EAS 687: Modeling for Landscape Planning (4 credits)
Winter 2023

Course Time and location
Tuesday, Thursday, 1:00-4:00 pm; 3028 Dana and 3325 Dana

Instructor
Dr. Runzi Wang, Assistant Professor
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Office hour: By Appointment

GSI: Jianxing Guan
E-mail: keyline@umich.edu
Office hour: Tuesday 4:00-5:00 pm (hybrid)
Room 4520 & zoom link: https://umich.zoom.us/j/94410721591

Course Description
This course concentrates on the theory and method of modeling the ecological, climatic, hydrological, and social systems of landscape. Specifically, it focuses on the computing tools to conduct quantitative spatial analysis of landscape factors including land cover, topography, socioeconomics, hydrology, and so on. It acquaints students with knowledge and skills of how spatial information can be collected, analyzed, and then combined to generate maps and models that allow stakeholders to investigate land planning alternatives. It also introduces cutting-edge landscape modeling methods such as QGIS, Google Earth Engine, RStudio, and InVEST, as well as data visualization techniques. It will result in a final project of comprehensive landscape planning in the Rouge River Watershed with data-driven methods.

Learning Outcomes and Course Objectives
The objectives of the course are:
- Develop critical thinking, design, and technical skills needed to excel at modeling for landscape planning and analysis projects across a variety of spatial scales.
- Apply the available software tools, coding skills, and ecosystem models to analyze landscape systems.
- Master data collection and fusion techniques to collect and process data from different platforms, in different formats and spatial scales.
- Be able to employ landscape data analysis and modeling techniques to diagnose specific issues at the watershed scale.
- Develop evidence-based innovative planning and management solutions to the real-world landscape problems.

Suggested Reference
There is no required textbook for this course. However, the following reference is helpful to explore the technologies covered in this course.
Course Contents and Logistics
This course is composed of 11 lectures, 8 lab assignments, and 1 final project lasting for five weeks (Mar 14-Apr 18). Lectures and labs will provide the theoretical and technical foundations to complete the final project. Lecture slides and lab instructions will be the major resources to communicate knowledge and offer technical guides. Some relating reading materials will also be posted on Canvas to help you better understand the lectures.

The 11 lectures and the corresponding lab assignments will be given from Jan. 5 to Mar. 9. The models we will cover include:
- Week 1-4. Google Earth Engine (GEE, with JavaScript API)
- Week 4-7. RStudio and QGIS
- Week 8-9. InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs)

In the first 9 weeks, the course content will be lectures followed by computer labs. Detailed document instruction will be provided to operate software and tools. Assignment questions are integrated into the lab operations. In the last five weeks, you will complete a group project to apply the techniques learned in the lectures and labs to address real-world landscape modeling and planning problems and come up with spatial-based solutions.

Class participation is required unless some lectures/critiques are held remotely. Notice will be given at least one week prior to the remote class if some emergency happens to the instructor.

Grading Policy and Assignment Evaluation
A = 90 or above, B = 80 to 89.9, C = 70 to 79.9, D = 60 to 69.9, F = below 60.

Weighting
Assignments  64% (8%*8)
Final project  30%
Class attendance  6%
Total        100%

Assignments – Homework assignments shall be neatly finished. We only accept assignments in electrical file (doc or pdf file). All the assignments should be uploaded to Canvas before the due time. No in-class submission is accepted. Typically, the due date is one week after it is issued and it is due before the beginning of the class. ALL late homework will be graded for half credit (50%), and no assignments will be accepted after the graded assignments are returned, resulting in a grade of zero.

Final Project-- Final project is a team project and each team should have 3-4 team members. This final project is about landscape analysis and planning. You are expected to team up and decide the topic of your final project. Every team will need to analyze the Rouge River Watershed with the skills learnt in former labs and develop a conceptual design for the study area based on different topics. You will work within your team on the final project and we will use the class time to critique your projects. The required final deliverables would be digital
posters or slides with all your analysis maps, planning strategies, and everything else to explain your design. A final presentation is scheduled on April 18.

**Extenuating circumstances** – If, at any time, extenuating circumstances interfere with your ability to meet class requirements, students are encouraged to contact Dr. Wang prior to passage of a due date, giving of a quiz or exam, etc. The ability to make up missed work and the terms of any allowed make-up will be determined on a case-by-case basis.

**Academic Integrity and Policy**
Integrity in research and scholarship is a fundamental value of the University of Michigan. It is the responsibility of all students to conduct research and scholarly activities in an ethical manner at all times. An indispensable part of graduate education is for students to become knowledgeable about the responsible conduct of research and scholarship appropriate to their discipline or field of study. Students are responsible for understanding and observing the graduate school’s academic and professional integrity policy. Students are also expected to understand and maintain standards of integrity and professional conduct endorsed by their program that are particular to their field of study and research.
Students are referred to Rackham Academic and Professional Integrity Policy that may be found at the website: [https://rackham.umich.edu/academic-policies/section8/](https://rackham.umich.edu/academic-policies/section8/)

**Americans with Disabilities Act (ADA) Policy Statement**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services by visiting [https://ssd.umich.edu/](https://ssd.umich.edu/).

**Professionalism, Respect and a Positive Learning Environment**
You are expected to treat your instructor and all other participants in the course with courtesy and respect. Your comments and written communications to others should be factual, constructive, and free from harassing statements. You are encouraged to agree or disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, gender, age, culture, religion, politics and sexual orientation. If you experience any such harassment during this course, please contact your instructors immediately.

Students in this course are also responsible for being familiar with the Universities student rules and policies: [https://spg.umich.edu/](https://spg.umich.edu/).

**Student Well-Being**
Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, mental health, alcohol or other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. If the source of your stressors is academic, please contact me so that we can find solutions together. For students’ personal concerns, U-M offers many resources at [https://wellbeing.studentlife.umich.edu/resources-list](https://wellbeing.studentlife.umich.edu/resources-list). Also keep in mind the following resources
• Dr. Jaime Yang (juemeiya@umich.edu), SEAS Embedded CAPS counselor, in SEAS on Wednesdays in the SEAS Student Center, reach out to her directly through email to schedule an appointment.
• Counseling and Psychological Services (CAPS) - 734-764-8312 (24 hours)
• The SEAS Student Center is available to assist students in any way, both academically and outside of the classroom. Please reach out to seas.gradsupport@umich.edu which will reach Jennifer Taylor, Jaime Langdon, and Kim Elliott.

**Class Schedule:**
See attached
We will try and follow this schedule throughout the term, but some adjustments may become necessary or desirable and they will be discussed at the beginning of the appropriate class.