Course Syllabus

Intermediate Environmental Geomatics

Course number: 11:573:362 3 cr.

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

Prerequisites: 11:573:232/11:573:233, 01:450:321 or equivalent

Meeting times/places

Wednesdays 10:20am-1:20pm
ENR 237 computer lab
Q&A with TA: Thursdays 10-11:30am in ENR 237 (or zoom by arrangement)

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

Description

This course is called Intermediate Environmental Geomatics. As an environmentally focused course, we will use a number of environmental and ecological datasets as examples throughout the semester. The goal of this course is to go beyond basic GIS to understand how to use advanced skills to do analysis of spatial environmental data.

Learning goals

Learning goals for this course include:

- Skills in intermediate to advanced level spatial analysis techniques including statistical and temporal analysis
- Deeper ability to "think spatially"
- Independent spatial analysis and modeling in the context of environmental and societal issues

Textbook

There is no required textbook for this class. All information will be provided on the course website through lectures and labs.

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.

AI Statement

The use of generative AI tools or apps for assignments, projects, exams or any items in this course, including tools like ChatGPT and other AI writing or coding assistants, is prohibited. We take AI use and cheating very seriously in this course. Do you own work.

Grading System

The course is comprised of online lecture videos, lab assignments, in-class reviews, attendance, a final project, practicals and extra credit.

Online lecture videos with embedded quizzes: watch the video, take notes, and answer the quiz questions embedded in the videos. Your grade on the video quizzes will be modified if it is clear from the time stamps that you were not actively watching the videos or didn't watch to the end.

Lab assignments: generally each week you will have a lab assignment to complete. The lab subject will be linked to what you learned in the lecture. You will upload your lab assignment to the course website to be graded.

In-class reviews: You will lead an in-class review of an online lecture video topic by leading a game. Your grade will be based on timeliness (starting on time, ending on time), creativity/uniqueness of the game, accuracy of information covered in the game, and level of interaction you create among classmates (note: generally games that get people actively talking in class work best).

Attendance: We will be working closely together in class so attendance is important. This portion of your grade will be determined at the end of the course based on attendance throughout

the semester. Lateness matters – if you are late, points will be deducted from your overall attendance grade. Absences will only be excused in the event of an emergency (with documentation) and submission of absence to the student absence reporting system.

Final project: You will use the knowledge gained in this class to do a final group project on a topic of your choice. See final project section of this syllabus for more info.

Practicals: there will be a midterm practical exam and a final practical exam at the end of the course. The final practical is not cumulative. You will be asked to use GIS datasets to perform actual analysis that you learned in this course on these practicals.

Extra credit: See course website for details on extra credit. More detail on extra credit opportunities will be sent through announcements.

Late submission policy for all assignments: 10% deduction per day, down to 60% (so it is still worthwhile submitting very late assignments).

Graded items	**%**
Lectures with embedded quizzes	10%
Lab assignments	45%
Projects	20%
Practicals (midterm and final)	20%
Attendance and class review leadership	5%
Extra credit (optional)	Up to 1%

Honor code

Classmates can form groups to discuss problems with labs (not practicals!) together, but each student is expected to arrive at assignment solutions on their own. A cluster of students providing the same erroneous solution should therefore be a rare event.

CRSSA lab policies

- No food or drink in the lab except for drinks in spill-proof containers
- Please close the lab door if you are the last person to leave the lab
- Please do not use the downstairs lab

- Hours: the upstairs lab is scheduled to be unlocked Monday through Friday from 7:00AM to 7:00PM (the front door to the building is unlocked Monday through Friday 7:00AM to 9:00PM)

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.

You will form small groups (ideally 3 people). Each team will collectively choose a research question to explore using GIS data and analysis (see course website for examples of project ideas that have been used in the past). For your final projects you will create a poster and give a short presentation to the class about your project. We have provided you with a list of GIS data websites on the course website but you are expected to locate other data as appropriate to your task.

At the end of the semester all groups will submit a high-resolution digital version of their poster to the course website. Students are encouraged to submit their posters to one of the regional (e.g. NJDEP Mapping contest) or national map competitions (GISCI Map Contest) in the spring.

Note: your professor and TA will be coming around to visit all groups during the time you are working on your projects in class. Use this time to pick our brains and help get answers to your questions. If we notice that not all people in the group are talking with us about the project or consistently doing work on the project, that will be noted in your final grades.

Project steps (important dates given on Canvas calendar; grading rubrics given at end of this section)

Group formation

Form a group (ideally 3 people). In class: submit the names of the members of your group.

Explore project topic

Your project should provide an answer to a real or hypothetical question pertaining to a human or environmental issue. Explore project ideas together as a group. Think about what questions you can answer using the skills we will be learning in this class and the data available. In class: submit the list of questions you will try to answer as part of your project and a title for your proposed project.

Searching for data

Find and download the data you will need to answer the questions you have identified as part of your project. In class: Submit a link to the actual downloaded data (via your project folder on the X drive or the cloud) and an excel file that includes the following for each dataset: name, source (organization that provided the data & link to website/location where you found the data), year, extent (where in the world does this dataset cover), projection when downloaded (new projection should be in an additional column if changed), and who in your group obtained the data.

Linking analysis to questions

Your project must include some type of spatial analyses addressing your research questions. Determine the analysis steps (ones we used or plan to use in class) that you will use to answer each of your questions. In class: submit a bullet point list with each of your questions and each of the linked analyses for those questions. Note: for full credit you should include at least three analysis techniques from class.

Analysis days 1-4

You should be working on your analyses on these four days. Seek help from your teachers when you get stuck. In class: submit a progress report for each of the analysis days (1-4) that outlines what you have done so far and what you still plan to do. These should include any relevant maps as completed. Each group members' individual contribution to the project needs to be identified for each of the analysis days.

ArcGIS Online site

Create an ArcGIS Online site detailing all aspects of your research topic and showing the final products of your project. It should be designed as an example of how GIS works to answer your question for both non-technicians and for GIS whizzes. Upload a link to your site to the course website (make sure the link works to access the site; check from another computer before uploading). Make sure you read over the rubric for this task to be sure you are meeting the requirements and specifications when making your site.

The ArcGIS Online site should include the following parts:

Title
Your names
Background -- explain the problem addressed and the importance of your study

Methods – briefly describe the methods used well enough that someone else could follow your methods to achieve the same result. Make sure to clearly specify (by name) the three or more topics from the course that you incorporated into your project in the methods section. This section should also include information on the sources for the data used in the project and the analysis steps. All references must be cited.
Results - detail the results found with maps and text
Conclusions – explain the greater implications or significance of the results, and any difficulties/limitations you encountered.
Graphic Content – you must include a minimum of *at least two maps*. These should be well-composed, well-labeled illustrations with projection and source information included. Feel free to include other content (tables, flowchart, etc) as appropriate.

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

Presentation

All teams are expected to provide a short (~10-15 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, a demonstration of something you did using GIS, and ample graphics. All group members must be present and speak in the presentation.

See Canvas Calendar for due dates

Only one person per group needs to upload project-related assignments.

GRADING (total = 100 points)

1) Group member list – 5 pts

5 points given for just turning in list of members

2) Explore project topic – 5 pts

5 points given for just turning in list of questions you wish to explore in your project and a project title

3) Searching for data – 10 pts

10 points given for submitting datasets for the project via your project folders. Points deducted for members not fully participating.

4) Linking analysis to questions – 10 pts

10 points given for submitting bullet point list with each of your questions and each of the linked analyses for those questions. Note: for full credit you should include at least three analysis techniques from class.

5) Analysis days 1-4 – 7.5 pts (each day)

7.5 points given for submitting analysis progress report that outlines what you have done so far and what you plan to do still. These should include any relevant maps as completed. Group points deducted if information is not given on individual participation toward tasks; individual points deducted for members not fully participating.

6) ArcGIS Online site- 20 points

Writing skills and format (3 points)

_____(1) Spelling, scientific names underlined or italicized, grammar, syntax

_____(1) Title and names of group members prominently displayed

_____(1) Writing clear and concise

Background, Methods, Results, and Conclusions (written content) (10 points)

_____ (2) Background and justification of research question (with appropriate citations)

_____ (2) Description and justification of methods and analysis

_____ (1) Clearly specified: three or more topics from the course that you included in your project

_____ (2) Explanation of results

_____ (2) Putting results in context

_____ (1) Limitations/changes you would make if you were to do this again

Maps and figures and additional content (7 points)

_____ (2) Layout visually appealing

_____ (2) Graphic content included (maps and figures with source information for data where appropriate)

_____ (3) Difficulty of the project

Group points deducted if information is not given on individual participation toward tasks; individual points deducted for members not fully participating.

7) Presentation - 20 points

10-15-minute PowerPoint presentation with 2-3 minutes for questions. All group members must be present and speak in the presentation.

_____ (2) Background, description, additional knowledge about why your project was important

_____	(2)	Questions answered in project linked with analyses/tools used
_____	(2)	Description of data used, justification of methods
_____	(4)	Demonstration IN ArcGIS of a particularly interesting tool used and how you used it
_____	(3)	Explanation of results found
_____	(3)	Implications of results/conclusions
_____	(2)	Limitations/things you would do differently
_____	(2)	Presentation quality, use of graphics to illustrate point, and appropriate citations

Topics for lecture/lab and project tasks

Week	Lecture topic	Lab topic	In class project task
1	Intro/review	1) software access & 2) Intro/review	
2	Spatial statistics	Spatial statistics	Group membership
3	Advanced spatial statistics	Advanced spatial statistics	Project topic
4	Spatial regression	Spatial regression	Data sources
5	Network analyst	Network analyst	Linking analysis to questions
6	Space time mapping	Space time mapping	Analysis week 1
7	ArcGIS Online	Midterm practical exam	
8	Interpolation	Interpolation	Analysis week 2
9	Social Equity	Social Equity	Analysis week 3
10	Tracing a network	Tracing a network	Analysis week 4
11	Model builder		Online website
12	Analysis in QGIS	Model builder	
13	Programming in Python		
14		Programming in Python	Presentation slides
15		Final practical exam + Extra credit & outstanding work due	

Course schedule

View Canvas Calendar for due dates. Items due by 11:59pm on due date unless otherwise noted.