

## Introduction to GIS – NRC585

Lecture: Thurs. 1:00 - 2:15

Holdsworth 308

Lab: Fri 10:10-1:10 or 1:25-4:25

Morrill III 212

### *Instructor*

Bethany Bradley

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### *Teaching Assistant*

Tyler Cross

Office Hours: by appointment

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Website: <http://people.umass.edu/bethanyb/gis.html>

Course Objective: To provide an understanding of the basic concepts and uses of GIS technology and spatial analysis.

Course Description: Geographic Information Science (GIS) is the science of linking data to locations to explore spatial relationships. GIS is way more than just maps. By evaluating the relationship between different spatial information you can identify the best location for new development, locate pollution point sources, find the easiest way to get from point A to point B, and develop a better understanding of the way the world interacts. The goals of this course are to teach you basic GIS concepts such as spatial data sources and structures, projections and coordinate systems, data editing and creation, and geospatial analysis.

***Required materials:*** *There is no required textbook. However, there is a coursepack available on LuLu at <http://tinyurl.com/og4rb8e> which includes a bound copy of all the lab materials (plus some bonus materials) if you prefer a hard copy to digital pdfs. You will need a USB storage drive for this class with at least 4 GB of storage. You will also need to print your final poster.*

## Grades

Assignment	Due Date(s)	Percent of Credit
Lab reports (7 total)	See schedule below	50%
Practical Exam	2/27	20%
Final project		
Methods & map	4/10	10%
Final poster	4/30	20%

A: 93 – 100%

A-: 90 – 92%

B+: 87 – 89%

B: 83 - 86%

B-: 80 – 82%

C+: 77 – 79%

C: 73 – 76%

C-: 70 – 72%

D+: 67 – 69%

D: 63 – 66%

F: below 63%

**Late policy:** Assignments will receive a 10% deduction for every 24 hour period following the assignment due date and time, but can be handed in late (see schedule) for up to 50% credit. Late assignments should be emailed to Tyler ([tcross@eco.umass.edu](mailto:tcross@eco.umass.edu)).

## Schedule

<b>Date/Topic</b>	<b>Assignments Due</b>
<i>Thursday 1/22</i> LECTURE: Course overview. Example applications	
<i>Friday 1/23</i> <b>LAB 1:</b> Visualization	
<i>Thursday 1/29</i> LECTURE: Data formats, querying and shapefile basics	
<i>Friday 1/30</i> LAB INTRO: Cartographic design <b>LAB 2:</b> Joining tables and selection	<b>Lab 1: Visualization <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 2/5</i> LECTURE: Vector data analysis	
<i>Friday 2/6</i> <b>LAB 3:</b> Vector analysis	<b>Lab 2: Joins &amp; Selection <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 2/12</i> LECTURE: Projections	
<i>Friday 2/13</i> <b>LAB 4:</b> Projections	<b>Lab 3: Vector analysis <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 2/19</i> LECTURE: Case Studies & examples of past GIS projects	
<i>Friday 2/20</i> LECTURE: Global positioning systems <b>GPS Scavenger hunt</b>	<b>Lab 4: Projections <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 2/26</i> NO CLASS – STUDY FOR EXAM	
<i>Friday 2/27</i>	<b>Practical Exam (during lab)</b>
<i>Thursday 3/5</i> LECTURE: Data creation and editing	
<i>Friday 3/6</i> <b>LAB 5:</b> Editor	<i>Bring GPS scavenger hunt data to class</i>
<i>Thursday 3/12</i> LECTURE: Raster analysis	
<i>Friday 3/13</i> <b>LAB 6:</b> Spatial analyst	<b>Lab 5: Editor <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<b>***SPRING BREAK!***</b>	
<i>Thursday 3/26</i> LECTURE: Remote sensing & GIS	
<i>Friday 3/27</i> Catch up lab time	<i>Last chance to hand in Labs 1-5 for partial credit</i>
<i>Thursday 4/2</i> LECTURE: Habitat modeling	

<b>Date/Topic</b>	<b>Assignments Due</b>
<i>Friday 4/3</i> <b>Poster layouts and final projects</b>	<b>Lab 6: Spatial analyst <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 4/9</i> LECTURE: Geostatistics	
<i>Friday 4/10</i> <b>LAB 7: Geostatistics</b>	<b>Methods outline &amp; study area map <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 4/16</i> LECTURE: Case studies	
<i>Friday 4/17</i> <b>Work on final projects</b>	<b>Lab 7: Geostatistics <u>due</u>.</b> Hand in assignment <i>by the end of your lab period.</i>
<i>Thursday 4/23</i> LECTURE: Review & special topics	
<i>Friday 4/24</i> <b>Work on final projects</b>	
<i>Thursday 4/30</i>	<b>POSTER CONFERENCE</b> 10 am – 12 pm Holdsworth 203

## Lab Reports

**Labs data and tutorials can be downloaded from the U:drive shared space.**

[https://udrive.oit.umass.edu/bethanyb/NRC585\\_labs](https://udrive.oit.umass.edu/bethanyb/NRC585_labs)

Each lab assignment is different. Almost all labs require a map in addition to answers to questions and/or description of methods. Please refer to the individual lab assignments for specific instructions. Note that most of the lab assignments will require printing in color to ensure that the maps are legible – illegible maps will lose points.

It will be easier for you if you save each lab in a single Word document. Export your maps from ArcGIS as a .jpeg and add the image to your Word document. Answer any questions in the same document. Please make sure that your name is printed on all pages of your lab report.

You may work with others on the lab assignments; however, the product you hand in must be your own work. Duplicated assignments will receive a 0.

**If you are unable to hand in your lab report by the end of your lab, email the assignment to Tyler ([tcross@eco.umass.edu](mailto:tcross@eco.umass.edu)) for partial credit.**

## Practical Exam

The practical exams will test how well you can solve problems in GIS based on skills learned in the first four labs and in class.

*Cheat sheets:* You may bring one standard piece of paper containing any information (on both sides) that you think will help you during the exam. You will be responsible for remembering the names of tools (or finding them using Google or ArcGIS help). No tools will be on the exam that you did not see in a lab tutorial or exercise.

## Final Project

The final project is an independent research project visualizing and analyzing spatial data. You are responsible for coming up with a research question, finding GIS data needed to answer that question, and conducting a GIS analysis of those data. To formulate a research question, think back to other classes you've taken for inspiration, browse for ideas online, and talk to faculty and graduate students for ideas. I will also be compiling a list of ideas from ECO graduate students and faculty that you can choose from. If you wish, you may work with a partner on the final project as long as there is a clear division of labor based on consultation with me. Everyone will be individually responsible for his/her own methodological outline and final poster.

You will have *three* lab periods to work on your final projects in the middle and end of the semester. Completing the project will also require substantial time outside of scheduled labs, so plan ahead!

The final project will be graded in two parts:

### 1. Methodological outline and study area map (*Due on 4/10*).

An outline of your project topic and the methods you plan to use to tackle your GIS research question. The outline must include:

- A 250 word description of your planned research project.
- A table of the datasets that you will use to complete your project, a short description of the data, and the data source(s).
- An outline of the mapping and/or analytical steps required to complete your research project.
- A map of your study area using appropriate cartographic techniques – invest the time making a professional map that you can reuse on your final poster.

### 2. Final poster presentation (*Sign up in class for printing times at the library*)

You will be responsible for presenting your research to faculty, students and friends in the form of a research poster. This poster will be presented at a GIS poster conference on reading day (Thursday, April 30<sup>th</sup>) from 10am-12pm. I will go over the poster layout during lab.

**Final posters must be uploaded to a course dropbox in pdf format by Thursday, April 30<sup>th</sup>:** [https://udrive.oit.umass.edu/bethanyb/NRC585\\_Dropbox.xapp](https://udrive.oit.umass.edu/bethanyb/NRC585_Dropbox.xapp)