

Course Syllabus for Spring 2025
GEOG 4095/5895 Introduction to Geospatial Artificial Intelligence

Syllabus information may be subject to change. Please refer to HuskyCT for the latest schedule.

1. Important Dates & Information:

Credits: 3

Format: In person

Lecture & Lab (required): Tue/Thu 75 minutes each

Course Time: Tue/Thu, 9:30 – 10:45

Office hours (by appointment): Tue/Thu, 11:00 – 12:00, Philip E. Austin Building, Room 433

Professor: Hanlin Zhou

Email: hanlin.zhou@uconn.edu

Classes Start	Classes End
Jan 21	May 2

***Apr 14: Last date to place courses on or remove from Pass/Fail grading.**

***The topics of GEOG 5895 are the same as GEOG 4095. However, for GEOG 5895, graduate students will have additional reading and additional assignments.**

2. Course Description and Learning Outcomes:

The course offers an introductory exploration of Geospatial Artificial Intelligence (GeoAI), propelled by recent surges in high-quality data, machine learning algorithms, and advanced computing infrastructure. This course navigates through the burgeoning field of GeoAI, which presents an introduction to how geographers pioneer AI-driven solutions for a spectrum of challenges affecting our natural world and societal structures. Beginning with the essentials of Python skills and statistics terms, the curriculum advances into the basic principles and selected topics of GeoAI, focusing on GeoAI applications to tackle spatially oriented problems. Emphasizing both theoretical foundations and practical proficiency, students will engage in hands-on exercises utilizing Python, R, and ArcGIS software to craft and implement machine learning models tailored for geospatial analyses and visualizations. This course will also present GeoAI applications with details through lectures and invited talks to help students understand how geographers implement GeoAI in their projects. This comprehensive approach ensures a robust understanding of how AI can be leveraged to decipher and address complex spatial issues, equipping students with the skills to contribute to the evolving landscape of GeoAI.

This course will use Jupyter Notebook, ArcGIS Pro, and RStudio. Online meeting software such as Webex might be used occasionally in this course.

After successfully completing this course, students should be able to:

- Gaining an introductory understanding of the fundamental concepts of GeoAI.

- Comprehend various applications of GeoAI, such as its role in tackling health and crime-related issues.
- Apply GeoAI approaches to address and resolve elementary geospatial challenges.

3. Prerequisites and Software Environment:

To successfully complete this course, you may have a GIS background using ArcGIS software and a programming background using Python and R.

Software:

- Anaconda (a Python-based software suite)
- Jupyter Notebook
- ArcGIS Pro
- RStudio (a R-based software suite)

4. Course Materials

There is no required reading in this course currently. However, the textbook is recommended:

Gao, S., Hu, Y., Li, W. (2023). Handbook of Geospatial Artificial Intelligence
 Additional course readings and media are available within HuskyCT, through either an Internet link or Library Resources. Course materials are accessible through UCONN HuskyCT [<https://huskyct.uconn.edu/>].

5. Tentative Course Schedule* (Subject to Change at the Discretion of the Instructor)

Day	Tuesday	Thursday
Week 1 (Jan 21 - Jan 24)	Lecture 1: Course Introduction	Lecture 2: GeoAI Overview I
Week 2 (Jan 27 - Jan 31)	Lecture 3: GeoAI Overview II	Lecture 4: How to take reading annotations & Python I
Week 3 (Feb 3 - Feb 7)	Lecture 5: Python II	Lab 1 starts
Week 4 (Feb 10 - Feb 14)	Lecture 6: Statistics I & Student Paper Presentation #1 + Discussion	Lab 1 continues
Week 5 (Feb 17 - Feb 21)	Lecture 7: Statistics II & Student Paper Presentation #2 + Discussion	Lab 1 continues
Week 6 (Feb 24 - Feb 28)	Lecture 8: GeoAI Invited Talk & Student Paper Presentation #3 + Discussion	Lab 2 starts

Week 7 (Mar 3 - Mar 7)	Lecture 9: Statistics III & Student Paper Presentation #4 + Discussion	Lab 2 continues
Week 8 (Mar 10 - Mar 14)	Midterm Test	Lab 2 continues
Week 9 (Mar 17 - Mar 21)	Spring Recess	Spring Recess
Week 10 (Mar 24 - Mar 28)	Conference & Reading Week (No In-Person Class)	Conference & Reading Week (No In-Person Class)
Week 11 (Mar 31 - Apr 4)	Lecture 10: GeoAI Method I & Paper Presentation #5 + Discussion & Discussion for Final Project Topics	Lab 3 starts
Week 12 (Apr 7 – Apr 11)	Lecture 11: GeoAI Method II & Paper Presentation #6 + Discussion	Lab 3 continues
Week 13 (Apr 14 – Apr 18)	Lecture 12: GeoAI Method III & Paper Presentation #7 + Discussion	Lab 3 continues
Week 14 (Apr 21 – Apr 25)	Student Paper Presentation #8 + Discussion & Final Project	Final Project
Week 15 (Apr 28 – May 2)	Final Project Presentation	Final Project Presentation

* The course schedule is tentative; it is subject to change.

* There will be at least two invited talks, which will be arranged during the lecture

6. Evaluation

Below is the evaluation breakdown for the course. Any deviations will be communicated. Your instructor and the university have a responsibility to promote academic honesty and integrity. You, as a student, are (1) responsible for the honest completion and representation of your work, and (2) expected to respect the academic endeavors of others.

Grading for Undergraduate Students

Assessment	Weight
In-Class Pop Quizzes (5 in total)	5%
Lab Assignment 1	15%
Lab Assignment 2	20%
Lab Assignment 3	20%
Midterm Test	10%
Paper Presentation	5%

Invited Talk Summary	5%
Final Project Proposal	5%
Final Project Presentation & Report	15%
In total	100%

Grading for Graduate Students	
Assessment	Weight
In-Class Pop Quizzes (5 in total)	5%
Lab Assignment 1	15%
Lab Assignment 2	20%
Lab Assignment 3	20%
Midterm Test	10%
Paper Presentation	5%
Invited Talk Summary	5%
Final Project Proposal	5%
Final Project Presentation & Report	15%
In total	100%

Percent	Grading Scale
≥93%	A
90% - 92.9%	A-
87% - 89.9%	B+
83% - 86.9%	B
80% - 82.9%	B-
77% - 79.9%	C+
73% - 76.9%	C
70% - 72.9%	C-
67% - 69.9%	D+
63% - 66.9%	D
60% - 62.9%	D-
< 60.0%	E

In-class Pop Quizzes: There will be a total of five In-class Pop Quizzes throughout the semester. The quiz will be arranged randomly (possibly in any lecture and at any time during the class) without prior notice. The in-class pop quiz will be in the format of online (laptop or mobile phone) or in-person tests. Please ensure you bring any compatible device to the class to take the pop quiz. The contents may cover any material learned (lectures, labs, etc.) by the time of the quiz.

Lab Assignments: Each lab assignment must be uploaded online before the deadline on the due date. Policy for late submissions can be found in the later section **Due Dates and Late Policy**.

Midterm Test: The mid-term test will be in person during the class. It will cover all materials before the midterm date. The test will include multiple types of questions, such as multiple-choice, numeric-answer, and short answers.

Paper Presentation: The paper presentation will be in-person during the class. Each student should present one paper within the domain of GeoAI. It is the responsibility of the student to contact the course instructor to get approval first.

Invited Talk Summary: All students are required to attend all invited talks. After each talk, students should submit a one-page summary (12 font, double-spaced) of this talk by the deadline mentioned online. Policy for late submissions can be found in the later section **Due Dates and Late Policy**.

Final Project: The goal of this project is to help you utilize the skills you learned in the class to address a geospatial question that you are interested in. Policy for late submissions can be found in the later section **Due Dates and Late Policy**.

- **Final Project Proposal:** In the proposal (1-2 pages, double-spaced), students are expected to describe their topics, data, and research questions.
- **Final Project Presentation:** In the final week of this course, the presentation will be in person during the class. In the presentation, students are expected to describe how they address their geospatial questions using course materials.
- **Final Project Report:** The final report will be expected to be 5-6 pages, not including the cited page or graphics. Materials of the proposal and the lab assignments can be used in the final report. Aside from the final report, you should upload both your report, codes, and your data.

STUDENTS WITH SPECIAL NEEDS SHOULD REQUEST ACADEMIC ACCOMMODATION AND INFORM THE INSTRUCTOR AS EARLY AS POSSIBLE.

Due Dates and Late Policy

All course due dates are identified in the course outline. If you have not contacted academic accommodation and made arrangements with the instructor prior to the due date, late assignments will be given a reduction in points. The deduction is 20% for each day after the due. Assignments submitted five days after the due will not be accepted except under special circumstances. Deadlines are based on Eastern Standard Time (EST); if you are in a different time zone, please adjust your submittal times accordingly. *The instructor reserves the right to change dates accordingly as the semester progresses. All changes will be communicated in an appropriate manner.*

7. How to Be Successful in this Class:

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.

- 1) Invest in a planner or application to keep track of your courses. Populate all your

deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.

- 2) Make it a daily habit to log onto HuskyCT to ensure you have seen everything posted to help you succeed in this class.
- 3) Take notes as you go through the course material. Keeping handwritten notes or even notes on a regular Word document will help you learn more effectively.
- 4) Reward yourself for success. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task.

8. Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. This section provides a brief overview to important standards, policies and resources.

Student Code

You are responsible for acting in accordance with the [University of Connecticut's Student Code](#). Review and become familiar with these expectations. In particular, make sure you have read the section that applies to you on Academic Integrity:

- [Academic Integrity in Undergraduate Education and Research](#)
- [Academic Integrity in Graduate Education and Research](#)

Cheating and plagiarism are taken very seriously at the University of Connecticut. As a student, it is your responsibility to avoid plagiarism. If you need more information about the subject of plagiarism, use the following resources:

- [Plagiarism: How to Recognize it and How to Avoid It](#)
- [University of Connecticut Libraries' Student Instruction](#) (includes research, citing and writing resources)

Copyright

Copyrighted materials within the course are only for the use of students enrolled in the course for purposes associated with this course and may not be retained or further disseminated.

Netiquette and Communication

At all times, course communication with fellow students and the instructor are to be professional and courteous. It is expected that you proofread all your written communication, including discussion posts, assignment submissions, and mail messages. If you are new to online learning or need a netiquette refresher, please look at this guide titled, [The Core Rules of Netiquette](#).

Adding or Dropping a Course

If you should decide to add or drop a course, there are official procedures to follow:

- Matriculated students should add or drop a course through the [Student Administration System](#).
 - Non-degree students should refer to [Non-Degree Add/Drop Information](#) located on the registrar's website.

You must officially drop a course to avoid receiving an "F" on your permanent transcript. Simply discontinuing class or informing the instructor you want to drop does not constitute an official drop of the course. For more information, refer to the:

- [Undergraduate Catalog](#)
- [Graduate Catalog](#)

Academic Calendar

The University's [Academic Calendar](#) contains important semester dates.

Academic Support Resources

[Technology and Academic Help](#) provides a guide to technical and academic assistance.

How to Request an Accommodation

Students needing special accommodations should work with the University's [Center for Students with Disabilities \(CSD\)](#). You may contact CSD by calling (860) 486-2020 or by emailing csd@uconn.edu. If your request for accommodation is approved, CSD will send an accommodation letter directly to your instructor(s) so that special arrangements can be made. (Note: Student requests for accommodation must be filed each semester.)

Policy against Discrimination, Harassment and Inappropriate Romantic Relationships

The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate Romantic relationships can undermine the University's mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate Romantic relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. Refer to the [Policy against Discrimination, Harassment and Inappropriate Romantic Relationships](#) for more information.

Sexual Assault Reporting Policy

To protect the campus community, all non-confidential University employees (including

faculty) are required to report assaults they witness or are told about to the [Office of Diversity & Equity](#) under the [Sexual Assault Response Policy](#). The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. Refer to the [Sexual Assault Reporting Policy](#) for more information.