



SYLLABUS

GEOG5212

GEOSPATIAL DATABASES FOR GIS

AUTUMN 2020 – DISTANCE ENHANCED

Course overview

Instructor

Instructor: Dr. Emily S. Castellucci
Email address: castellucci.5@osu.edu
Office hours: See the CarmenCanvas Calendar
Office location: CarmenZoom

Teaching Assistant (TA)

Teaching Assistant: Jialin Li
Email address: li.7957@osu.edu
Office hours: See the CarmenCanvas Calendar
Office Location: CarmenZoom

Course description

This course focuses on designing, implementing, querying, and managing geospatial databases or persistent data stores where most entities have footprints in geographic space and time. This is critical for designing and implementing GIS for projects and organizations. It is also crucial for moving beyond GIS to the bigger world of geographic information services.

In designing any GIS project, a fundamental decision is how to represent the world of interest in the computer. This is critical since no GIS or spatial analysis tools – no matter how powerful – can extract more information than is designed in the database representation. The growing size of geospatial databases requires these databases to support efficient querying and searching. A well-designed spatial database can also evolve as the questions in the project or organization change over time. A poorly designed spatial database is difficult to rewind and fix.

Understanding spatial database design and management is not only essential for designing and implementing GIS, but also to support a much wider range of geographic information services such as Google Maps and location-based services such as the location apps on your smartphone. This is a much bigger market than the market for professional GIS service.

Database technologies. The most common spatial database management system (SDBMS) technology is a specialized object-relational database management system (ORDBMS). An ORDBMS supports objects within a relational (table-based) database and its associated query language, Structured Query Language (SQL). An ORDBMS is a SDBMS if it also supports spatial objects through spatial indexing and spatial (geometric) operations.

ORDBMS with spatial objects is the approach used by ESRI's Geodatabase as well as open-source software such as PostGreSQL/PostGIS. It is also supported by other major vendors such as IBM.

In this course, we will be working with ESRI's ArcGIS Geodatabase and PostGreSQL/PostGIS. There will be a series of assignments using these technologies. These will be provided via the course website and discussed in class.

Course learning outcomes

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

- Understand database design with spatial objects.
- Write spatial queries.
- Understand physical data storage and performance tuning.
- Understand spatio-temporal and moving objects data.
- Have practical GIS data skills.

How This Course Works

Mode of delivery

This course is a distance enhanced hybrid course. This means that most of the course activity will occur online, but there will also be opportunities for in-person engagement. For the online portion of the course, please note that *there are no required sessions when you must be logged in to Carmen at a scheduled time*. For the in-person portion of the course, please note that *any in-person component is optional, due to the ongoing pandemic, and absence from any in-person component will not result in a grade penalty*, e.g. loss of points toward participation. You may choose to engage with the course by completing it entirely online, but please note that if you do then 1) you won't be taking advantage of any benefits that the in-person experiences would bring and 2) you're still responsible for paying tuition for the course as a distance enhanced hybrid course (not a fully online course), since tuition is always based on how the course is listed in the course catalog.

Pace of online activities

This course is divided into **weekly modules** that are released at least one week ahead of time. 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.

Course materials

Additionally, excerpts from the following texts are provided in digital (PDF) format:

- **B:** Bolstad, P. (2019). *GIS Fundamentals*, 6th edition.
- **CM:** Coronel, C. & Morris, S. (2016). *Database Systems: Design, Implementation, and Management*, 12th edition.
- **EN:** Elmasri, R. & Navathe, S. (2016). *Fundamentals of Database Systems*, 7th edition.
- **N:** Nasser, H. (2014). *Learning ArcGIS Geodatabases*.
- **OH:** Obe, R. & Hsu, L. (2015). *PostGIS in Action*, 2nd edition.
- **R+:** Rigaux, P., Scholl, M., & Voisard, A. (2002). *Spatial Databases with Application to GIS*.
- **RG:** Ramakrishnan, R. & Gehrke, J. (1999) *Database Management Systems*, 2nd edition.
- **SC:** Shekhar, S. & Chawla, S. (2003) *Spatial Databases: A Tour*.
- **WD:** Worboys, M. & Duckham, M. (2004) *GIS: A Computing Perspective*, 2nd edition.
- **Z:** Zeiler, M. (2010) *Modeling Our World: The ESRI Guide to Geodatabase Concepts*, 2nd edition.

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>, 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
- **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](#).
- [CarmenZoom virtual meetings](#)

Required equipment

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

Required software

Please keep in mind that you are NOT required to purchase any software for this class. The following list should help you access the software free-of-cost to you as a student in this class.

- [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 at <https://ocio.osu.edu/kb04733>.
- ArcGIS Pro
 - ArcGIS Pro is provided free-of-cost to OSU students, staff, and faculty for educational and research purposes under the ESRI Education Site License Program. You may review ESRI's privacy policies at [Esri Privacy](#).
 - Full instructions for downloading and installing can be found at <https://osu.box.com/s/qxrdgqoni1qvhc0esjgsvm5dpoxhypvl>. **DO NOT attempt to download and install this software using any other method.** Otherwise, you might end up with the wrong software, the wrong version of the software, or a paywall when you should have free and unlimited access while a student.
 - For information about accessibility, visit [Accessibility in ArcGIS Pro](#).
 - Note for Mac users: ArcGIS Pro requires a Windows operating system. If you can install Windows on your Mac using Parallels, Boot Camp, VMWare Fusion, or a similar program, then you should be to install ArcGIS Pro. If installing Windows on your machine is not an option, then you will need to access this software using the RemoteLab option (see below).
 - Email esri-support@osu.edu for ArcGIS Pro technical support. If they are unable to help you install ArcGIS Pro on your machine, then you will need to access this software using the Remote Lab option (see below).
- QGIS

- This is the leading open source desktop GIS software that is available free-of-cost. You can download the software from here: <https://qgis.org/en/site/forusers/download.html>.
- Successful download and installation of QGIS is ultimately the student's responsibility. You may contact your instructor/TA with installation-related questions, but we cannot guarantee that we'll be able to resolve all issues. If you are unable to install QGIS on your own machine, then you will need to access this software using the RemoteLab option (see below).
- PostgreSQL, PostGIS, and pgAdmin
 - PostgreSQL, also known as Postgres, is a free and open-source relational database management system emphasizing extensibility and SQL compliance. PostGIS is an open source software program that adds support for geographic objects to the PostgreSQL object-relational database. pgAdmin is a management tool for PostgreSQL.
 - You can download the installer for PostgreSQL from this site: <https://www.postgresql.org/download>.
 - The installation of PostgreSQL includes pgAdmin, and it is during the final step of installing PostgreSQL that you have the option to install additional packages as well. You want to do this, because this is when you'll have the opportunity to select PostGIS, which will then be installed.
 - Additionally, remember to record any passwords and port numbers that you create during the installation process. You'll need this information.
 - Successful download and installation of PostgreSQL, PostGIS, and pgAdmin is ultimately the student's responsibility. You may contact your instructor/TA with installation-related questions, but we cannot guarantee that we'll be able to resolve all issues. If you are unable to install PostgreSQL, PostGIS, and pgAdmin on your own machine, then you will need to access this software using the RemoteLab option (see below).
- RemoteLab
 - If you have any trouble with downloading, installing, or using ArcGIS Pro or QGIS on your own machine, you may access the computers in the Derby Hall 0135 and 0140 computer labs via remotelab.osu.edu.
 - Instructions for using RemoteLab can be found at [this Google Doc](#).
 - Important: It is best if you can download, install, and use ArcGIS Pro and QGIS on your own machine, rather than via RemoteLab, because there are a limited number of computers available remotely, so please only use this option of absolutely needed.
 - Email Jens Blegvad at blegvad.1@osu.edu for RemoteLab technical support.

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.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- 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

Grades

Assignment or category	Percentage
Participation	10
Exams (6)	42
Labs (12)	48
Total	100

See course schedule, below, for due dates

Assignment information

Participation

With each module, there will be ~2 participation activities, usually 0.5-1 point each. Your goal is to accumulate 10+ points to receive full credit for the participation portion of your grade.

Exams

There will be 6 short, noncumulative exams. Each exam will be...

- *Timed.* (If you are registered with SLDS for extended time accommodations, please confirm that extended time has been granted before you begin the exam.)
- *Open-note.* This means that you can use the lecture slides, the handouts, your notes, the textbook, etc.
- *Completed independently.* You should complete the exam by yourself. Collaboration with one or more other persons will be considered academic misconduct.
- *Allowed only one attempt.* Be sure that you are ready to complete the exam in one sitting before you begin.
- *Graded immediately.* Your grade should be visible as soon as you click Submit; if it is not, please notify your instructor. Correct answers will be posted once the "available until" date and time has passed (i.e. once the exam closes).
- *Password protected.* You'll find the password in the quiz instructions, so make sure you read the instructions before you click Take the Quiz.
- *Submitted on time.* Late submissions will not be accepted for exams.

Labs

There will be 12 labs. You will be provided with data and step-by-step instructions for each lab, but keep in mind that the process of completing any given lab may not go as smoothly as planned. Unexpected challenges may arise, so it is best to plan for this. Set a goal to submit each lab in advance of the deadline. That way, if unexpected challenges do arise, you have time to deal with them before the deadline passes.

If you need assistance with a lab, you are required to post your question(s) in the Q&A discussion board for that lab. If you attempt to contact your instructor/TA with your lab-related question, you will be directed to post your question in the discussion board before it is answered. (The only exception to this is grade-related questions. These are private!) Using the discussion boards for Q&A is how your instructor/TA can avoid answering the same questions repeatedly, and the discussion board becomes an excellent archive for editing the lab for use in future semesters.

Late assignments

- Labs
 - a. You can submit labs up to **one week late** unless otherwise noted, and the late penalty is 5% (of the total possible score) per day. The late penalty will not reduce grades to below 70% (of the total possible score). Late penalties are managed by the course website and automatically applied.
 - b. Extensions are NOT typically granted due to getting "stuck," encountering unexpected errors, software crashes, lost work, or other issues related to these. This is because these are realistic issues that you are likely to encounter when performing GIS work outside of this class, and you need to learn how to manage these issues. However, do keep in touch with your instructor/TA when issues arise so that we can provide support.

- Exams
 - a. You must submit your exams on time. Late submissions will not be accepted for exams.
- Participation
 - a. Participation assignments may or may not be accepted late. To check, go to the Assignments page and compare the “Due” date and the “Available until” date. After the “Available until” date, no more submissions will be accepted. Late submissions of participation assignments are not usually penalized, unless they are automatically graded, in which case the late penalty (same as for labs) will be applied automatically.

Grading scale

92.5–100: A
89.5–92.49: A-
86.5–89.49: B+
82.5–86.49: B
79.5–82.49: B-
76.5–79.49: C+
72.5–76.49: C
69.5–72.49: C-
66.5–69.49: D+
59.5–66.49: D
Below 59.5: E

Instructor feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course.

Grades and feedback

You can generally expect grades and feedback to be returned within **7 days** once the assignment’s deadline has passed. More or less time may be needed, depending on the complexity of the assignment.

E-mail and discussion boards

I usually reply to e-mails and discussion board posts within **24 hours on school days**. This usually occurs during normal work hours (8am-5pm), and although I might reply to emails outside of those hours, please do not expect this.

What should I call my instructor?

Use the proper title when addressing your instructors/TAs. Recommended resource: [What should I call my professor?](#) For example: Because Emily S. Castellucci has a Ph.D., it’s always Dr. Castellucci, *never* Ms., Mrs., or Miss.

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 ONCE 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**
All live, scheduled events for the course, including my office hours, are optional.
- **Participating in discussion forums: ~1-2 TIMES PER WEEK (FLEXIBLE)**
In each module, there will be ~2 participation activities (usually worth 0.5-1 point each), and most of these activities involve participation in a discussion forum. Your goal is to accrue 10+ points by the end of the semester, which allows some flexibility for which participation activities you choose to complete.

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. (Note: Excessive grammar, spelling, or punctuation errors in discussions or any other assignment submissions may be penalized at the discretion of the instructor/TA.) 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.

Other course policies

Health and safety requirements

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

Academic integrity policy

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. (Note that "warnings" are not given due to an offense being one's first offense, due to ignorance of what constitutes academic misconduct, or due to any other circumstances.) 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.

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)

Academic integrity information specific to this course

Collaboration for the purposes of troubleshooting is highly encouraged in this course, but everyone is expected to complete all assignment tasks themselves and submit their own unique work. With this in mind, here are some examples of acceptable and unacceptable behavior:

- Acceptable:
 - Asking a classmate how to resolve an unexpected error message, how to find a hidden setting in the software, or similar troubleshooting tasks.
 - Participating in a study group study the course material.
 - Asking a trusted person to proofread (without revising or rewriting) your assignments before you turn them in.
- Unacceptable:
 - Using another student's work (in part or in full) as your own.
 - Sharing files and/or using shared files that contain intermediate or final results.
 - Submitting the same work (even if modified) from a past semester or from another course.
 - Comparing and/or sharing answers before submitting a graded assignment.
 - Forgetting to cite sources, including the course materials, websites visited, etc.

There are many other acceptable/unacceptable actions than those exemplified here, so if you have any questions or concerns about acceptable/unacceptable actions or what constitutes academic misconduct in this course, ask your instructor for clarification/permission.

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.

Statement on diversity

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Accessibility accommodations for students with disabilities

The university strives to make all learning experiences as accessible as possible. **In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's [request process](#), managed by Student Life Disability Services.** 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; 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.

- [CarmenCanvas accessibility](#)
- [CarmenZoom accessibility](#)

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 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.

Disclaimer

This course syllabus provides a general plan for the course; deviations may be necessary. Such deviations may be made for individuals or for the entire class, as deemed appropriate by the instructor. Any changes that affect the entire class will be announced by the instructor with as much advance notice as possible.

Course schedule

You can find the schedule as a Google Doc at this link: [Schedule](#).