



SYLLABUS

GEOG4103 - INTRODUCTORY SPATIAL DATA ANALYSIS

AUTUMN 2024 - HYBRID

Course overview

Instructor

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Teaching Assistant

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Course prerequisites

Math 1116 or 1130 or above, or Math Placement Level M or L, or permission of instructor.

Course description

This is an introductory course in statistical analysis of spatial data emphasizing spatial thinking. Lectures will introduce students a range of fundamental statistical and spatial analysis methods used in geographic problem solving. Labs will help students develop skills to analyze and interpret spatially referenced data using computer software.

Course learning outcomes

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

- Obtain a basic set of statistical concepts and tools geographers use to solve statistical problems.
- Use statistical software to make graphs and maps, compute descriptive statistics, conduct hypothesis tests, implement regression analysis, and quantify spatial patterns.

- Interpret data-driven results and critically evaluate statistical arguments in the discipline of geography.
- Understand special issues arising from the statistical analysis of spatial data.

How This Course Works

Mode of delivery

This course is a hybrid course with asynchronous online lectures and in-person labs in Derby 0135. You are required to attend one lab section per week.

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. Weekly lecture recordings to be viewed include 2-3 videos of ~30 minutes. All course materials, lectures, labs, quizzes, and exams can be found on the course website, under Modules, organized according to the week that they are assigned.

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

Rogerson, P.A. (2020). *Statistical Methods for Geography: A Student's Guide (Fifth Edition)*, Sage Publications, London.

This book will be used as the required text for this course. The ISBN-13 for the paperback is 9781526498809. It is available for purchase in print or electronic format from the campus bookstore, Amazon, the publisher, etc.

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
- **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.

- R and RStudio
 - R is a free software environment for statistical computing and graphics. You can learn more at <https://www.r-project.org/about.html>. Please download it from <https://cran.r-project.org/bin/windows/base/>.
 - RStudio is an integrated development environment for R programming language. You can download it from <https://posit.co/download/rstudio-desktop/>. Make sure you install R before installing RStudio.
- [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>.
- RemoteLab
 - If you have any trouble with downloading, installing, or using R or RStudio 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 the course website in Carmen.
 - Important: It is best if you can download, install, and use R and RStudio 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
Homework	15
Labs	30
Quizzes	15
Midterm Exam	15
Final Exam	25
Total	100
Attendance (extra credit)	5

Assignment information

Homework

There will be 5 homework assignments of selected problems from the textbook. Your homework assignments should be your own original work and include sufficient details to demonstrate the steps to your final answers.

Labs

There will be 10 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. Your lab reports should be your own original work. You are encouraged to ask a trusted person to proofread your written reports before you turn them in, but no one else should revise or rewrite your work.

Quizzes

There will be 12 weekly short quizzes administered in Carmen. Quizzes are important distance-learning activities designed to enrich online lectures. Quizzes will be open-note, and you will have up to three attempts to complete each quiz independently. The dates and times in which quizzes will open can be found in Carmen. Quizzes must be turned in on time to receive credits. No make-up quizzes will be given unless legitimate documents for medical or personal emergency are presented in advance.

Exams

There will be 2 exams (midterm and final) administered in Carmen. You must take the exams to receive credits. No make-up exams will be given unless legitimate documents for medical or personal emergency are presented in advance. 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.

Attendance

Attendance will be recorded at all lab meetings. To encourage lab presence and productivity, attendance is made worth up to 5% of EXTRA CREDITS counted towards your final grade. However, 2 unexcused absences are allowed to cover any emergency or unexpected event that may prevent you coming to the labs. In case of any health emergency such as COVID19 related absences, please make sure to inform your Lab TA and me as soon as possible to get special arrangements as per policies. Documented proof may be required to get your attendance excused.

Late assignments

- You can submit assignments 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.

- 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 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.

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 **14 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.

Attendance, participation, and discussions

Student participation requirements

Because this is a hybrid course, your attendance is partially 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 & video recordings: OPTIONAL OR FLEXIBLE**

All video recordings will be posted, no live sessions. If you are interested in discussing an assignment with me, please contact me at the beginning of the week to schedule virtual office hours by appointment.

- **Participating in discussion forums: OPTIONAL**

There is a Q&A discussion forum for every lab. These forums are for addressing lab-specific questions, and you may engage with these forums as needed. Participating in these forums does not affect your participation grade.

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

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. 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.

Religious accommodations

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Weather or other short-term closing

In the event of weather or other short-term closing, the online or distance-learning component of this class will occur as scheduled unless otherwise announced by the university. Should an 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 the in-person component of this class. Communication will be done via Carmen Canvas.

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

Week	Topics		Readings	Assignments
1	Lecture	Introduction	Ch. 1: p. 1-17	
	Lab	Review of Basic Terms and Notations		
2	Lecture	Geographic Data	Ch. 1: p. 18-26	
	Lab	Lab 1: Introduction to R		
3	Lecture	Descriptive Statistics	Ch. 2: p. 27-54	
	Lab	Lab 2: Descriptive Statistics		Lab 1 due Sept 8
4	Lecture	Probability (I)	Ch. 3: p. 61-95	HW 1 due Sept 11
	Lab	Lab 3: Probability Distribution		Lab 2 due Sept 15
5	Lecture	Probability (II)	Ch. 4: p. 96-125	
	Lab	Lab 3: Probability Distribution		
6	Lecture	Sampling	Ch. 5: p. 160-165	HW 2 due Sept 25
	Lab	Lab 4: Sampling		Lab 3 due Sept 29
7	Lecture	Estimation	Ch. 5: p. 126-132	
	Lab	Lab 5: Confidence Interval		Lab 4 due Oct 6
8	10/8	Midterm Exam		
	10/10	<i>Autumn Break</i>		
9	Lecture	Hypothesis Testing (I)	Ch. 5: p. 133-160	
	Lab	Lab 6: Hypothesis Testing		Lab 5 due Oct 20
10	Lecture	Hypothesis Testing (II)	Ch. 5: p. 133-160	
	Lab	Lab 6: Hypothesis Testing		
11	Lecture	Analysis of Variance	Ch. 6: p. 187-215	HW 3 due Oct 30
	Lab	Lab 7: ANOVA		Lab 6 due Nov 3
12	Lecture	Correlation	Ch. 7: p. 216-238	
	Lab	Lab 8: Correlation		Lab 7 due Nov 10
13	Lecture	Regression	Ch. 9: p. 261-288	HW 4 due Nov 13
	Lab	Lab 9: Regression	Ch. 10: p. 289-318	Lab 8 due Nov 17
14	Lecture	Spatial Autocorrelation	Ch. 11: p. 335-341	
	11/28	<i>Thanksgiving Break</i>		Lab 9 due Nov 24
15	Lecture	Spatial Pattern Analysis	Ch. 11: p. 328-334	HW 5 due Nov 27
	Lab	Lab 10: Spatial Analysis in GeoDa		
16	12/06	Final Exam: 8:00-9:45AM		Lab 10 due Dec 4