

Geography 5223: Design and Implementation of GIS

Spring 2021

Location: Online

Course URL: <http://carmen.osu.edu>

Instructors

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Office hours

Day	Time and link	Passcode	Instructor
Monday	11-12	399066	Dr. Xiao
Wednesday	11-12	399066	Dr. Xiao
Friday	10-12:30	415362	Ms. Berezina

This course covers a wide range of topics in developing GIS software tools. There are two main themes of this course. First, we introduce techniques that will help students build custom tools to automate spatial data handling processes, including topics of programming skills, software testing, and verification. The second theme of this course is about project management for GIS software development. More specifically, we discuss how agile methods can be applied for software development projects. The course is organized around a set of coding tutorials, lectures, and discussions. It is mostly a project-oriented course, where each major coding topic will end with finishing a project using the concepts covered, and there is also a final project. Upon completion of this course students will be able to

- understand the tasks of GIS customization,
- write code to implement GIS tools in open-source and commercial GIS,
- understand the fundamentals of agile project management
- put together and manage a project to automate GIS tasks, and
- identify and act upon ethic issues in GIS software design and applications.

How this course works

This is an asynchronous course and is delivered 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 and each module is released at the beginning of the week. A module is organized around a specific topic (see course schedule for details) and may consist of introduction videos, coding tutorials, readings, and other activities (see assignment information below). Students are expected to keep pace with weekly deadlines

but may schedule their efforts freely within that time frame. The final project is a long-term activity that starts in week 3 and continues through a set of major steps throughout the semester, as outlined in the course schedule.

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 direct instruction (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. Of this allocated time, one 50 minute session will be held in person.

Technical Requirements

The minimum technical requirements for this class include the following:

- Computer: current Mac or PC with high-speed internet connection
- Microphone: built-in laptop or tablet mic or external microphone
- Webcam: built-in or external webcam, fully installed

Carmen. Your computer must be able to access Carmen online, which requires a modern web browser. In order to view the embedded images in the tutorials, you need to install FireFox on your computer. A recent version of Python 3 must also be installed. We will use video in this class, which should be supported by most modern web browsers. CarmenZoom will generally require a microphone and camera on the computer for best communication.

Network. Reliable access to the internet is essential. Internet access may not be used as an excuse for late, missing, or incomplete submissions. It is students' responsibility to ensure reliable connections.

CarmenZoom. We will use CarmenZoom extensively throughout the course of this semester, for office hours and, more importantly, for team meetings. All OSU students have full access to CarmenZoom service. To familiarize with CarmenZoom, please visit <https://resourcecenter.odee.osu.edu/carmenzoom/getting-started-carmenzoom>.

Remote access to lab computers. All lab computers can be accessed remotely using a service called Guacamole at <https://remotelab.service.osu.edu/> (Links to an external site). Students can log in using their OSU credentials (name.# and password). Please see the document named *Geography Lab Courses Software How To Get and configure (1).docx* in the misc folder in Files.

ArcGIS Pro. The remote access mentioned above will allow every student in this class to use ArcGIS Pro (and all other software packages) installed on the lab computers in Derby Hall. However, students can also install ArcGIS Pro on their own PC computers. Detailed instructions for installation can be found in the document named *Geography Lab Courses Software How To Get and configure (1).docx* in a folder called *misc* in Carmen Files.

QGIS. The lab computers Derby Hall have QGIS installed. Students can also install it on their own computers (Mac, Linux, or PC). Please download QGIS from their official web site at <https://www.qgis.org/en/site/>. Detailed information about installation can also be found from their web site.

Texts

The following textbook is required for this course:

- *Agile Project Management For Dummies*, (2nd Ed.) by Mark C. Layton and Steven J. Ostermiller, John Wiley & Sons, Inc., 2017.

The following two textbooks are optional:

- *Python Scripting for ArcGIS Pro*, by Paul A. Zandbergen, ESRI Press, 2020.
- *Advanced Python Scripting for ArcGIS Pro*, by Paul A. Zandbergen, ESRI Press, 2020

In addition to the textbooks, we will provide tutorials to cover topics of tool development in QGIS and ArcGIS Pro. There are other readings materials that will be handed out during the class.

Prerequisites

Geography 5222 or consent of instructor.

Credit Hours

This class is for 3 credits.

Schedule

The detailed course schedule is presented on the front page of the Carmen site. In general, the course is roughly divided into the following topics:

Week 1: Introduction

Weeks 3-5: Python scripting for ArcGIS Pro

Weeks 6-8: Agile project management

Weeks 9-13: QGIS plug-ins development

Week 14: GIS ethics

Week 15: Final projects

Grading and faculty response

Assignment category	Percent
Weekly exercises	20
Class projects	20
Final projects	30
Quizzes	10
Participation	20
Total	100

Assignment information

The assignments are organized to provide multiple lower stakes opportunities. While they will build of learning from various modules. There are no cumulative high stakes assignments.

- **Weekly exercises.** Each week we will have some questions that reflect what is covered in that week's module.
- **Class projects.** At the end of the topics of ArcGIS Pro and QGIS, there is also a project that will be assigned to every student in this class. All the tutorials will be working toward the same project idea, which is based on computing the market share of public libraries in Franklin County. Manual calculation of the market share will introduced at the beginning of the semester.
- **Final projects.** Students will be divided into several teams, each working on a GIS development project. A typical team has no more than 4 students. Conducting the final project is a semester long process, where a formal deliverable such as a video presentation or document is required at each of the steps (see the Project column in the course schedule for the steps). At the end of the semester each project should be concluded by (a) delivering the final product including a full set of documents, software, and necessary data, and (b) making professional video presentations about the project to the class. Teams that do not deliver the complete package on time will not receive any credit for the project. Teams will use CarmenZoom (<https://osu.zoom.us>) for their team meetings and other group activities.
- **Quizzes.** There will be two quizzes for this semester.
- **Participation.** At the end of each module, we will post questions on the discussion board and students are required to post their responses. Each student will be assigned to peer review a number of questions each from other students. Peer review is also used for numerous final project items (see the Project column in the course schedule). It is important to know that peer reviews will be automatically assigned, and you will only be assigned to peer review after you have already submitted your own assignment by the due date.
- Each module also includes a **check-your-knowledge/skills quiz**. These quizzes can be taken multiple times and will be graded automatically. They are not counted toward the final grade of the class. Each student must successfully finish the quiz in order to complete the module.

Important Class Policies

- **Lab computers.** The computers in the classroom will have all the software installed for this class. Every student should be able to log in any computer with their OSU credentials, in the lab or through the remote access at <https://remotelab.service.osu.edu/>. Please note that WE ARE NOT RESPONSIBLE FOR FILES LEFT ON LAB MACHINES. Files on the computer hard drive may be deleted at any time if needed. Students should use USB devices or Cloud storage to save their work. It is important to LOG OUT when you are done with their work.
- **Submissions.** All submissions must be done on Carmen (unless otherwise specified). There will be **absolutely no email submissions**. Email submissions of work for this class will not

be acknowledged and will not be accepted.

- **Late submissions.** 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 was submitted on time. If you contact me **prior to the due date** for deadline adjustments you will not incur any penalty. Please refer to the assignments on Carmen for their due dates.
- **Do your own work.** Collaboration is healthy and often necessary, but each student should definitely finish the work individually. Please see below for more information about academic misconduct.
- **Communication.** The only official way to communicate with me and the TA is through our OSU email address as listed on the top of the syllabus. We cannot guarantee that we will reply messages through any other methods. We normally will reply emails in a day (except weekends or holidays).

Students with Disabilities. I would like to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please talk with me after class or during my office hours. If you need more information about disabilities and accommodations, contact the Office of Disability Services.

Policy on Plagiarism and 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. In the Code of Student Conduct, academic misconduct is defined as "any activity that tends to compromise the academic integrity of the university, or subvert the educational process"; plagiarism is defined as "the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas."

Plagiarism is wrong and should be prohibited. The University has a policy on academic misconduct and plagiarism, as provided in the [Code of Student Conduct](#). To further understand this, it is worthwhile to read and understand the Eight Cardinal Rules of Academic Integrity at [here](#) and guidelines to avoid plagiarism at [here](#).