

## Term Information

Effective Term Spring 2023

## General Information

Course Bulletin Listing/Subject Area Geography  
Fiscal Unit/Academic Org Geography - D0733  
College/Academic Group Arts and Sciences  
Level/Career Graduate  
Course Number/Catalog 6223  
Course Title Web GIS development  
Transcript Abbreviation WEB GIS  
Course Description This course helps students grasp the technology for the design and implementation of web GIS applications.  
Semester Credit Hours/Units Fixed: 3

## Offering Information

Length Of Course 14 Week  
Flexibly Scheduled Course Never  
Does any section of this course have a distance education component? Yes  
Is any section of the course offered 100% at a distance  
Greater or equal to 50% at a distance  
Grading Basis Letter Grade  
Repeatable No  
Course Components Lecture  
Grade Roster Component Lecture  
Credit Available by Exam No  
Admission Condition Course No  
Off Campus Never  
Campus of Offering Columbus

## Prerequisites and Exclusions

Prerequisites/Corequisites GEOG 5210 and GEOG 5212, or consent of instructor.  
Exclusions  
Electronically Enforced Yes

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code 45.0701  
Subsidy Level Doctoral Course  
Intended Rank Masters, Doctoral

## Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

## Course Details

### Course goals or learning objectives/outcomes

- 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

### Content Topic List

- Network principles and enabling technology
  - Introduction to JavaScript
  - Serving spatial data on the web
  - Web mapping API: Leaflet
  - Web mapping API: ArcGIS Online
  - User interface design
  - Thematic mapping
  - Search and query
  - Data visualization and mapping (d3js)
  - Geolocation
  - Mobile GIS
  - Online data
  - Online GIS services: geocoding, routing
  - Final project
- No

### Sought Concurrence

## Attachments

- GEOG6223-inperson-web-gis-development.docx: Syllabus (in-person)  
*(Syllabus. Owner: Xiao, Ningchuan)*
- GEOG6223-online-web-gis-development.docx: Syllabus (online)  
*(Syllabus. Owner: Xiao, Ningchuan)*
- GEOG6223-asctech-review.docx: ASCTech review (online)  
*(Other Supporting Documentation. Owner: Xiao, Ningchuan)*
- GEOG6223-inperson-web-gis-development-v2.docx: Syllabus (in-person) - revised  
*(Syllabus. Owner: Xiao, Ningchuan)*
- GEOG6223-online-web-gis-development-v2.docx: Syllabus (online) - revised  
*(Syllabus. Owner: Xiao, Ningchuan)*

**Comments**

- Responses to contingency requests:
  - The calendar is now on a day-by-day basis. Assignments are due in a week, which is now stated in the Assignment information section.
  - This course does not have required text. We will prepare tutorials, and the length of each tutorial will be between 10 to 30 pages when printed (now stated in the Course materials section, page 2).
  - The course meets two 80-minute sessions per week, now stated on the first page.
  - More detailed descriptions are added for all assignments in the Assignment information section.
  - Discussion posts are no longer required. Instead, each student is required to review two or more final projects, counted for participation.

Old comments. This course will be part of a masters program that will be proposed soon. The ASC Tech review was conducted on 7/13/20. I was waiting to submit this new course along with the masters program proposal. But I was advised recently that the course should be proposed first. *(by Xiao,Ningchuan on 01/20/2022 12:30 PM)*

- Please see Panel feedback e-mail sent 12/03/21. *(by Cody,Emily Kathryn on 12/03/2021 02:28 PM)*

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Xiao,Ningchuan	11/08/2021 11:30 PM	Submitted for Approval
Approved	Xiao,Ningchuan	11/08/2021 11:47 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	11/12/2021 09:30 AM	College Approval
Revision Requested	Cody,Emily Kathryn	12/03/2021 02:28 PM	ASCCAO Approval
Submitted	Xiao,Ningchuan	01/20/2022 12:30 PM	Submitted for Approval
Approved	Xiao,Ningchuan	01/20/2022 11:56 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	01/23/2022 06:46 PM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	01/23/2022 06:46 PM	ASCCAO Approval



THE OHIO STATE UNIVERSITY

---

COLLEGE OF ARTS AND SCIENCES

# **SYLLABUS: GEOG 6223 (ONLINE) WEB GIS DEVELOPMENT SPRING 2022**

## **Course overview**

### **Instructor**

Instructor: Prof. Ningchuan Xiao

Email address: xiao.37@osu.edu

Phone number: 614-292-4072

Office hours: by appointment only (CarmenZoom)

Office Location: 1132 Derby Hall

### **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.

This class meets twice a week for two 80-minute sessions.

### **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 one week ahead of time. Each module is organized around a specific topic (see course schedule below) and consists of introduction videos, coding tutorials, and student activities (see assignment information below). 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](#), a 3 credit hour course comprises 3 hours of instruction in class (including online instruction content and Carmen activities) and 6 hours of homework/study time outside class per week, for a total of 9 hours per course per week, for the student to earn a C grade.

## GE Course Information

- This is not a GE course.

## Prerequisites

GEOG 5210 and GEOG 5212, or consent of instructor.

## Course materials

There is no required text for this class and there is no need to purchase any textbooks. Tutorials will be provided for each week. The typical length of each tutorial will be between 10 and 30 pages when printed. I recommend the following books that are highly relevant to this class.

## Optional materials

- Bennett, J. 2010. *OpenStreetMap*. Packt Publishing.
- Freeman, E.T. & Robson, E. 2014. *Head First JavaScript Programming*. O'Reilly Media.
- Fu, P. 2020. *Getting to Know Web GIS*, 4th Ed. Redlands, CA: ESRI Press.

- Murray, S. 2017. *Interactive Data Visualization for the Web: An Introduction to Designing with D3*. 2nd Ed. O'Reilly Media.
- Myers, M. 2014. *A Smarter Way to Learn JavaScript*. O'Reilly Media.
- Newton, T., Villarreal, O. and Verspohl, L. 2017. *Learning D3.js 4 Mapping: Build Cutting-edge Maps and Visualizations with JavaScript*. 2nd Ed. Packt Publishing.
- Robbins, J. 2012. *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript and Web Graphics*. O'Reilly Media.

## Other materials

Tutorials from <http://w3schools.com> will also be used.

## Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** [8help@osu.edu](mailto:8help@osu.edu)
- **TDD:** 614-688-8743

## Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

## Technology skills necessary for this specific course

- CarmenZoom text, audio, and video chat
- Collaborating in CarmenWiki
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

## Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

## Necessary software

- [Geoserver](#): students will install this open-source, free software system to manage and publish their geospatial data sets.

- [Leaflet](#) is an essential Javascript library for online mapping and GIS development.
- [D3.js](#): students will use D3 Javascript library for various course exercises and projects.
- ArcGIS Online: students will be provided 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 word processing, spreadsheet, and presentations. View their privacy statement at <https://www.openoffice.org/privacy.html>.
- [Microsoft Office 365 ProPlus](#) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
  - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
  - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

## Grading and faculty response

### Grades

Assignment or category	Points
Weekly assignments	40
Term project	30
Quizzes	20
Participation	10
Total	100

### Assignment information

**Weekly assignments.** The course is generally organized on a weekly basis and assignments will be given for students to practice each week's topic. These exercises require students to work individually on the theme of the week (see the course schedule). Students should first follow the

tutorial of each week to get familiar with the concepts and practical details. The tutorials are hands-on materials for the concepts and techniques covered in each week. The exercises include reflection questions of the tutorial materials, as well as problems that require certain level of extension from what is covered in the tutorials. Exercises are typically due in a week.

**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.

**Quizzes.** There will be three quizzes throughout the semester. Quizzes are not cumulative, and only topics covered in the section of the quiz will be tested.

**Participation.** Each student will be assigned to peer review two or more term projects from other students. Evaluation rubric will be provided.

## Late assignments

Late submissions will be accepted up to a week past the due date. One day late will incur a 10% penalty. Two days late will incur 20% penalty. Three days will incur a 30% penalty. Four days late will incur a 40% penalty. Five to seven days late will only receive 50% credit of the grade you would have received if it is submitted on time. If you contact me ahead of time for deadline adjustments, you will not incur any penalty. Please refer to Carmen for due dates.

## 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

## Faculty 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**.

### **E-mail**

I will reply to e-mails within **24 hours on school days**.

### **Discussion board**

I will check and reply to messages in the discussion boards **Monday, Wednesday, and Friday on school days**.

## **Attendance, participation, and discussions**

### **Student participation requirements**

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

- **Logging in: 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 OR FLEXIBLE**  
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 peer review: FINAL PROJECT**  
Each student is required to review two or more final projects of other students. Review rubric will be provided.

### **Discussion and communication guidelines**

The following are my expectations for how we should communicate as a class. 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. Informality (including an occasional emoticon) 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.

## Other course policies

### Academic integrity policy

- **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.

## Ohio State's academic integrity policy

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. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

## 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 (Recommended)

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at [titleix@osu.edu](mailto:titleix@osu.edu)

## Accessibility accommodations for students with disabilities

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](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 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.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

## 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](http://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](http://suicidepreventionlifeline.org)

## Course schedule (tentative)

Week	Topics	Dates	Modules
1	Enabling technology	1/11	<b>Network principles and enabling technology</b>  <u>Lecture</u> : computer networks, internet, web, HTML, HTTP, server and client, online GIS
		1/13	<u>Tutorial</u> : getting started HTML and CSS <u>Exercise</u> : building your own course home page
2		1/8	<b>Introduction to JavaScript</b>  <u>Concepts</u> : JavaScript basics, Document Object Model, IDEs, debugging <u>Tutorial</u> : interactive web pages using HTML/CSS <u>Exercise</u> : making your responsive web page
		1/20	<u>Tutorial</u> : JavaScript <u>Exercise</u> : making your responsive web page (continued)
3		1/25	<b>Serving spatial data on the web</b>  <u>Concepts</u> : GeoServer, WMS, GeoJSON, OGC standards <u>Tutorial</u> : getting started with GeoServer for data services <u>Exercise</u> : putting your own data online
		1/27	<u>Exercise</u> : putting your own data online (continued) <u>Quiz 1</u>
4	Mapping and visualization	2/1	<b>Web mapping API: Leaflet</b>  <u>Concepts</u> : API, layers, tiles, map elements, popups, interactivity <u>Tutorial</u> : getting started with leaflet <u>Exercise</u> : map using your own data
		2/3	<u>Exercise</u> : map using your own data (continued)
5		2/8	<b>Web mapping API: ArcGIS Online</b>  <u>Concepts</u> : layers, 2D maps, 3D scenes, autocasting, REST API, layers <u>Tutorial</u> : getting started with ArcGIS Online <u>Exercise</u> : map your place, neighborhood or hometown
		2/10	<u>Exercise</u> : map your place, neighborhood or hometown (continued) <u>Project</u> : project ideas and data
6		2/15	<b>User interface design</b>  <u>Concept</u> : widgets, buttons, menus, HTML form and select

			<p><u>Tutorial</u>: develop responsive web GIS app</p> <p><u>Exercise</u>: custom web GIS</p>
		2/17	<p><u>Exercise</u>: custom web GIS (continued)</p>
7		2/22	<p><b>Thematic mapping</b></p> <p><u>Concepts</u>: dot maps, choropleth maps, point and proportional symbol maps</p> <p><u>Tutorial</u>: thematic mapping with leaflet and ArcGIS Online</p> <p><u>Exercise</u>: thematic map using your own data</p>
		2/24	<p><u>Exercise</u>: thematic map using your own data (continued)</p>
8		3/1	<p><b>Search and query</b></p> <p><u>Concepts</u>: filter, classification, query features, asynchronous querying using promise in JavaScript</p> <p><u>Tutorial</u>: search and query in leaflet and ArcGIS Online</p> <p><u>Exercise</u>: search and query using your own data</p>
		3/3	<p><u>Exercise</u>: search and query using your own data (continued)</p>
9		3/8	<p><b>Data visualization and mapping (d3js)</b></p> <p><u>Concepts</u>: D3, scales, data binding, plot types, projections</p> <p><u>Tutorial</u>: linking data and map</p> <p><u>Exercise</u>: histogram and map</p>
		3/10	<p><u>Exercise</u>: histogram and map (continued)</p> <p><u>Quiz 2</u></p>
10	Spring break	3/14-3/18	No class
11	Applications	3/22	<p><b>Geolocation</b></p> <p><u>Concepts</u>: geolocation techniques, privacy, and ethics</p> <p><u>Tutorial</u>: geolocation in HTML5</p> <p><u>Exercise</u>: finding nearest features</p>
		3/24	<p><u>Exercise</u>: finding nearest features (continued)</p> <p><u>Exploration</u>: report on an online GIS app or technology</p>
12		3/29	<p><b>Mobile GIS</b></p> <p><u>Concepts</u>: mobile app design and implementation issues</p> <p><u>Tutorial</u>: geolocation on mobile devices</p> <p><u>Exercise</u>: track and map your mobile devices</p>

		3/31	<u>Exercise</u> : track and map your mobile devices (continued)
13		4/5	<b>Online data</b> <u>Concepts</u> : volunteered geographic information, OpenStreetMap, crowdsourcing, data quality <u>Tutorial</u> : streaming and mapping tweets <u>Exercise</u> : find and map your own data from online
		4/7	<u>Exercise</u> : find and map your own data from online (continued) <u>Project</u> : prototype/first version
14		4/12	<b>Online GIS services: geocoding, routing</b> <u>Concepts</u> : geocoding, routing, services, shortest path <u>Tutorial</u> : setting up online service for routing <u>Exercise</u> : a web GIS routing app
		4/14	<u>Exercise</u> : a web GIS routing app (continued) <u>Quiz 3</u>
15	Project	4/19	<b>Final project</b> Work on the final project
		4/21	<b>Final project</b> Project final release Project video presentation Project report Peer review of at least two other projects



THE OHIO STATE UNIVERSITY

---

COLLEGE OF ARTS AND SCIENCES

# **SYLLABUS: GEOG 6223**

## **WEB GIS DEVELOPMENT**

### **SPRING 2022**

## **Course overview**

### **Instructor**

Instructor: Prof. Ningchuan Xiao

Email address: xiao.37@osu.edu

Phone number: 614-292-4072

Office hours: Monday and Wednesday, 10-11:30 AM or by appointment

Office Location: 1132 Derby Hall

### **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.

This class meets twice a week for two 80-minute sessions.

### **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

## GE Course Information

- This is not a GE course.

## Prerequisites

GEOG 5210 and GEOG 5212, or consent of instructor.

## Course materials

There is no required text for this class and there is no need to purchase any textbooks. Tutorials will be provided for each week. The typical length of each tutorial will be between 10 and 30 pages when printed. I recommend the following books that are highly relevant to this class.

### Optional materials

- Bennett, J. 2010. *OpenStreetMap*. Packt Publishing.
- Freeman, E.T. & Robson, E. 2014. *Head First JavaScript Programming*. O'Reilly Media.
- Fu, P. 2020. *Getting to Know Web GIS*, 4th Ed. Redlands, CA: ESRI Press.
- Murray, S. 2017. *Interactive Data Visualization for the Web: An Introduction to Designing with D3*. 2nd Ed. O'Reilly Media.
- Myers, M. 2014. *A Smarter Way to Learn JavaScript*. O'Reilly Media.
- Newton, T., Villarreal, O. and Verspohl, L. 2017. *Learning D3.js 4 Mapping: Build Cutting-edge Maps and Visualizations with JavaScript*. 2nd Ed. Packt Publishing.
- Robbins, J. 2012. *Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript and Web Graphics*. O'Reilly Media.

### Other materials

Tutorials from <http://w3schools.com> will also be used.

## Course technology

### Necessary software

- [Geoserver](#): students will install this open-source, free software system to manage and publish their geospatial data sets.
- [Leaflet](#) is an essential Javascript library for online mapping and GIS development.
- [D3.js](#): students will use D3 Javascript library for various course exercises and projects.
- ArcGIS Online: students will be provided 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](#).

## Grading and faculty response

### Grades

Assignment or category	Points
Weekly assignments	40
Term project	30
Quizzes	20
Participation	10
<b>Total</b>	<b>100</b>

### Assignment information

**Weekly assignments.** The course is generally organized on a weekly basis and assignments will be given for students to practice each week's topic. These exercises require students to work individually on the theme of the week (see the course schedule). Students should first follow the tutorial of each week to get familiar with the concepts and practical details. The tutorials are hands-on materials for the concepts and techniques covered in each week. The exercises include reflection questions of the tutorial materials, as well as problems that require certain level of extension from what is covered in the tutorials. Exercises are typically due in a week.

**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.

**Quizzes.** There will be three quizzes throughout the semester. Quizzes are not cumulative, and only topics covered in the section of the quiz will be tested.

**Participation.** Students are required to attend the course lectures and actively participate in-class discussions. Each student will also be assigned to peer review two or more term projects.

## Late assignments

Late submissions will be accepted up to a week past the due date. One day late will incur a 10% penalty. Two days late will incur 20% penalty. Three days will incur a 30% penalty. Four days late will incur a 40% penalty. Five to seven days late will only receive 50% credit of the grade you would have received if it is submitted on time. If you contact me ahead of time for deadline adjustments, you will not incur any penalty. Please refer to Carmen for due dates.

## 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

## Faculty 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**.

## E-mail

I will reply to e-mails within **24 hours on school days**.

## Discussion board

I will check and reply to messages in the discussion boards **Monday, Wednesday, and Friday on school days**.

# Other course policies

## Academic integrity policy

- **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.

## Ohio State's academic integrity policy

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. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

## 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 (Recommended)

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at [titleix@osu.edu](mailto:titleix@osu.edu)

## Accessibility accommodations for students with disabilities

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](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 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.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

## 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](http://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](http://suicidepreventionlifeline.org)

## Course schedule (tentative)

Week	Topics	Dates	Modules
1	Enabling technology	1/11	<b>Network principles and enabling technology</b> <u>Lecture</u> : computer networks, internet, web, HTML, HTTP, server and client, online GIS
		1/13	<u>Tutorial</u> : getting started HTML and CSS <u>Exercise</u> : building your own course home page
2		1/8	<b>Introduction to JavaScript</b> <u>Concepts</u> : JavaScript basics, Document Object Model, IDEs, debugging <u>Tutorial</u> : interactive web pages using HTML/CSS <u>Exercise</u> : making your responsive web page
		1/20	<u>Tutorial</u> : JavaScript <u>Exercise</u> : making your responsive web page (continued)
3		1/25	<b>Serving spatial data on the web</b> <u>Concepts</u> : GeoServer, WMS, GeoJSON, OGC standards <u>Tutorial</u> : getting started with GeoServer for data services <u>Exercise</u> : putting your own data online
		1/27	<u>Exercise</u> : putting your own data online (continued) <u>Quiz 1</u>
4	Mapping and visualization	2/1	<b>Web mapping API: Leaflet</b> <u>Concepts</u> : API, layers, tiles, map elements, popups, interactivity <u>Tutorial</u> : getting started with leaflet <u>Exercise</u> : map using your own data
		2/3	<u>Exercise</u> : map using your own data (continued)
5		2/8	<b>Web mapping API: ArcGIS Online</b> <u>Concepts</u> : layers, 2D maps, 3D scenes, autocasting, REST API, layers <u>Tutorial</u> : getting started with ArcGIS Online <u>Exercise</u> : map your place, neighborhood or hometown
		2/10	<u>Exercise</u> : map your place, neighborhood or hometown (continued) <u>Project</u> : project ideas and data
6		2/15	<b>User interface design</b> <u>Concept</u> : widgets, buttons, menus, HTML form and select

			<u>Tutorial</u> : develop responsive web GIS app <u>Exercise</u> : custom web GIS
		2/17	<u>Exercise</u> : custom web GIS (continued)
7		2/22	<b>Thematic mapping</b>  <u>Concepts</u> : dot maps, choropleth maps, point and proportional symbol maps <u>Tutorial</u> : thematic mapping with leaflet and ArcGIS Online <u>Exercise</u> : thematic map using your own data
		2/24	<u>Exercise</u> : thematic map using your own data (continued)
8		3/1	<b>Search and query</b>  <u>Concepts</u> : filter, classification, query features, asynchronous querying using promise in JavaScript <u>Tutorial</u> : search and query in leaflet and ArcGIS Online <u>Exercise</u> : search and query using your own data
		3/3	<u>Exercise</u> : search and query using your own data (continued)
9		3/8	<b>Data visualization and mapping (d3js)</b>  <u>Concepts</u> : D3, scales, data binding, plot types, projections <u>Tutorial</u> : linking data and map <u>Exercise</u> : histogram and map
		3/10	<u>Exercise</u> : histogram and map (continued) <u>Quiz 2</u>
10	Spring break	3/14-3/18	No class
11	Applications	3/22	<b>Geolocation</b>  <u>Concepts</u> : geolocation techniques, privacy, and ethics <u>Tutorial</u> : geolocation in HTML5 <u>Exercise</u> : finding nearest features
		3/24	<u>Exercise</u> : finding nearest features (continued) <u>Exploration</u> : report on an online GIS app or technology
12		3/29	<b>Mobile GIS</b>  <u>Concepts</u> : mobile app design and implementation issues <u>Tutorial</u> : geolocation on mobile devices <u>Exercise</u> : track and map your mobile devices



		3/31	<u>Exercise</u> : track and map your mobile devices (continued)
<b>13</b>		4/5	<b>Online data</b> <u>Concepts</u> : volunteered geographic information, OpenStreetMap, crowdsourcing, data quality <u>Tutorial</u> : streaming and mapping tweets <u>Exercise</u> : find and map your own data from online
		4/7	<u>Exercise</u> : find and map your own data from online (continued) <u>Project</u> : prototype/first version
<b>14</b>		4/12	<b>Online GIS services: geocoding, routing</b> <u>Concepts</u> : geocoding, routing, services, shortest path <u>Tutorial</u> : setting up online service for routing <u>Exercise</u> : a web GIS routing app
		4/14	<u>Exercise</u> : a web GIS routing app (continued) <u>Quiz 3</u>
<b>15</b>	Project	4/19	<b>Final project</b> Work on the final project
		4/21	<b>Final project</b> Project final release Project video presentation Project report Peer review of at least two other projects

## Arts and Sciences Distance Learning Course Component Technical Review Checklist

**Course: Geog 6223**

**Instructor: Ningchuan Xiao**

**Summary: Web GIS Development**

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			<ul style="list-style-type: none"> <li>• Office 365</li> <li>• Carmen</li> <li>• Python</li> <li>• ArcGIS</li> <li>• QGIS</li> <li>• RemoteLab</li> </ul>
6.2 Course tools promote learner engagement and active learning.	X			<ul style="list-style-type: none"> <li>• CarmenZoom</li> <li>• CarmenWiki</li> <li>• Carmen Discussion Boards</li> </ul>
6.3 Technologies required in the course are readily obtainable.	X			All tools are available via OSU site license free of charge.
6.4 The course technologies are current.	X			All are updated regularly.
6.5 Links are provided to privacy policies for all external tools required in the course.		X		Please include all privacy policies (when such exists) for all 3 <sup>rd</sup> party tools (Python, ArcGIS, QGIS).
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			Links to 8HELP are provided
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.	X			b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	X			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.		X		Please include all accessibility policies (when such exists) for all 3 <sup>rd</sup> party tools (Python, ArcGIS, QGIS).
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			Instructions are provided to obtain materials in another format.
8.4 The course design facilitates readability	X			
8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of

				use by being available through a standard web browser
--	--	--	--	---

### Reviewer Information

- Date reviewed: 7/13/20
- Reviewed by: Ian Anderson

**Notes: Just a few issues with policy statements.**

<sup>a</sup>The following statement about disability services (recommended 16 point font):  
Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, [slds@osu.edu](mailto:slds@osu.edu); [slds.osu.edu](http://slds.osu.edu).

<sup>b</sup>Add to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus.  
<http://advising.osu.edu/welcome.shtml>

<sup>c</sup>Add to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the "Other Course Policies" section of the syllabus.