

GEOG 8102 – Advanced Spatial Data Analysis

Friday 10:00-12:45pm

Instructor

Professor Desheng Liu
Email: liu.738@osu.edu
Office Hours: CarmenCanvas Calendar
Office Location: CarmenZoom or Derby 1056

Course Description

This course focuses on advanced statistical methods for spatially referenced data, including spatial point patterns, geostatistical data, and lattice data. Major topics to be covered include spatial random processes, exploratory spatial data analysis, spatial point pattern analysis, spatial covariance functions, variograms, kriging, spatial autoregressive models, and geographically weighted regression. Computer exercises are designed to help students to gain hands-on experience on the topics presented in lectures. Students are required to present and discuss assigned readings and develop an individual research project that applies spatial statistical methods in geographical problem solving.

Course Website

The course schedule, announcements, lecture notes, assignments, readings, and other course information will be posted on Carmen (<https://carmen.osu.edu>).

Prerequisites

GEOG 4103, or consent of instructor. Students should be familiar with basic probability theory, multiple linear regression, and basic linear algebra.

Required Textbook

Lance A. Waller and Carol A. Gotway (2004). *Applied Spatial Statistics for Public Health Data*. Wiley, New York.

Reference Books

Trevor C. Bailey and Anthony C. Gatrell. (1995). *Interactive Spatial Data Analysis*, Prentice Hall.

Roger S. Bivand, Edzer J. Pebesma, and V. Gómez-Rubio (2013). *Applied Spatial Data Analysis with R*, 2nd edition. Springer, New York.

Anselin, Luc. (2005). *Exploring Spatial Data with GeoDaTM: A Workbook*.

Course Evaluation

Final course grades will be based on the following weighting of assessment components:

- Class discussion 20%
- Homework 25%
- Midterm 15%
- Final project 40%

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.

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.