Syllabus: Intro to GIS (Spring, 2016)

Version 1 – Pre-Class

You Will Make Many Maps!

Introduction to GIS will present a methodical review of the capabilities of Esri software for Geographic Information Systems (GIS). Students will use ArcMap, ArcCatalog, ArcGIS Online, Collector, and other ArcGIS software components to conduct practical hands-on exercises in a guided week-by-week sequence.

While learning practical GIS skills and software tools, the class will include background lectures and theory readings to provide context for the acquisition of practical software skills. This class is designed to provide pre-requisite skills for students intending to proceed with Advanced GIS in the future and exploit many types of geographic information for thesis research and field studies.

Students will undertake their own practical exercise in field data collection using smartphone technology and the Collector for ArcGIS software. This exercise is designed as a practical introduction to the type of field work tools often used in environmental science research and citizen science applications of GIS.

Challenge exercises will stimulate creative thinking about places and people, landscapes and oceans, human and built places, and managed lands and parks, and more.

Textbooks

The textbooks for the class include both a skills guide and a project workbook:

- Esri ArcGIS Desktop Associate Certification Study Guide (by Miriam Schmidts) http://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=236

The study guide provides a succinct outline of skills and foundation knowledge about the detailed workings of ArcGIS for Desktop software. The book comes with a database and provides short guided exercises that use practical demonstrations to help students learn key skills.

- Understanding GIS – An ArcGIS Project Workbook (Edition 2) http://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=238&moduleID=0

The project workbook provides a broad and comprehensive set of cumulative exercises that help develop a highly complete set of ArcMap skills. The exercises are "click through" – every step is illustrated and the student that follows all the steps gets to the intended endpoint for each exercise fairly inevitably.

Challenge Exercises

A variety of exercises complement the Understanding GIS textbook program. These exercises draw from "real life" workflows that are commonly encountered by GIS practitioners.

As the quarter progresses, these "challenges" rely on problem solving creativity and rely less on "click-through" instructions.

Week by Week

Pre-Class

Read Chapter 1 in Certification Study Guide ("ArcGIS Products and Extensions") Fill in the Personal Interest questionnaire (using Canvas) Read the *Maps in the News* Discussion on Canvas Prepare to discuss one of the three articles during the first class meeting (Week 1).

Week 1 - Introduction to GIS

Lecture: Introduction to Geographic Information Platform Discussion: Maps in the News Practicum: Basics of Data Management (ArcCatalog) In-Class Exercise: Connect to Data Stores, Create "States" Map UGIS: Chapter 1 – "Frame the Problem" Reading - CERT: Chapter 20 (Map Layouts)

Week 2 - Geospatial Information Production

Lecture: Types and Scales of Spatial Information Discussion: Maps in the News Practicum: ArcMap Layout and Export Tools Demo: Introduction to ArcGIS Online Mapping and Map Stories Practicum: Login to ArcGIS Online with your Evergreen Credentials In-Class Exercise: Create Layout for "States" Map and Export PDF into Canvas UGIS: Chapter 2 – "Preview the Data" Reading - CERT: Chapters 5 (Coordinate Systems) and 6 (Data Evaluation)

Week 3 - Coordinate Systems Principles

Lecture: Managing Coordinate Systems in ArcMap Practicum: Adding a Feature Class into a File Geodatabase Practicum: Projection Examples and the "First Feature Class" rule in ArcMap In-Class Exercise: Publish the "States" Map Package and Upload to Canvas In-Class Exercise: Learning GIS Section 1 (ArcGIS Online) UGIS: Chapter 3 – "Choose the Data" Reading - CERT: Chapter 3 (Geodatabase) and Chap 8 (Georeferencing)

Week 4 - Geodatabase Principles and Editing

Lecture: Data Formats for Spatial Features and Attributes Practicum: ArcCatalog Tools for Creating a Feature Class Practicum: Editing Features and Calculating Fields In-Class Exercise: Learning GIS Section 2 (ArcGIS Online) UGIS: Chapter 4 – "Build the Database" (ArcCatalog) Reading - CERT: Chapter 10 (Creating Feature Geometry) Prep for Quiz on Coordinate Systems, Week 5

Week 5 - Mobile GIS

Quiz: Coordinate Systems (30 minutes)
In-Class Exercise: Field Data with Collector for ArcGIS on a Smartphone
In-Class Exercise: Learning GIS Section 3 (ArcGIS Online)
UGIS: Chapter 5 – "Edit the Data"
Reading - CERT: Chapter 11 (Updating Feature Geometry)
Project Assignment: Create a Field Data Collector of Your Own Design
(Optional: Collecting Invasive Species in LBA Woods - Field Data Collection Exercise)

Week 6 - Analysis (1) SELECT, JOIN, and RELATE

Lecture: Basic Spatial Analysis Practicum: Powers of Selection In-Class Exercise: Georeferencing an Image – Make Data from Nothing In-Class Exercise: Learning GIS Section 4 (ArcGIS Online) UGIS: Chapter 6 – "Conduct the Analysis" Reading - CERT: Chapter 18 ("Layers")

Week 7 - Analysis (2) Spatial Operators

Lecture: Buffer, Dissolve, Summarize Practicum: Geoprocessing Tools on Desktop In-Class Exercise: State Legislative Districts Maps In-Class Exercise: Learning GIS Section 5 (ArcGIS Online) ArcGIS Online: Publishing maps in Geoduck.maps.arcgis.com UGIS: Chapter 8 – "Present Analysis Results" (for 2 weeks) Reading - CERT: Chapter 19 ("Layer Display")

Week 8 - Online Map Production

Lecture: App Publishing Practicum: Making a Web App UGIS: Continue UGIS Chapter 8 Exercise ArcGIS Online: Learning GIS 4-5 Homework: Yale's Climate Opinion Database (JOIN and analysis) No Reading

Week 9 - Time in the Geodatabase

Lecture: Temporal GIS Practicum: Desktop and ArcGIS Online - Time Demonstrations In-Class Exercise: Mapping Elephant Movements in Tarangire National Park Yale Climate Opinion Maps and Mobile Data Collection, Continued No Reading

Week 10 - Student Presentations

Exam: Analysis Methods Students will present their Mobile GIS results and Climate Change Opinion maps. Practicum: Excel for Office – Maps in a Spreadsheet (in class – no homework) No Reading

"Week 11": - Evaluations

Scheduled Student Assessment Conferences

- Required for students continuing to Advanced GIS
- Optional but recommended for all students

By the way ...

Are you interested in a short summer class (in planning stage) concerning GIS and mapping for elevation?

Currently proposed as an intensive weekend class for two credits, summer 2016.

Learn about elevation data, landscape modeling, and Lidar applications.

Details to follow ...