The Ohio State University

SYLLABUS
GEOG 5103: Intermediate Spatial Data Analysis

Spring 2024
3 credit hours
11:10-12:30 MW, Derby 0135

CONTENTS

COURSE OVERVIEW

Instructor

Instructor: Dr. Huyen Le, Assistant Professor, Department of Geography

Email: le.253@osu.edu

Office hours: 1-2pm Mon & Thu at Derby 1110, and by appointment (see Carmen Canvas for how to book an appointment)

Prerequisites

GEOG 4103 or equivalent (with basic knowledge of statistics), or as approved by the instructor.

Course description

This course focuses regression-based multivariate methods widely used by geographers and other scientists, including linear regression (including generalized linear models) and spatial regression (including spatial autoregressive models, conditional autoregressive models, and geographically weighted regression). By the end of the course, you will know how to select the appropriate regression method to answer a research question, be comfortable using multiple software packages to analyze data, and correctly interpret and write-up the results of your statistical analysis.

This course emphasizes hands-on experience and practical/conceptual understanding. The material covered in this course falls into one of four categories: (1) principles of multiple regression, (2) functional forms of the generalized linear model, (3) regression diagnostics, and (4) spatial regression alternatives. The course will emphasize the assumptions inherent in regression analyses, consequences of violating these assumptions, and (spatial) solutions when assumptions have been violated.

Course learning outcomes

Upon successful completion of this course, students should be able to:

1. Develop "statistical literacy," a working understanding of statistics that can help in critically evaluating data-driven results in the discipline of geography (or urban planning, public health, etc…).

2. Apply statistical tools for data analysis, with an understanding of the how to choose which tool to use and how to implement them in statistical software.

3. Interpret the results of data analyses and clearly communicate those results.

4. Develop practical experience in using real datasets to address meaningful research questions.

HOW THIS COURSE WORKS

Mode of delivery: This class is in-person. All learning materials will be uploaded on Carmen Canvas. There will be additional components:

- Lectures
- In-class quizzes and lab
- Assignments and exams
- In-person office hours.

Credit hours and work expectations: This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content, group 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.

Communications with instructor: Questions related to class materials should be posted on Carmen Canvas discussion forum. Make sure you include a detailed description of the problem and attach a screenshot if applicable. You are encouraged to help your classmates out if you know the answers, but make sure you are not violating the code of student conduct (e.g., do not upload your assignment or show them the exact answer to complete their assignments). ***Email me if you have questions related to personal issues and/or when you want to send me the code. Make sure that you put "GEOG 5103" in the subject line.***

Weather or other short-term closing: Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via Carmen Canvas announcement.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

Chi, G. and J. Zhu (2020). *Spatial Regression Models for Social Sciences.* Los Angeles: Sage Publications

We will use chapters from the following texts, which will be available on Carmen Canvas:
Hair, Anderson, Tatham, and Black. (2014). Multivariate Data Analysis, 7th Edition. England: Pearson Education.
Gelman, A. and J. Hill. (2007). Data Analysis Using Regression and Multilevel/Hierarchical Models. New York: Cambridge University Press. (e-book available through the OSU Libraries: https://ebookcentral.proquest.com/lib/ohiostate-ebooks/detail.action?docID=288457)

Course technology

Technology support

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

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

Technology skills needed for this course

- Newest R and RStudio versions (at the time you start the course)
- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)

Required equipment

- Computer: current Mac (Mac OS) or PC (Windows 10 or higher) with high-speed internet connection
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

- Newest version of R, which is a free and open source program for statistical computing and graphics (https://www.r-project.org/). Its privacy policy can be found at https://www.r-statistics.com/privacy-policy/.
- Newest version of RStudio (https://rstudio.com/products/rstudio/), which is a shell for enhanced visualization and programming. Its privacy policy can be found at https://www.rstudio.com/about/privacy-policy/.
- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen access

You will need to use BuckeyePass (buckeyepass.osu.edu) 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 (go.osu.edu/add-device).
- 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 (go.osu.edu/install-duo) 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 FEEDBACK

How your grade is calculated

All submissions must be made via Carmen Canvas by 11:59PM on the due date to be considered on time. All lab assignments are due on Mondays except for holidays.

CATEGORY	POINTS	OCCURRENCE	DUE DATES
Participation	15%	Multiple	N/A
Assignments	56%	Four assignments	Mondays (check Canvas for specific dates)
Exam 1 (midterm)	12%	Once	TBD
Exam 2 (final) or final paper	17%	Once	TBD
Total	**100%**		

Participation (15%)

Class participation is required and accounts for 15% of the total grade. Participation grade is calculated based on quizzes, lab outputs, and/or discussion. It is very important that you attend all class sessions because this course follows sequential learning: each week's material is built on the content of the previous week. You may find yourself lost if you miss the class completely for a week or two.

If you have excuses, please notify me <u>before</u> class. You still need to turn in lab outputs and quizzes in order to get full participation credit for the missing class.

Assignments (4*14% = 56%)

You will have 4 assignments throughout the semester, each of them is worth 14% of your grade. Each assignment requires that you use R to analyze data, interpret the results of these statistical analyses, and demonstrate an understanding of statistical principles discussed in class. Discussion forum and office hours will be available to help you troubleshoot the coding problems that you encounter in the labs and assignments.

You will submit the HTML outputs from your R markdown code for grading, along with a written memo to summarize the results. Detailed guidelines and rubrics are available on Carmen Canvas.

Exam 1 (midterm, 12%)

All exams are take home. All students are expected to take exam 1 (midterm). Late exams will not be accepted except in case of emergency. Honor code applies.

Exam 2 or final paper (final, 17%)

Undergraduate students will take exam 2 (final). Exam 2 is also take-home, and will be in similar format as exam 1. Late exams will not be accepted except in case of emergency. Honor code applies. You may choose to write a final paper but only with approval from me.

Graduate students will write a final paper instead of taking exam 2. You are expected to consult with me during the semester about the topic, data gathering, and analysis. You will turn in a short proposal and final paper for grading on Carmen Canvas.

Details about each assignment, including guidelines and rubric, will be made available on Carmen Canvas.

Late submissions

By default, late submissions of assignments and final project (or paper) are subject to 5% grade reduction for each late day, up until the 10th day after the deadline. The max late penalty is 50%. Late submission is always better than no submission.

You have one opportunity to extend your deadline for one day during the semester (indicate it in your submission to get the full credit). This extension will be applied to an assignment of your choice (including the final paper). No permission is required; you will indicate in your submission that you are using the one-day extension. I'd suggest that you use this opportunity wisely and reserve it for the end of the semester when the workload is unusually high.

In case of personal and family emergencies, please notify me as soon as possible so that we can work out a new submission time. Such extensions will be granted on a case-by-case basis. **Excuses and extensions will NOT be granted retrospectively (i.e., after the deadline, except for emergency).**

Grading scale

A	A-	B+	B	B-	C+	C	C-	D+	D	E
≥93%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	60-66%	<60%

Instructors' feedback and response time

We are providing the following list to give you an idea of our intended availability throughout the course. (Remember that you can call **614-688-4357(HELP)** at any time if you have a technical problem).

- **Grading and feedback:** For large assignments, you can generally expect feedback within **20 school days**, unless emergencies occur to the instructor.

- **Email:** I will reply to emails within **48 hours on school days when class is in session at the university**.

OTHER COURSE POLICIES

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

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* (studentconduct.osu.edu), 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 we 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, we are obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

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

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

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)
- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for instructional materials

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.

Commitment to a diverse and inclusive learning environment

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.

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. No matter where

you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

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 us know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us 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 Canvas (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.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- Collaborative course tools

RELIGIOUS ACCOMMODATION

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

COURSE SCHEDULE

Please refer to this link for an updated schedule:

https://docs.google.com/document/d/1KTlIX4VPXxQYHlkxSJc7t869z5s06pRf-Zt2j1v_u8k/edit?usp=sharing