Emerging Topics in GIS: Modeling the Environment

The Ohio State University

Autumn 2019

Instructor: Prof. Yue QIN
Office: 1123 Derby Hall
E-mail: qin.548@osu.edu
Office Hour: Mo 3:00 - 4:30 PM or by appointment

Lecture: Derby Hall 1080, Mo We 12:45 - 2:05 PM
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:

Participation & Assignments & Quiz (55%):

- 1) you have to show up for at least one of the lectures in the first week to stay enrolled in this course
- 2) Your attendance (**10%; 0.4 deduction for each class found missing)**
- 3) We will have students-organized in-class discussions to evaluate your participation. (**25%**) We are going to have multiple assignments to facilitate students-led discussions. Each student will lead the discussion at least once during the semester. By default, you'll receive 1 point for assignment completion, 0-2 points for in-class discussion, 10 points for the one you lead. ***Respect each other!***
- 4) 1 quiz during the semester (**20**%)

Mid-term group projects (15%):

- Group presentations on classical literature review– you'll grade each other among/within groups

Final project (30%):

- Each student must submit a proposal about the final project by the end of October 20. Students are encouraged to introduce an environmental modeling related topic, and prepare a final poster and presentation.

Important Issues

Late papers. Each lab, exercise, and project item have a specific deadline and late submissions will not be accepted. Exceptions may be granted in cases such as serious illness, family emergency, or career opportunities, if requests were made before class starts with solid proofs. All submissions must be done on carmen (no email submissions please).

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.

Below is a tentative syllabus. Please constantly check back, as this may change.

Week	Date	Topics	Notes
1	8/21	Introduction about modeling the environment	#Assignment #1- self introduction: submit before 8/27
2	8/26	Use and misuse of basic quantitative methods. Back-of-the envelope estimates.	Case studies
	8/28	Systems Introduction & Modeling the population	Earth system &Population growth model #Assignment #2-population: get ready before 9/4
3	9/2	Labor Day (no class)	
	9/4	Modeling the population	Population growth under pressure
4	9/9	Student-led in-class discussions on population modeling	
	9/11	Modeling energy consumption	Global, national, and city energy consumption trend; #Assignment 3- energy: get ready before 9/16
5	9/16	Student-led in-class discussions on energy production/consumption of regions interested	Comparison across different regions
	9/18	Energy models (LEAP) or World Energy Model	#Assignment #4-urban energy: Reading on urban energy consumption to get prepared for in-class discussions on 9/23
6	9/23	Student-led in-class discussions on urban energy modeling	
	9/25	Modeling air pollution	Air pollution introduction #Assignment #5-O3: get ready before 9/30 (O3 readings)
7	9/30	Student-led discussions on O3 pollution	
	10/2	Modeling emissions	#Assignment #6-air pollution: get ready before 10/7 to lead the discussion
8	10/7	Student-led discussions on global distribution of air pollutants	
	10/9	Mapping environmental data in GIS	Data search/process/mapping

9	10/14	Midterm- group presentation (20 minutes per group)	Select a topic we have covered so far and conduct literature review, then report to the class in groups (tentative papers are uploaded)
	10/16		
10	10/21	Modeling the health impacts	Air pollution-related health impacts;
	10/23	Lecture on integrated assessment models case study	SNG #Assignment #7-GAINS, get ready for 11/4
11	10/28	Integrated assessment model - GAINS	
	10/30	Quiz in class	
12	11/4	Student-led discussions on GAINS model application	
	11/6		
13	11/11	No class	
	11/13	Modeling water resources	
14	11/18	Quiz review/ water resources/ Lifecycle assessment/GBD model et al	
	11/20		
15	11/25	Final individual presentation – ppt, 15 minutes each. 10 minutes presentations + 5 minutes questions	
	11/27		
16	12/2		
	12/4		

Appendix1. Mid-term paper lists: (main text+ SI provided)
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.

1) Literature review of the paper: what question is asked? Why it is important? how is the question answered? What is the major innovation?
2) Think about what you like the most about the paper; what you think could be improved?
3) What do you think make this paper 'impactful'?

Paper lists: you can choose any of the papers below or any high-impact publications you are interested in

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