SYLLABUS
GEOG 6223: WEB GIS DEVELOPMENT
FALL 2025 – ONLINE

COURSE OVERVIEW

Instructor

- **Name:** Dr. Chayanika Singh, GISP
- **Credentials:** PhD, Geographic information Sciences, Texas State University 2022
- **Email:** singh.1883@osu.edu
- **Office location:** 1123 Derby Hall
- **Office hours:** Zoom by appointment

- **Preferred means of communication:**
    - My preferred method of communication for questions is **email.** Please have the email subject as "**Geog 6226_.....",** to make sure it gets my attention.
    - My class-wide communications will be sent through the Announcements tool in Carmen Canvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course description

The advances of web-based technologies have brought fundamental changes to how spatial information can be presented, understood, and used for different purposes. Today, maps are essential in our daily lives. Web based mapping tools play critical roles for applications ranging from data visualization to travel planning to complex natural resource management. This is also a constantly evolving field as new technologies and new applications emerge. The goal of this course is to help students grasp the technology for the design and implementation of web GIS applications. We will survey a variety of enabling software systems for spatial data management and processing, geographical knowledge representation, and interactive mapping. A wide range of web-based GIS applications will be discussed. Intensive hands-on tutorials will be used to help students develop their skills in this area.

Prerequisites: GEOG 5210 and GEOG 5212, or consent of instructor.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Demonstrate understanding of the nature and mechanisms of web applications
- Develop interactive web applications
- Develop interactive web GIS application using open source and proprietary APIs
- Prepare data for web GIS applications
- Configure and deploy web GIS applications
- Use online data sources and appropriate APIs for mapping and visualization
- Understand social and professional issues related to online data and applications

HOW THIS COURSE WORKS

Mode of delivery: This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time.

Pace of online activities: This course is divided into **weekly modules** that are released at the beginning of the week. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a **3-credit-hour course**. According to Ohio State policy, students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Participating in online activities for attendance**: **AT LEAST TWICE PER WEEK**
  Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*
- **Office hours and live sessions**: **OPTIONAL**
  This course is asynchronous, no live sessions. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.

- **Participating in discussion forums**:
  As part of your participation, each week you can expect to post on the Carmen Discussion Board as part of our substantive class discussion on the week's topics.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

REQUIRED

- There is no required text for this class and there is no need to purchase any textbooks. Various tutorials and other reading materials will be provided. I recommend the following books that are highly relevant to this class.

RECOMMENDED

- Muehlenhaus, I. *Web Cartography: Map Design for Interactive and Mobile Devices,* First edition.; CRC Press: United States, 2013.
- Fu, P. *Getting to Know Web GIS*, Fifth edition.; ESRI, Incorporated: Redlands, California, 2022.
- Crampton, Jeremy W. *Mapping: A Critical Introduction to Cartography and GIS*. Wiley-Blackwell, 2010,
  - Not available via OSU Libraries but you can find it Via State Library of Ohio (you need to have an account with a member library of the Ohio Digital Library)
- Tutorials from http://w3schools.com will also be used.

Other Optional

- Murray, S. 2017. *Interactive Data Visualization for the Web: An Introduction to Designing with D3*. 2nd Ed. O'Reilly Media.
- Robbins, J. 2012. *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript and Web Graphics*. O'Reilly Media.

Course technology

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

BASELINE TECHNICAL SKILLS FOR ONLINE COURSES

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the Canvas Student Guide.

REQUIRED TECHNOLOGY SKILLS SPECIFIC TO THIS COURSE

- CarmenZoom virtual meetings
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

REQUIRED EQUIPMENT

- **Computer**: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- **Webcam**: built-in or external webcam, fully installed and tested
- **Microphone**: built-in laptop or tablet mic or external microphone
- **Other**: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

REQUIRED SOFTWARE

- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Full instructions for downloading and installation can be found at go.osu.edu/office365help.
- Geoserver: students will install this open-source, free software system to manage and publish their geospatial data sets.

- ArcGIS Online: students will be provideded access to ArcGIS Online for exercises and projects. More details can be found at https://cura.osu.edu/esri#arcgis-online. This is provided through ESRI's Education Site License Program and you may review ESRI's privacy policies at https://www.esri.com/en-us/privacy/overview. For information about accessibility, visit Accessibility in ArcGIS Pro.
- OpenOffice is a free and complete suite of software tools for world processing, spreadsheet, and presentations. View their privacy statement at https://www.openoffice.org/privacy.html.

CARMEN ACCESS

You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

Your Grades will be calculated based on the following assignment weightage.

ASSIGNMENT CATEGORY	POINTS
Syllabus quiz & lab 0	1%
Labs (9)	45%
Reading Discussions (6)	18%
Exams (4)	12%
Project	23%
Class participation	1%
Total	**100%**
Extra credit assignment	3%

See course schedule below for due dates.

Assignment information

- **Weekly assignments**. The course is generally organized on a weekly basis, and assignments will be given to students to practice each week's topic. This will include Labs and/or writing assignments for discussion, based on assigned readings.
- **Term project**. Each student will work on a final project using the techniques learned in this class. The student is responsible for collecting data and implementing the project idea. Each project has a few deadlines for required deliverables, including a short proposal that describes the project idea, an early release of a working prototype, and the final product. Each student will write a final project report and make a 10-minute video presentation of the project. Each project will also be peer reviewed by at least two students.
- **Exam**. There will be four mini-exams throughout the semester to evaluate your learnings from different topics based on modules discussed throughout the course.
- **Participation**. Students are required to post and respond to online discussion boards. Each student will also be assigned to peer review two or more term projects.

Late assignments

Please refer to Carmen course website for due dates of assignments. Assignments will be penalized **10% for each day late**. Thus, **assignments submitted 10 days after the deadline will be graded 0**. Extensions will not be granted due to lost work; be sure you back up and keep all your work. In case of unavoidable emergencies (for ex: health concerns or conference attendance) you must notify your instructor and request for permission to submit a late assignment.

Grading scale

93–100: 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+
60 –66.9: D
Below 60: E

Instructor feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days after the assignment is closed.**
- **Email:** I will reply to emails within **48 hours** on days on school days. Feel free to send follow up email after 2 days of no response.
- **Discussion board:** I will check and reply to messages in the discussion boards **Twice a week on school days**.

OTHER COURSE POLICIES

Discussion and communication guidelines

Above all, please remember to be respectful and thoughtful.

- **Writing style**: While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources**: When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy for this course

- **Quizzes and exams**: You must complete the quizzes yourself, without any external help or communication.
- **Written assignments**: Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow Chicago style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work**: In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results**: All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review**: The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

GENERATIVE ARTIFICIAL INTELLIGENCE TOOLS

Given that the learning goals of this class include getting yourself familiar with Web and tools available on web, in this course, students are welcome to explore innovative tools and technologies including generative artificial intelligence (GenAI). Students are permitted to use GenAI tools for most course assignments, except for **the final project assignments and reading reflections**. Your written assignments, including **discussion posts or essays**, should be your own original work.

If I suspect that you have used GenAI on an assignment for which it is prohibited, I will ask you to explain your process for completing the assignment in question. Submission of GenAI-generated content as your own original work is considered a violation of Ohio State's Academic Integrity policy and Code of Student Conduct because the work is not your own. The unauthorized use of GenAI tools will result in referral to the Committee on Academic Misconduct.

OHIO STATE'S ACADEMIC INTEGRITY POLICY

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct.

If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages (COAM Home)
- *Ten Suggestions for Preserving Academic Integrity (Ten Suggestions)*
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options at titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu. Title IX is part of the Office of Institutional Equity (OIE) at Ohio State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information on OIE, visit equity.osu.edu or email equity@osu.edu.

Intellectual Diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are

intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

Grievances and Solving Problems

A student who encounters a problem related to his/her educational program has a variety of avenues available to seek resolution. (Note: the procedures for grade grievances are explicitly covered in the faculty rules) Typically, a student is advised to resolve any dispute, disagreement, or grievance as directly as possible, engaging with the person or persons most closely involved. The faculty and staff of the departments and colleges are available to work with students in this regard. If this step does not produce acceptable results, the student should follow a logical stepwise progression to address the academic concerns.

According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, take your case to the department chairperson, college dean or associate dean, and to the provost, in that order. Specific procedures are outlined in Faculty Rule 3335-8-23. Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

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 find yourself feeling isolated, anxious or overwhelmed, please know that there are resources to help: ccs.osu.edu. 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 Prevention Hotline at 1-(800)-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Religious accommodations

Our inclusive environment allows for religious expression. Students requesting accommodations based on faith, religious or a spiritual belief system in regard to examinations, other academic requirements or absences, are required to provide the instructor with written notice of specific dates for which the student requests alternative accommodations at the earliest possible date. For more information about religious accommodations at Ohio State, visit ***odi.osu.edu/religious-accommodations****.*

Weather or other short-term closing

Following **Policy 6.15** (Weather or Other Short-Term Closing):

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via CarmenCanvas. Unless otherwise announced by the university, online or distance-learning classes will occur as scheduled.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

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; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- CarmenCanvas accessibility
- Streaming audio and video
- CarmenZoom accessibility
- Collaborative course tools

COURSE SCHEDULE

AU25 Geog 6223: Web GIS Development				
Week	**Module**	**Content**	**Lab**	**Assignments**
w1		**Course Overview**	Lab 0	syllabus quiz
w2	**Module 1**	**Basics of Web technologies**	Lab 1	Reading Discussion 1
w3		**Basics of Web GIS technologies**	Lab 2	
				Exam 1
w4		**Spatial Data formats**	Lab 3	Reading Discussion 2
w5	**Module 2**	**OGC standards**	Lab 4	Reading Discussion 3
w6		**GeoServer**	Lab 5	GeoServere set up
				Exam 2
w7		**Spatial data query**	Lab 6	
w8	**Module 3**	**ArcGIS SDK**	Lab 7	ESRI tutorial
		Autumn break (10/16 - 10/17)		
w9		**Web GIS Scalability**	Lab 8	Reading Discussion 4
				Exam 3
w10		**Mobile GIS**	Lab 9	Project Proposal
w11	**Module 4**	**Web GIS Optimization**		Reading Discussion 5
w12		**Ethics and Security in Web GIS**		Reading Discussion 6
				Exam 4
w13		**Project consultation**		Data check
w14	**Module 5**	**Project work**		Bonus*
		Thanksgiving Break (11/26- 11/27), Columbus Day (11/28)		
w15		**Project work**		Survey
				Project presentations
w16				**Project report & peer reviews**
	* is an Extra Credit Assignment			