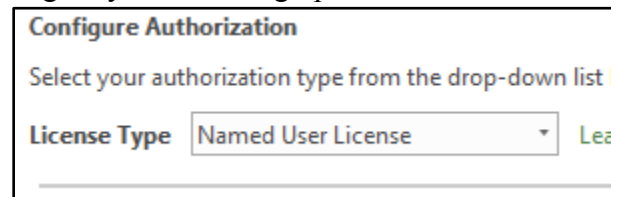
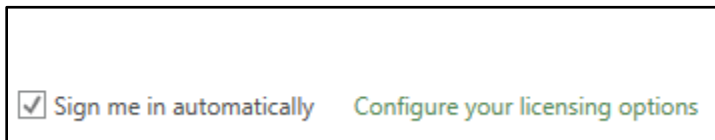
PDF's of the exercises will be available for download by going to the following link:

You will also need to download a ZIP file for each of the assignments from the link below:

http://geo02.tamtu.edu/gis_2018

You should create a folder in your USB flash drive (e.g. GIS_Exercises) where you will save all data you will work throughout the semester.

- Download the Exercise_1.zip file and save it in your GIS_Exercises folder.
- Right-click the zip file, point to 7-zip and click Extract Here. A new folder will be created. (Keep the original ZIP file in case you corrupt any of your data.)
- Click on the Windows Start menu > All Programs > ArcGIS > ArcGIS Pro > and click on the ArcGIS Pro application.
- Towards the bottom of the application window, click on Configure your licensing options.



- Make sure the License Type is set to Named User License and click OK.
- In the ArcGIS Sign in Window, use the user name provided to you and the password you created to log in to ArcGIS Pro (you might need to do this step every time you start using a PC in the lab computers).
- The ArcGIS Pro Welcome window gives you the option to open a previously saved project, or to create a new one.

The four options to create a project in ArcGIS Pro are:

Blank – Empty project

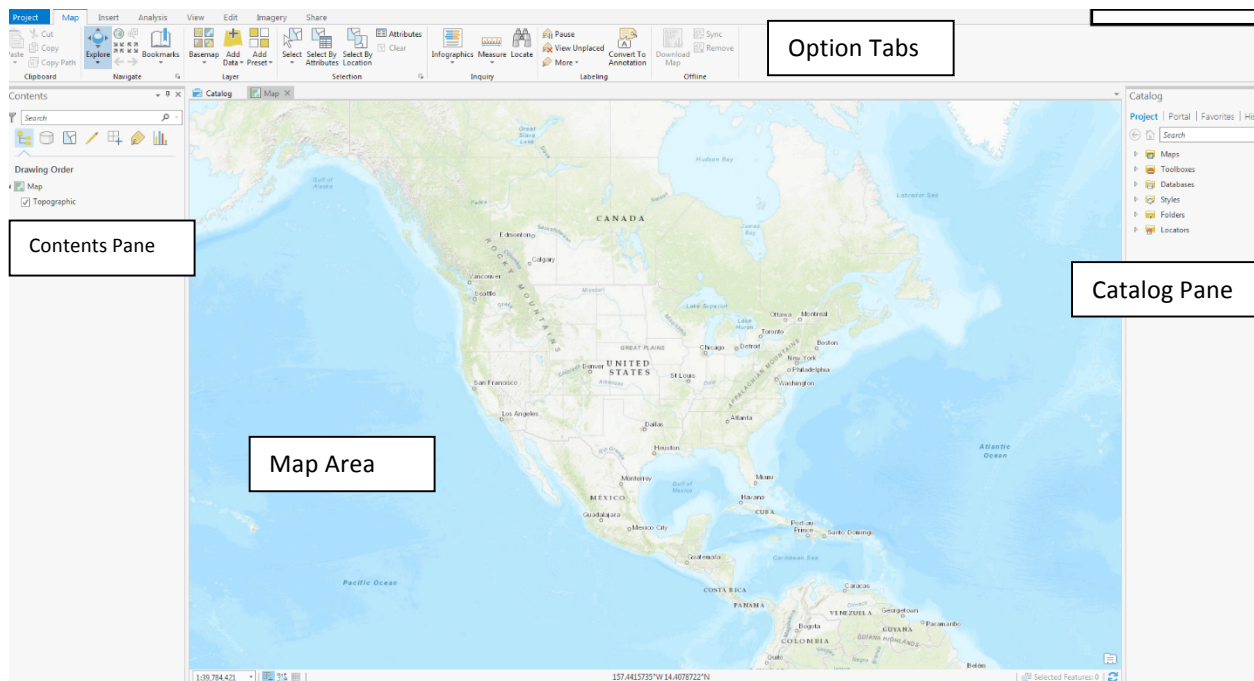
Local Scene – Local 3D scene (small area with 3D capabilities)

Global Scene – Global 3D scene (View of the earth as a globe)

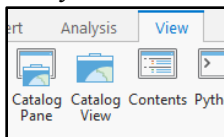
Map – 2D map

- Click on the Map.aprx template to create a 2D map.
- For Name enter Lab1, for Location click on the browse button and navigate to your GIS_Exercises folder, select it (do not double click on the folder). Make sure the “Create a new folder for this project” box is checked and then click OK. The project will be created.

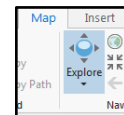
- The main parts of the project are:




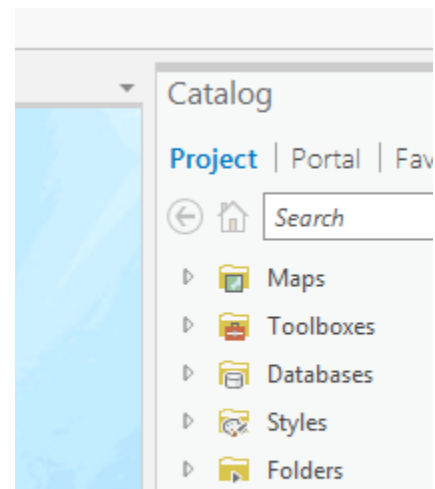
- You will notice ArcGIS Pro has an interface that looks very much like the Office applications with different tabs on top where you access the main functionality of the program.
- If any of the Contents or Catalog panes are not visible, these can be activated using the View option tab



- If you put your mouse over any of the buttons, you will get a pop-up explaining what the button does. Put your mouse over the Explore button on the Map option tab. Read the description of the button.



- Click on the Bookmarks button  and choose New Bookmark. On the Create Bookmark window, type USA for Name and click Ok.
- Click again on the Explore button to make sure it is selected.
- Left-click on the center of the map and hold the button down. Move the mouse to the left to move the map. To continue moving the map release and move again until you center it over China. Notice that at the bottom of the map you can see the geographic coordinates of the location of the mouse pointer.
- Click on the Bookmarks button again and click on USA under Map Bookmarks. The map returns to the original location where you marked the bookmark.
- On the Catalog Pane on the right, click on the Project tab if necessary.



- There are different shortcuts that were automatically created that summarize all the parts of your project. Expand the Maps, Databases, and Folders shortcuts. These are the three main ones.
- The Maps shortcut contain the different maps part of your project. There can be more than 1 map for each project.
- The Databases shortcuts has 1 or 2 databases that were automatically created for your project.
- The Folders shortcut contains connections to folders with data that you want to have direct access within your project.
- We will create a folder connection to the Exercise 1 data you downloaded. Right-click the Folders shortcut, then click on Add Folder Connection. Browse to and select the Exercise 1 folder and click OK. The folder should automatically appear under the Folders shortcut. Folder connections are useful to have access to data without the need to be browsing to folders.

1. Expand your exercises folder and then expand the Exercise 1 folder.

How many files do you see? _____

What are their names? _____

Open a My Computer window and navigate to your Exercise 1 folder.

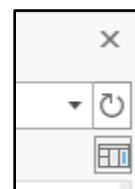
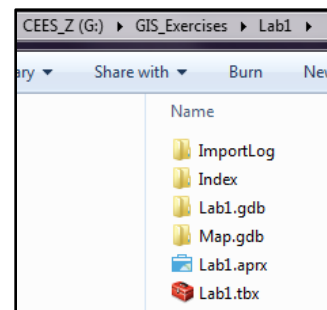
How many files are there in this folder? _____

How many files are named Texas Counties? _____

What are the different extensions or file extension of these files? e.g. .dbf

If you try to move files using copy, paste in Windows you might corrupt the files. Copies of GIS files should always be made within ArcGIS Pro.

- Now in Windows explorer go the Folder that was automatically created for your project (e.g F:\GIS_Exercises > Lab1)
- You will see a series of folders and files that area meaningless to Windows. They should never be manually modified. However, you can create other folder and files inside the project folders. We will create copies of the Exercise 1 data. Right-click on any empty area of the Lab1 folder, point to New > Folder and name it Data Copy
- Return to ArcGIS Pro and create a folder connection to this new folder. If the new folder does not appear in the Add Folder Connection, click on the Refresh button on the upper right corner of the window
- Expand both the Data Copy and Exercise_1 folders. Right-click the Major Rivers file under the Exercise_1 folder and click Copy. Right-click on the Data Copy folder and click Paste.

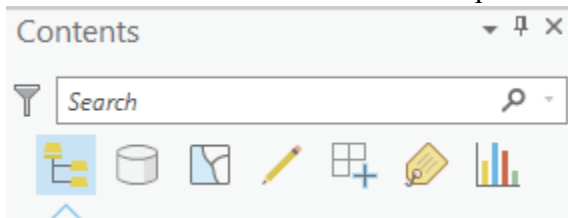



- Open the Data Copy folder inside the Lab1 folder in Windows explorer.

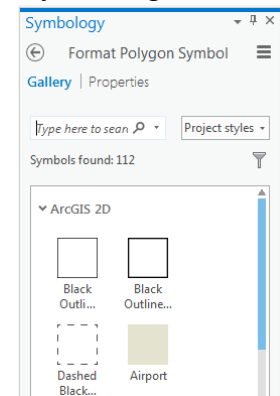
2. How many files are there in this folder? _____

This is the correct way to copy GIS files. The software will automatically copy all necessary files for GIS file to work properly.

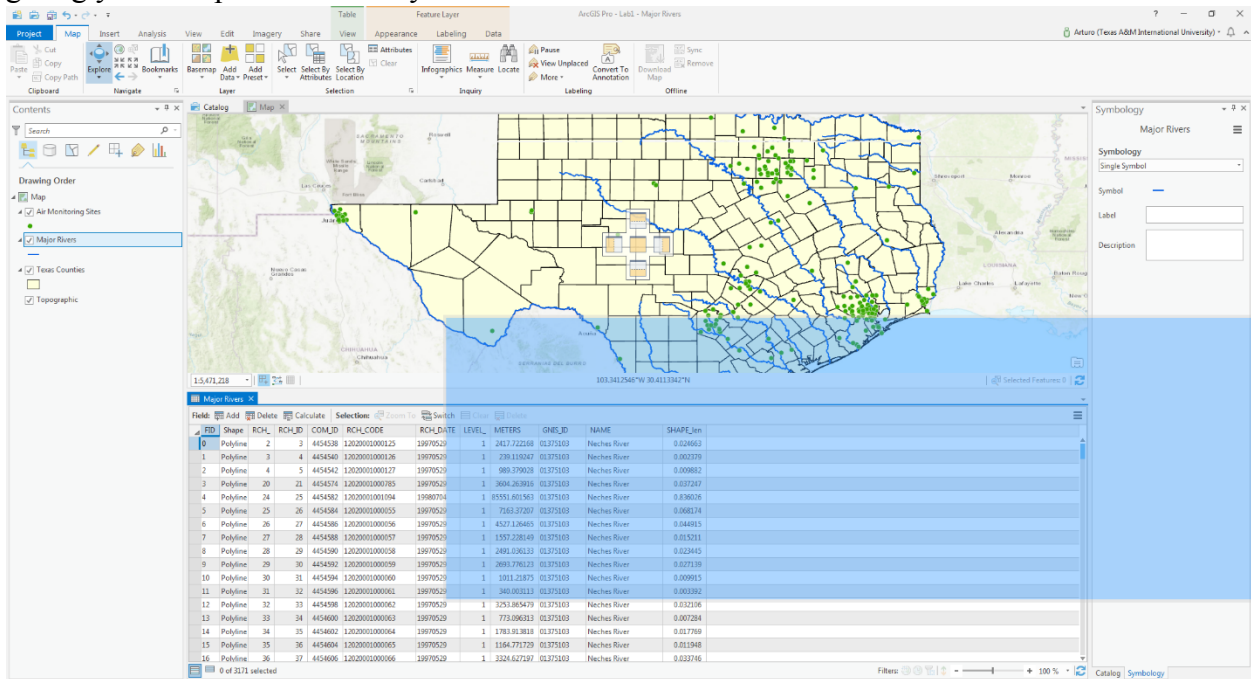
- On the Catalog pane left-click on the Texas Counties.shp file and while holding down the button drag the file onto the map area and release the mouse button. The map will automatically zoom to the extent of the file you added. You can add data to the map in this way or by using the Add Data button on the Map tab. Now add the other 2 files from the Exercise 1 folder. Once a file is added to the map, we will call them layers.
- Under the Contents pane there are several options to view the layers of the map. Put the mouse over each of the icons to see a description of how the view of the layers changes with each one.



- Using the List by Drawing option click on the Texas Counties layer and by holding the mouse button drag it to the top of the other 2 layer. (NOTE: If you click once without holding the mouse button, this will make the name of the layer editable. You have to click any other area to cancel the edit and be able to move the layer). Notice how it hides the other monitoring stations and rivers. Sometimes you will wonder why you cannot see a layer. Always check the order of drawing. Return the counties to the bottom.
- Click on the square under the Counties layer (it matches the color of the counties on the map). This opens the Symbology pane as a tab next to the Catalog tab on the right of the map.
- Click on the box next to symbol. And choose the symbol named Land. The color changes but you cannot see the outline of each of the counties. On the Symbology pane, click on Properties (next to Gallery highlighted in blue).
- The outline color is set to black but the width is set to zero. Change it to 1 and click on Apply at the bottom of the pane.
- Change the monitoring stations symbol to a green size of 6 and the rivers to a blue with a width of 1.5. Make sure to click apply after each change.
- Click Save  at this point to make sure all changes are saved. Remember to continuously save your map so that you don't have to go back and repeat steps.
- Right-click on the rivers layer and click on Attribute Table. The attribute table is information related to each one of the features on the map. Each row on the table corresponds to one feature on the map. Usually, when you open an attribute table it appears docked at the bottom of the



map area. However, it can be undocked and leave it floating, or docked to other areas of the ArcGIS Pro window by clicking on its name and dragging it to any area. A symbol will appear giving you the option of where you want it to be docked.



- We will work with the table docked at the bottom to have a view of the map area. If you open multiple attribute tables, they sometimes will appear in the same area as tabs and other times they will appear in a separate window and block your view of the map area. You can close tables by clicking on the X on the right of the tab name or you can always rearrange them by dragging them and combining them as explained above.
- Right-click on the field called Name and click on the Fields option from the pop-up menu. This will open a separate tab giving you information for each of the fields of the table.

3. What is the Data Type of the field Name? _____

Length _____

- Close the Fields: Major Rivers window
- Right-click the Name field again and notice you can sort data based on that field.

4. What is the name of the first and last river if you sort in ascending order?

Answer the following questions using the appropriate attribute table:

(Check all field names and sort as necessary)

5. What is the name and size of the largest county in Texas by square miles (SqMiGLO)?

6. What is the air quality station at the highest elevation?

7. How many air quality stations are there in Mexico and in what city are they located?

8. Make sure the Explore tool is active on the Map tab. Click on the upper-most, right-most county of Texas to get the following information. (Close any tables and move the map if necessary)

Name _____

County Seat _____

County FIPS _____


Square Miles _____

Clicking on a feature on the map with the Explore tool gives you the feature information stored in the attribute table.

- Close the information box.

9. How many records are there in the Major Rivers layer? (Hint: Check at the bottom of the attribute table)

This dataset was developed using criteria that would not be necessary if you are just looking for a simplified representation of the major rivers in Texas. As mentioned earlier, each record on the table represents a feature on the map. Sort the table by name in ascending order.

- Find the first instance of Rio Grande and right-click on the square at the beginning of row to the left of the FID field. Click Zoom To from the Pop-up menu. You should see a highlighted portion of Rio Grande on the map and the record on the table is highlighted as well.
- From the Map tab in the Selection group, click on the Clear  Clear button to deselect the record and feature. Close the attribute table.
- Right-click the Texas Counties layer and click on Zoom To Layer from the pop-up menu. This brings your map the geographic extent of the layer.

What if you want this dataset but you don't want to have thousands of features on the map but only one line per river that you want to label? We will see a quick introduction to the geoprocessing capabilities of ArcGIS.



- Click on the Analysis tab and then click on the Tools button. This opens the Geoprocessing pane on the right side of the window along with the Catalog and Symbology panes. Save your Map!
- In the Find Tools search window type "dissolve". Automatically you will get geoprocessing tools that match your search criteria. Click on Dissolve (Data Management Tools).
- The Dissolve tool window opens in the same Geoprocessing pane. Click on the drop down arrow for Input Features and select Major Rivers. Notice the Output Feature Class automatically gets a default name (MajorRivers_Dissolve). We will leave the default for now, but in later exercises we will be giving more meaningful names to outputs from geoprocessing tools.
- Click in the automatically generated name to be able to see the full path of the output layer.

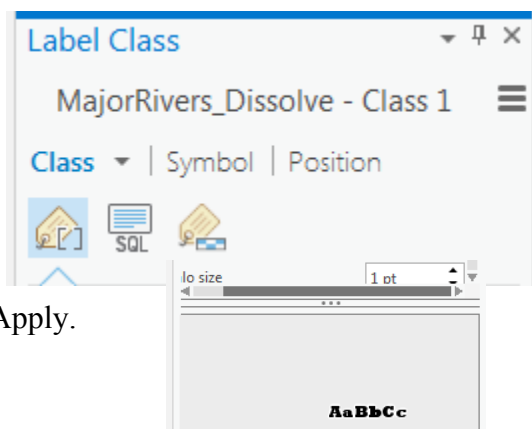
10. What is the full path? _____



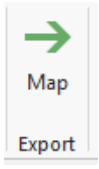
Output layers are automatically placed in the project default database. Later in the course we will learn about databases.

- Click on the Dissolve_Field(s) drop down arrow. You will see a list of all the fields from the attribute table that you can use to dissolve the layer. Dissolving in this case means we want to combine all features that share the same value for that field. Since we want to create a single feature for each river, in this case we want to select NAME. Click Run at the bottom of the Dissolve tool.
- When the tool finishes running the new layer will be automatically added to the map.
- Open the attribute table of the new layer.

11. How many records are there in this new layer? _____

- Select the Rio Grande record. Move the map if necessary so that you can see now the whole Rio Grande line is selected.
- Clear the selection using the Clear button in the Map tab. Close the attribute table.
- Remove the Major Rivers layer by right-clicking the layer and selecting Remove.
- Zoom to the extent of the Counties layer.
- Right-click the MajorRivers_Dissolve layer and click on Labeling Properties. This will open the Labeling pane on the right side. There are 3 sections: Class, Symbol, Position.
- Under the Class section, change Language to Python. Make sure the Expression contains [NAME]. If it contains something else or if it's empty, first delete any contents, double click NAME under Fields. Click Apply.



- Click on the Symbol section under Appearance. For Font name choose Rockwell Extra Bold (there is a scroll bar above the preview area in case the drop down arrows are not visible).
- Select Size 10. Scroll down to the Halo category and expand it. In the Halo symbol select the white color. Click Apply.
- Click on the Position Section. Under the Position  button, expand the Placement category and select River placement.
- Under the Conflict resolution  button expand Remove duplicate labels. Select Remove all.
- Right-click the rivers layer again (if you get a message asking to commit changes click OK) and click on Label. This will place labels for the rivers on the map.
- Save your map.
- Click on the Share tab, and then click on Map on the Export  group.
- Save the map as a JPEG in your Lab1 project folder as Lab1 Map.
- Open the image from the Lab1 folder. You might notice that some areas of the map were cropped. Later in the course, we will learn how to create map layouts to create more professional maps.

BIOL 4460/5460 and GEOL 4460 Introduction to GIS
ASSIGNMENT 1 – ANSWER SHEET

Name: _____

1. How many files do you see? _____

What are their names? _____

How many files are there in this folder? _____

How many files are named Texas Counties? _____

What are the different extensions or file extension of these files? e.g. .dbf

2. How many files are there in this folder? _____

3. What is the Data Type of the field Name? _____

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4. What is the name of the first and last river if you sort in ascending order?

5. What is the name and size of the largest county in Texas by square miles (SqMiGLO)?

6. What is the air quality station at the highest elevation?

7. How many air quality stations are there in Mexico and in what city are they located?

8.

Name _____ County Seat _____

County FIPS _____ Square Miles _____

9. How many records are there in the Major Rivers layer? _____

10. What is the full path? _____

11. How many records are there in this new layer? _____