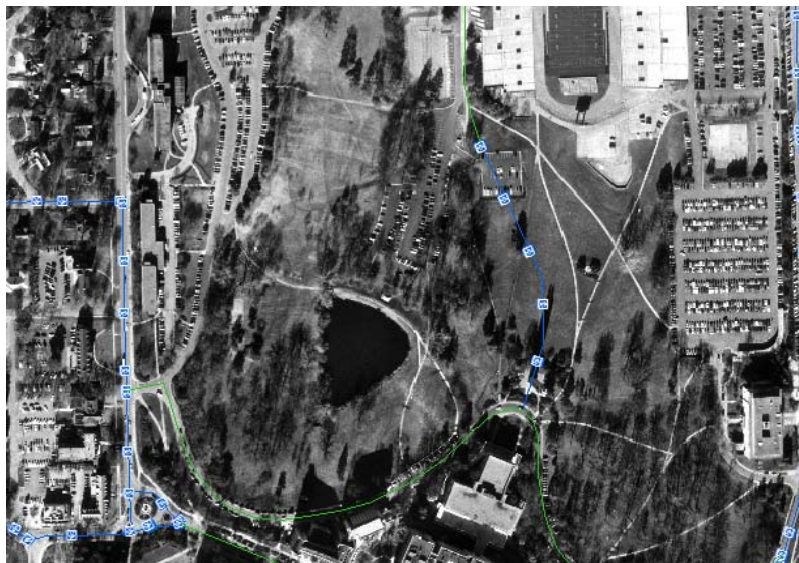


GIS I: ArcMap Power Hour

Fall 2006 Workshop



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www.ku.edu/~adrsa/

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Introduction

This workshop is essentially the same as ArcMap Introduction, except compressed into one quick and dirty hands-on session. It is designed for those with ‘more than basic’ computing skills, limited time, or those wanting a fast-paced experience with spatial data and software. Participants may also be interested in attending: *GIS I: Finding GIS Data on the Web* and *GIS II: Mapping Your Data*.

Objectives

- Add and remove data in ArcMap
- Navigate (zoom, pan, etc.)
- Learn about format of geographic data
- Turn layers off and on
- Change layer order
- Display data by particular attributes
- Label features
- Use Identify tool
- Save work as map document
- Set view projection
- Set display/ distance units
- Measure distances
- Select a record from the attribute table, manually and by performing a query
- Select features by location/ relationship to features in other layers

More Information

All workshops offered through Information Services are free to KU students, staff, faculty, and approved affiliates. To learn more about or register for workshops, receive announcements of upcoming workshops, and track workshops you attend, visit the KU Libraries Instruction Web site at www.lib.ku.edu/instruction.

Upcoming GIS Workshops (: <http://www2.ku.edu/~workshops>)

- o **GIS I: Empower Hour**, Aug. 21
- o **GIS I: Finding GIS Data on the Web**, Aug. 23, Oct. 26

- o **GIS II: Mapping Your Data**, Aug. 25, Oct. 31

The datasets that accompany ArcGIS, or 'ESRI Data and Maps' are now available online at http://gis.lib.ku.edu/esri_data_maps.shtml. The PDF software manuals, or 'ESRI Digital Books' are also available via the Web at http://gis.lib.ku.edu/esri_dig_books.shtml.

Additional Help

Online Tutorials- Learn GIS at your own pace through virtual tutorials. ESRI online tutorials are available free to KU-affiliates and can be used by individuals or classes. See a list of courses at: www.kars.ku.edu/user/vc_courses.shtml and email or call (data@ku.edu, mickey@ku.edu or 864-1238, 864-0454) to register for one or more.

GIS and Data Lab - 105 Anschutz Library

Hours (while KU is in session): Mon-Thurs **9AM-8PM**, Fri **9AM-5PM**, Sat/Sun **1PM-5PM**

Contact: data@ku.edu or 864-1238 (Rhonda Houser), 864-7777 (Mickey Waxman)


More information: www.lib.ku.edu/gis



Copy Workshop Data

- To copy workshop data from network drive to hard drive, click on Start (button) → Programs → ArcGIS → Data
- Click once on the folder called **gis1**
- Under **File and Folder Tasks**, choose '**Copy this folder**'
- Make sure **c:\wutemp** is selected as file destination
- Click on '**Copy**'






Explore ArcMap

- Click on Start Menu → Programs → ArcGIS → **ArcMap**

ArcGIS is a suite of software that includes  **ArcCatalog**,  **ArcMap**, and  **ArcToolbox**, among other modules. ArcCatalog is for data management; ArcMap is primarily for displaying and working with data, and ArcToolbox is for data conversion and manipulation.

- Click OK to start in ArcMap with a new empty map (if message appears)
- Maximize ArcMap (click on  middle button, top right corner)
- Find your toolbar 

Add Aerial Photos (below) **OR use Orthophotos via IMS** (jump to bottom pg. 4)

- Click on the 'Add Data' button  to bring data layers into ArcMap
- Navigate to: **c:\ wutempl\ gis1**
- Hold down the **Ctrl** key while clicking on (selecting) each of the following aerial photos (raster datasets) to add them all at once: **121925.sid, 121936.sid, 122030.sid, 122031.sid**
- Click on 'Add'
- Click 'OK' for any messages that appear about building pyramids or about spatial reference
- Double-click on the photo name in the table of contents
- Click on the **Source** tab, and scroll down to note the lack of coordinate system information. The photo may be in a particular geographic projection or coordinate system, but this reference information was not recorded in the dataset, and so does not appear on the **Source** tab.
- Click Cancel
- Click on 'Full Extent' button  to see entire area covered by the air photos
- Click on the 'Precise Zoom In' tool  then click, hold and drag a box around an area on the map that you want to see closer
- To deactivate current tool being used or switch to another tool, click on the Select Elements button  (default tool or cursor) or click on another tool
- Click on the 'Previous Extent' button  to return to the last zoom
- Find Jayhawk Boulevard, Strong Hall, South Park, or where you work or live on campus
- Click on the 'Window' menu and choose 'Magnifier' to bring up a magnification window
- Move the window by clicking/ dragging the top blue bar
- To change magnification level, right-click on the blue bar and choose 'Properties'
- Close the 'Magnifier' window
- Turn one air photo **on** or **off** by clicking in the box next to the layer title (to remove checkmark)
- Turn all layers **on** (make them draw)

OR Add orthophotos through an IMS

You can also use orthophotos through an internet mapping service (IMS). An IMS allows you to use data via the web, instead of downloading and using from your computer. The KS GIS clearinghouse, or DASC, makes imagery and raster data available through IMSs at:


<http://www.kansasgis.org/catalog/catalog.cfm>. For the 2002 County Orthophotos, directions are provided for connecting to the IMS.





- In ArcCatalog's left-hand listing of drives/folders, click on the plus sign to select **GIS Servers**, then select **Add ArcIMS Server**

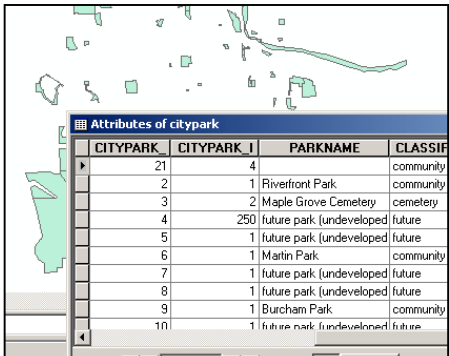
- Copy the data server URL (<http://maps.kansasgis.org>) into the box provided
- Expand maps.kansasgis.org and scroll down to the **kgcc_Imagery** map service
- Drag it into ArcMap to the left-hand listing of layers (table of contents)
- In ArcMap, expand this layer and check the boxes next to 'kgcc_Imagery' and 'View Aerials 2002'
- Hit the Refresh button at bottom (chasing arrows) if imagery does not draw or only partially displays.

Add Vector Data


- Click on the 'Add Data' button  to bring in more layers (you can also right-click anywhere in the mapping view to add data)
- Navigate to: **c:\ wutemp\ gis1**
- Select the vector layer for schools (represented by points): **LawrenceSchools.shp**
- Click on 'Add'
- Right-click on layer title and choose 'Zoom to Layer'
- Turn this layer on if needed
- Repeat this process to add and look at the following layers:
 - BikePaths.shp** (bike paths represented by lines)
 - NeighAssn.shp** (neighborhood associations represented by polygons)
 - Parks.shp** (parks represented by polygons)
 - Streets.shp** (streets represented by lines)

Data are layered one on top of the other in the view (stacked out toward you), according to their order in table of contents (left-hand listing of data layers). Most recent layers added will be on top, with point layers over line layers and line layers over polygon layers. Change layer order by clicking and dragging a layer on top or below another in the table of contents.

- Click on the 'Pan' tool  then click, hold and drag map to move (or use scroll bars)
- Click on 'Identify' tool . This tool brings up associated attribute information for a feature (point, line or polygon) that you click on. By default, **information is shown for the top layer**.
- Choose **parks** as the target layer and click inside one to see table information.
- Close the 'Identify' tool window.
- Remove **neighborhood association** layer: right-click on layer title and choose '**Remove**' (this does not delete data from hard disk)
- Add layer back in



| CITYPARK | CITYPARK_1 | PARKNAME | CLASSIF |
|----------|------------|---------------------------|-----------|
| 21 | 4 | | community |
| 2 | 1 | Riverfront Park | community |
| 3 | 2 | Maple Grove Cemetery | cemeley |
| 4 | 250 | future park (undeveloped) | future |
| 5 | 1 | future park (undeveloped) | future |
| 6 | 1 | Martin Park | community |
| 7 | 1 | future park (undeveloped) | future |
| 8 | 1 | future park (undeveloped) | future |
| 9 | 1 | Burcham Park | community |
| 10 | 1 | future park (undeveloped) | future |

- Right-click on **parks** layer to select, and choose 'Open Attribute Table' to view tabular data
- Close the parks attribute table
- Click on 'Full Extent' button  to see total area covered by data layers

Change How Data Display


ArcMap applies a **default display scheme** to data layers (i.e. the colors, classes and patterns used to display data). These **settings are dynamic** and can be changed so that data are displayed using the information in the attribute table or with a certain color, line thickness, or particular symbol.

- Turn off (uncheck box for) every other vector layer except the one being edited below so changes are apparent. Leave aerial photos (raster data) on as a base map.

Schools, Streets and Neighborhood Layers

- Zoom to the extent of the **schools** layer (right-click)
- Double-click on the title (next to check box) of this layer in the table of contents, to bring up the 'Layer Properties' window
- Click on each tab in turn to see properties and information provided
- On the **Symbology** tab, click on the box near 'Symbol'
- Select 'Features' and 'Single Symbol'
- Select one of the formatted symbols or create a custom symbol under 'Options'
- Click OK and OK again
- Repeat this process for **Streets** and **Neighborhood Associations**

Label Streets

- Right-click on the **streets** layer title and choose 'Label features' (field used for labels can be changed in properties, on the **Labels** tab)
- Click on 'Fixed Zoom In' tool  to zoom in (closer) at regular intervals and notice what happens to street names as you zoom closer?
- Turn labels off (right-click on layer) if they are slow to draw

Bike Paths and Park Layers

- Zoom to the extent of the **Parks** layer (right-click)
- Double-click on the title (next to check box) of this layer in the table of contents, to bring up the 'Layer Properties' window
- Click on each tab in turn to see properties and information provided
- On the **Symbology** tab, select 'Categories' and 'Unique Values'
- Under 'Value Field,' choose 'CLASSIFICATION' and click 'Add All Values'
- Change color scheme or individual colors (by clicking on each symbol)
- Click OK
- Repeat this process for **Bike Paths**, using the 'STATUS' field
- Go back to properties for **Parks**
- Click on the **Display** tab and change the percent transparent value (40-60%), so you can see underlying air photos

- Click OK

Save Settings and Data as One File


- Choose File → Save As and save map document in **c:\wutemp**

You can save existing data, settings, display schemes, etc. as **ONE** file. Map document files end with .mxd and do not store actual data layers, but references to those layers and settings for data and the data frame.

- As you work, choose **File → Save** to save changes

Compare View Projections

- Choose **View → Data Frame Properties** (or right-click in the View)
- Click on the **Coordinate System** tab and in the 'Select a Coordinate System' box choose: Predefined → Projected Coordinate Systems → State Plane → NAD 1983 (feet) **NAD 1983 StatePlane Kansas North FIPS 1501 (Feet)**
- Click OK
- Choose **View → Data Frame Properties** again
- On the **General** tab, change Display Units to **Meters**
- Click OK
- Find and zoom into Burcham Park (near the river)

- Click on the  Measure Tool to measure the west (left) perimeter of this park from SW to NW side
- Click and drag to start measuring; double-click to stop
- Distance is simultaneously displayed at the bottom left of the data frame
- Write down the total distance _____ m (State Plane)

- Choose **View → Data Frame Properties**
- On the **Coordinate System** tab, in the 'Select a Coordinate System' box choose: Predefined → Projected Coordinate Systems → UTM → NAD 1983 → **NAD 1983 UTM Zone 14N**
- Click OK
- Zoom into Burcham Park again if necessary




- Use the Measure Tool again to measure the same side of the park
- Write down the total distance _____ m (UTM)

Projections affect **distance, area, direction or shape** (or a combination of these). Depending on the scope and scale of a dataset or project and level of accuracy required, using different projections might clearly make a difference in distance (or other parameters).

How wide is the Kansas River at the downtown bridge?

How long is the path that loops around the 'Train Park' at 6th and Kentucky streets?

What is the real name of this park? (use  Identify tool)

- Change the projection back to Kansas State Plane North by following the directions at the beginning of this section

Find 'community' parks

- Choose Selection → Clear Selected Features to clear any previously highlighted features
- Open the attribute table of the **Parks** layer (right-click on layer)
- Hit the 'Options' button and choose '**Select by Attributes**'
- Use the 'Create a new selection' method
- **Double-click** on field name (CLASSIFICATION); **Single-click** on operator (=)
- Click 'Get Unique Value' button to display values from the table
- **Double-click** on field value (community) to complete the equation: "CLASSIFICATION" = 'community'
- Click on 'Apply' and 'Close' to see selected parks

Community parks are highlighted in the table (note number of records selected at bottom)

- Close the table to see the community parks highlighted
- Clear selected features (parks); choose Selection → Clear Selected Features

Create new layer for public schools

- Now use the same methodology to determine **how many private schools** are in Lawrence, and where they are. Use the **Schools** layer and select by attribute from the Selection menu in the mapping (not table) view.
- All private schools should now be selected (highlighted); open the attribute table, click the 'Options' button and choose 'Switch Selection' to highlight public schools
- Close the table
- Right-click on the **schools** layer and choose **Data → Export Data**
- Export **selected features** using the **same coordinate system as the layer's source data** and save in c:\temp


- Choose **Yes** to add the new layer, and check the table to confirm it contains only public schools

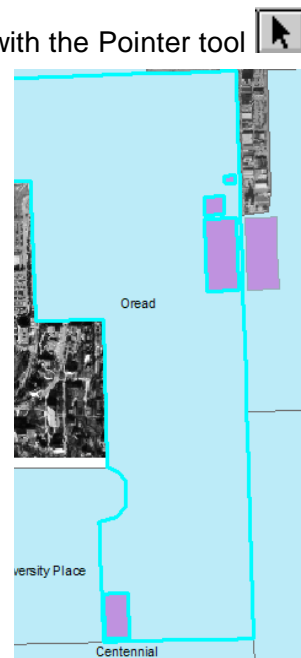
Find parks in Oread neighborhood

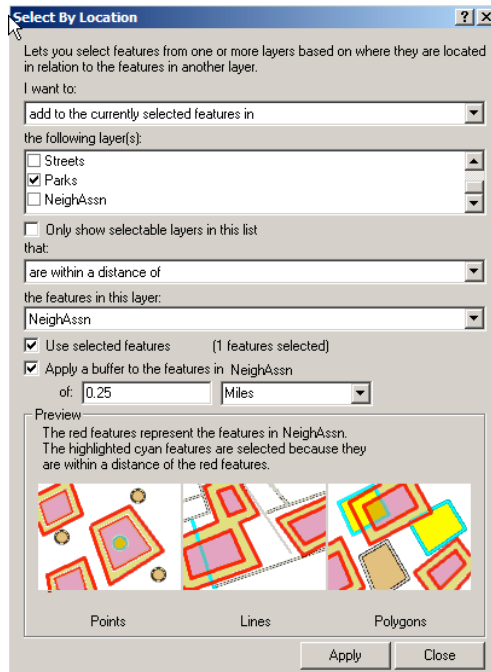
Label neighborhood associations

- Turn off all layers except **neighborhoods** and **parks**
- Drag the **parks** layer above the **neighborhoods** layer so it displays on top
- To set the field (or column heading from attribute table) used to label features, double-click on the **neighborhood** layer title to bring up 'Layer Properties'
- Click on **Labels** tab and choose **LABEL** in the drop-down box for Label Field
- Click OK
- Right click on the **neighborhood** layer title and choose **Label Features**

Highlight 'Oread' neighborhood

- Right-click on **neighborhood** layer and choose 'Open Attribute Table'
- Right-click on the 'neighborhood' column name and choose 'Sort Ascending' to alphabetize names
- Select '**Oread..**' by clicking on the arrow at the far left of this record with the Pointer tool 
- Close the table
- Zoom in to the Oread neighborhood; right-click on layer and choose Selection → Zoom to Selected Features
- Choose **Selection → Select by Location** (select by relationship to features in other layers)
- Complete the phrase:
I want to: **select features from**
the following layers: **Parks**
that: **are completely within**
the features in this layer: **NeighAssn**
- Make sure the **boxes are checked** next to 'Use selected features'
- Hit Apply and Close
- Go through the 'Select by Location' process again to find out how many and **which parks are within a quarter-mile** of the Oread NA (choose 'add to currently selected features' in first dropdown window) to find additional parks





Note: Please complete a workshop evaluation. An online evaluation is linked from the internet browser 'Favorites' menu.

Definitions

| Term | Definition |
|---|---|
| geographic information systems (GIS) | system comprised of spatial data and software in which user can display and manipulate layers of information representing real world features and their actual geographic location. |
| latitude and longitude | spherical reference system used to measure locations on Earth's surface; latitude measures angles in a north-south direction; longitude measures angles in the east-west direction (from www.esri.com). |
| map projections | describe ways to represent areas on the Earth's surface (three-dimensional) on a flat surface such as a map; imagine trying to wrap a piece of paper around a globe; all projections distort shape, area, distance or direction to some extent. |
| map scale | dimensions of a map compared to the dimensions of the Earth, usually expressed as a ratio between a distance on the map and a distance on the Earth; for instance, a scale of 1:24,000 means 1 unit of distance on the map equals 24,000 units on the ground. |

| | |
|-----------------|--|
| pyramids | give original data several levels of resolution to speed display of large raster data files; a lower resolution copy of the data displays quickly when drawing the entire dataset; levels with finer resolutions draw as user zooms closer (www.esri.com). |
| raster | type of spatial data in which features are represented by cells (or pixels) with same value and cells are organized in a grid of rows and columns; raster format is appropriate for data that vary continuously over space such as elevation; images and grids are types of raster data. |
| vector | type of spatial data in which features are represented by points, lines or polygons; coordinate-based structure (XY or latitude-longitude) commonly used to represent linear features; coverages and shapefiles are types of vector data. |

Last Update: 09/07/2006