Emerging Topics in GIS: Modeling the Environment

The Ohio State University

Spring 2021

Instructor: Dr. Yue QIN

Office: 1123 Derby Hall
E-mail: qin.548@osu.edu
Office Hour: Mo 2:10 - 3:40 PM or by appointment

Lecture: Mo We 12:45 - 2:05 PM (Online)
Course URL: http://carmen.osu.edu

This is a seminar-style class that focuses on modeling the environment. This class is designed to help students understand and characterize typical environmental components (e.g., population, energy, air pollution, water stress) by modeling the fundamental environmental components, predicting the problems, and seeking for solutions.

Evaluation

Standard OSU grading scale will be used for evaluation. Grading will be based on four elements:

Activity	Share of Final Grade (100%)
Participation in lectures	20%
Students-led discussion	10%
Take-home exam	20%
Mid-term Presentation	20%
Final Project	30%

1. Your in-class participation will be evaluated by your inputs to in-class discussions.

2. We will have students-organized in-class discussions to evaluate your participation. We will have multiple group case studies to facilitate students-led discussions. Each student has to work on each case study (encouraged to work as groups at the size of 5 if safety can be guaranteed). The instructor will randomly select a few groups to lead in-class discussions on each case study to ensure all groups have worked on each topic; each group will lead at-least one discussion.

3. 1 online exam during the semester. Instructor will email the exam at the usual class time, and you will submit it after 1 hr. Late submission is not allowed (0 points; allow 5minutes internet buffer). Please check your wifi connection and set an alarm in advance. Exceptions can apply on a case-by-case evaluation.

4. Midterm presentation: Potential topics and instructions are provided as appendix at the end.

5. Final project presentation: Each student must think about the final project topic early on, and have a (almost) finalized topic ready by April 5th. Students are encouraged to choose a topic related to environmental modeling, and prepare a final presentation. Check the File 'Instructions on Final Project' for details. Final project instructions are provided in carmen.

Important Issues

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. **Plagiarism is wrong and should be prohibited.** Instructors shall report all instances of alleged academic misconduct to the Committee (Faculty Rule 3335-5-847). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/csc/).

Disability Services: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

Policies

You are expected to attend the all lectures scheduled this semester. If you ABSOLUTELY must miss class, you must notify the Instructor beforehand. Pending my approval, we will discuss potential make-up options. Exceptions will only be made for serious, unanticipated reasons (emergencies, illness), for which documentation will be required.

Health & Safety Requirements (COVID-19 policies)

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (https://safeandhealthy.osu.edu), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

A more detailed description of expectations and accountability measures can be found here:

https://safeandhealthy.osu.edu/sites/default/files/2020/07/safe_and_healthy_campus_expectations_accountability_measures_7.24.2020_website.pdf

Repeated or persistent failure to wear a mask that covers your mouth and nose to an in-person lab will be reflected in your grade for this course.

All classes are synchronous unless otherwise stated in the syllabus.

Week	Date	Topics	Notes
1	1/11	Course Introduction	Start thinking about your mid-term group and final project topic
	1/13	Basics about modeling the environment; Use and misuse of basic quantitative methods.	Case studies
2	1/18	*Martin Luther King Jr. Day (no class)*	
	1/20	Systems Introduction & Modeling the population	Case study #1: population
3	1/25	Modeling the population (Part 2)	
	1/27	Case study: molding and visualizing the population	Asynchronous
4	2/1	Student-led in-class discussions on case study: molding and visualizing the population	
	2/3	Modeling energy consumption (Part 1)	Global, national, and city energy consumption trend;
5	2/8	Modeling energy consumption (Part 2)	Case study #2: Energy
	2/10	Case study: mapping energy consumption	Asynchronous
6	2/15	Student-led in-class discussions on energy production/consumption of regions interested	
	2/17	Modeling air pollution	Case study #3: Air pollution
7	2/22	Modeling air pollution & Modeling emissions	Air pollution introduction
	2/24	Modeling emissions	Emission inventories Case study #3: Air pollution
8	3/1	Case study: air pollution	Asynchronous
	3/3	Student-led discussions on air pollution	
9	3/8	Review session for Midterm Exam [also finalize mid-term groups]	

	3/10	Midterm Exam	
10	3/15	Project: Readings and reports on selected topic	Asynchronous; Select a topic we have covered so far and conduct literature review, then report to the whole class
	3/17	Midterm presentations in class with selected topic (group presentations) Remind the deadline for finalizing final project topic	Literature review with Q&A (each group will have 20 minutes in total; 15 minutes presentation+5 minutes Q&A; 5 students per group)
11	3/22		
	3/24		
12	3/29	Modeling health impacts	
	3/31 (4/2)	*No 3/31 class: this class will happen on Apr 2nd* Modeling health impacts (part 2)	
13	4/5	Discuss the final project; each student has to report your final project topic	
	4/7	Students-led in-class activity: Estimate your energy footprint	
14	4/12		
	4/14		
15	4/19	All students' final project presentations. Individual presentation	
	4/21		
16	4/26		
	4/28		

Appendix1. Suggested Mid-term paper lists:
Please use google scholar https://scholar.google.com to check whether there are supplementary figures/tables/data you'll need for the paper of interest. You can choose papers not suggested below.

1) You have to demonstrate your ability of finding appropriate journal articles (e.g., classical; cutting-edge; high-impact journals)
2) Literature review of the paper: what question is asked? Why it is important? how is the question answered? What is the major innovation?
3) Think about what you like the most about the paper; what you think could be improved?
4) What do you think make this paper 'impactful'?
5) Each group will have 20 minutes in total; 15 minutes presentation+5 minutes Q&A; 5 students per group
6) Please also check 'guidelines on final project', a similar rubric applies.

Paper lists: you can choose any of the papers below or any high-impact publications you are interested in (i.e., nature; nature energy; nature climate change; nature sustainability; science; science advances; pnas)

1. Power-generation system vulnerability and adaptation to changes in climate and water resources

2. Integrity of firms' emissions reporting in China's early carbon markets; https://www.nature.com/articles/s41558-018-0394-4

3. Air quality co-benefits of carbon pricing in China

4. Non-CO2 greenhouse gases and climate change

5. The next generation of scenarios for climate change research and assessment

6. Limited impact on decadal-scale climate change from increased use of natural gas

7. A systems approach to evaluating the air quality co-benefits of US carbon policies

8. High secondary aerosol contribution to particulate pollution during haze events in China

9. The contribution of outdoor air pollution sources to premature mortality on a global scale

10. Modelling the potential for wind energy

11. The Cascade of Global Trade to Large Climate Forcing over the Tibetan Plateau Glaciers

12. Air quality co-benefits for human health and agriculture counterbalance costs to meet Paris Agreement pledges

13. Declines in mental health associated with air pollution and temperature variability in China

14. Potential for widespread electrification of personal vehicle travel in the United States

15. Vulnerability of US and European electricity supply to climate change