Course Syllabus

Intermediate Environmental Geomatics

Course number: 11:573:362 3 cr.

Instructors: Dr. Marci Meixler (meixler@sebs.rutgers.edu)
& lab TA: _____

Prerequisite: 11:573:232/11:573:233 or equivalent

Meeting times/places
MW 2:15-3:35
Lectures (Wednesdays): ENR 237 computer lab
Labs (Mondays): ENR 237 computer lab
Office hours with Ellen: Mondays 10:30-noon and Wednesdays (ENR 237 or CRSSA lab)

Course Website: If you are registered for this course, you should have access to the course website.

Description
This course is called Intermediate Environmental Geomatics. Geomatics is meant as a general term to encompass the various earth measuring technologies (including Global Positioning Systems, Remote Sensing, and Geographic Information Systems). As an environmentally focused course, we will use a number of environmental and ecological projects as examples throughout the semester. We will be focusing in this course primarily on GIS but will touch on GPS and RS as well.

Learning goals
Learning goals for this course include:

- A thorough understanding of the theoretical foundations of GIS
- Skills in the conception, planning and execution of a GIS awareness event
- Ability to think spatially
- Skills in spatial data analysis, overlays and modeling in the context of environmental and societal issues

Textbook
There is no required textbook for this class. All information will be provided in the lectures, labs and online.

Academic Integrity Policy
Academic Integrity. You are responsible for understanding the RU Academic Integrity Policy. I will strongly enforce this Policy and pursue all violations. For all examinations and assignments, you will be required to uphold the RU Honor Pledge, which states, "On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment." For all

written assignments, we will screen your work through an automated plagiarism detection service that compares your work against a large database of past work.

Other resources
CRSSA keeps a digital copy of the manuals for ESRI products available for internal viewing.

CRSSA also maintains a databank, which you can access from the computers in the lab. Explore the databank to become familiar with potential resources for your final project.

Grading System
The course is comprised of lectures, lab assignments, GIS day planning, a final project and exams with a requirement of attendance and participation.

Attendance: This is critical to understanding the lecture material. This portion of your grade will be determined at the end of the course based on attendance throughout the semester.

Participation: Participation in the class (which includes organizing GIS day) improves the quality of the class for everyone. This portion of your grade will be determined at the end of the course based on average participation throughout the semester.

Exams: There will be one midterm and a final exam. Medical note required for makeup exams.

Lab assignments: each week you will have one lab. You will upload your lab assignment online to be graded.

Review assignments: Review questions and answers (one for each topic covered on the coming exam) should be uploaded to the course website.

Final project: You will use the knowledge gained in this class to do a final group project on a topic of your choice.

Graded item	**%**
Attendance	3%
Participation	3%
Lab assignments	30%
Review assignments	4%
Final project	30%
Midterm Exam	15%
Final Exam	15%

Final project

GIS is touted as being an important tool for data dissemination, integration and decision making. Desktop GIS and open-source resources are making GIS applications more available and many organizations have been incorporating GIS projects and activities into their management plans. We would like this group project to simulate the process of working together as a team to use GIS to answer a research problem of your choosing. The resulting products can be used in your job-hunting portfolio to prove GIS competency.

Students will form small groups (ideally 3 people). Each team will collectively choose a research question to explore using GIS data and analysis. For your final projects you will turn in a report, a poster/website, and give a short presentation to the class about your project. You will be provided with contact information for some datasets (e.g. CRSSA database) and are expected to locate others appropriate to your task.

Project steps (important dates and grading structure given at end)

Team formation

Form a group (ideally 3 people). Upload membership list to the course website by due date.

Proposal

Get together with the other members of your group and start exploring possible project ideas. Your project should provide an answer to a real or hypothetical question pertaining to a human or environmental issue. Important: Your project must include some type of spatial analysis addressing the research question. Also important: Make sure the necessary data are available to answer your question.

Submit a proposal with these specific items:

- Names of all team participants
- Title of proposed project
- Question(s) being asked and answered
- Short description of expected analytical methods to be used
- Data to be used and sources of data
- Description of who will be responsible for each part of the project
- Expected major output (poster, web page, or other)

Anything else that is needed in order for your proposal to be understood

Submit to the course website. We will review your proposals. The point of this will be to make sure that you have something that is realistic, but also meaningful and that truly involves GIS analysis.

Data dictionary

Submit an updated list of the data names and sources used (upload to the course website). You will use this data dictionary in your report.

Analysis diagram

Submit a flowchart or data diagram to show the steps of your analysis (upload to the course website). You will use this analysis diagram in your report.

Final report

All teams will be expected to provide a report on their project detailing the proposed question and displaying the final results. The report should be prepared in a professional manner -- spelling and grammar should reflect the upperclass/grad level of this course, all graphics should be easy to understand and sharp. Each report should be of sufficient quality to present to a potential employer and should include:

- A Cover Page -- The cover should incorporate the names of all team members, a title for the project, and some sort of graphic that provides at least some hint or representation of the primary content of the report.
- An Executive Summary -- The report should begin with a 2-3 paragraph summary of what is in the report.
- Written Content -- The primary written content of the report should be a section of no more than 10 pages explaining the problem addressed, the methods used, the results found, and the greater implications or significance of the project.
- Graphic Content -- Each report must include a minimum of *two black-and-white, 8.5" x 11" maps* produced during the project. The report must also include at least *two 8.5" x 11" color maps*. These should be well-composed, well-labeled illustrations.
- Data Dictionary -- You must include a table detailing the data layers you started with and where they came from
- Analysis Diagram -- You must include a flowchart or data diagram showing the steps of your analysis. it should show all of the major alterations to data that you have made. There should be enough detail that one of your classmates (with a decent knowledge of the basics) could recreate your project.

(see grading section below for more information on what to include)

Product

You should create a poster or website showing the final products of your project. The poster or website should more or less be a copy of the BEST parts of your report, in particular your major maps, research question and results. It should be designed as an example of how GIS works to answer your question for both non-technicians and for GIS whizzes.

Presentation

All teams are expected to provide a short (~10 minute) presentation showing their work. The final presentations should include a brief and simple description of the real world problem, an explanation of how you used ArcGIS to complete the project, and ample graphics to demonstrate it (see grading section below for more information on what to include).

Important dates (due before class):

Sep 15 – Project group member list due

Sep 29 – Project proposals due

Oct 20 – Data dictionary due

Oct 27 – Analysis diagram due

Nov 3 – Draft report due

Nov 10 – Reports due online, product (posters/website) and presentations due in class

GRADING (total = 100 points)

1) Group member list – 5 pts

5 points given for just turning in list on time

2) Project proposal – 10 pts

____ (5) Novel idea that is well thought out
____ (5) Idea that involves data analysis (not just compiling data but actual analysis)

3) Data dictionary – 5 pts

5 points given for just turning in dictionary on time

4) Analysis diagram – 5 pts

5 points given for just turning in analysis diagram on time

5) Draft report – 5 pts

5 points given for just turning in draft report on time

6) Final product (website/poster) – 10 pts

____ (5) Well crafted product that communicates idea
____ (5) Visually appealing

7) Final report - 50 points

Writing skills and format (5 points)

_____(1) Spelling, scientific names underlined or italicized

_____(1) Grammar, syntax

_____(2) Writing clear and concise

_____(1) Cited all references in the text in the proper format; References in the bibliography listed

in the proper format

Model development and analysis (written content) (20 points)

_____ (5) Background and justification of research question

_____ (5) Description and justification of methods and analysis

_____ (5) Explanation of results/putting results in context

_____ (3) Use and understanding of relevant primary literature, ecological theory, and biological conservation to support your methods and findings

_____ (2) Maps and supporting figures properly labeled and referenced in text.

Inclusion of appropriate elements (25 points)

_____ (1) Cover page

_____ (2) Executive summary

_____ (10) Graphic content

_____ (2) Data dictionary

_____ (5) Analysis diagram

_____ (5) List of tasks each group member performed

8) Presentation - 10 points

7-minute PowerPoint presentation with 3 minutes for questions. All group members must be present and speak in the presentation.

_____ (2) Background, description, additional knowledge for why your analysis was important

_____ (2) Description of data used

_____ (2) Description and justification for your methods and data analysis

_____ (2) Explanation and reasoning for results found

_____ (2) Presentation quality, use of graphics to illustrate point, and appropriate citations

Extra credit

Any group that chooses to present their poster at GIS day or give a presentation at GIS day will get an extra 5/10 points for poster/presentation, respectively.

All groups that submit all intermediate work and final products by deadlines will earn an extra 10 points.

Class schedule

		Week 1	Week 2		Week 3		Week 4		Week 5
September		Wed	Mon	Wed	Mon	Wed	Mon	Wed	Mon
		3-Sep	8-Sep	10-Sep	15-Sep	17-Sep	22-Sep	24-Sep	29-Sep
	Class	Lecture: Course intro / review geomatics/ data mgmt	Lab 1: tour of ArcGIS, accounts, data management	Lecture: mapmaking / queries	Lab 2: attributes, tables, queries & relationships	Lecture: Geodatabases/ArcSDE	Lab 3: geodatabases	Lecture: spatial modeling	Lab 4: model builder
	HW				Lab 1 due (project group member lists due)		Lab 2 due		Lab 3 due (project proposals due)

		Week 5	Week 6		Week 7		Week 8		Week 9	
October		Wed	Mon	Wed	Mon	Wed	Mon	Wed	Mon	Wed
		1-Oct	6-Oct	8-Oct	13-Oct	15-Oct	20-Oct	22-Oct	27-Oct	29-Oct
	Class	Lecture: programming	Lab 5: programming I	GIS day planning	Lab 6: programming II	MIDTERM EXAM (in lab)	Project in class work day	Lecture: webmapping	Lab 7: webmapping	Lecture: interpolation
	HW		Lab 4 due	Review q/a due	Lab 5 due		Lab 6 due (project data dictionary due)		(project analysis diagram due)	

		Week 10		Week 11		Week 12		Week 13	
November		Mon	Wed	Mon	Wed	Mon	Wed	Mon	Wed
		3-Nov	5-Nov	10-Nov	12-Nov	17-Nov	19-Nov	24-Nov	26-Nov
	Class	Project in class work day	Lecture: spatial statistics	Project presentations	Lecture: Regression	Lab 8: spatial statistics	Guest lecture: Ellen Oettinger Network Analysis -----&---- GIS day	Lab 9: Regression	No class: Friday class schedule
	HW	Lab 7 due (final report draft due)		(project reports, product and presentations due)				Lab 8 due	

		Week 14		Week 15	
December		Mon	Wed	Mon	Wed
		1-Dec	3-Dec	8-Dec	10-Dec
	Class	Lab 10: Tracking analyst	Lecture: Geocoding	Lab 11: Geocoding	FINAL EXAM (in lab)
	HW	Lab 9 due	Review q/a due	Lab 10 due	Lab 11 due (Dec 12th)

Legend:

- Lecture
- Lab
- GIS day related
- Project related
- Exam (meet in lab room)
- Lab due
- Review due