**College of Science**

**GGS 300: Quantitative Methods for Geographical Analysis**

**Course Syllabus**

Associated Term: Fall 2025
Levels: Non-Degree, Undergraduate, Consortium
Attributes: Undergraduate - Upper Division
Instructors: Donglian (Lillian) Sun (P)
Fairfax Campus
Lecture Schedule Type
3.000 Credits
CRN: 71719

**Course Instructor: Dr. Donglian (Lilian) Sun**

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Office: Exploratory Hall #2407

Phone: 703-993-4736

Office hours: 1.30-2.30 PM on Wednesday or by appointment.

Course Web Page: http://courses.gmu.edu

Class Location: **Exploratory Hall 2103**

Class Times: 12:00 p.m. to 1:15 p.m. every Monday and Wednesday (in-person)

Class Dates: 08/25-12/17, 2025

**Required Texts:**

McGrew, J.C., Lembo, A.J., and C.B. Monroe. 2014. An Introduction to Statistical Problem Solving in Geography (Third Edition). Waveland Press, Inc., Illinois. ISBN: 1478611197

Make sure to get the Third Edition! Available at the GMU Bookstore or order online at www.waveland.com

**Other Requirements:** Flash drive/memory stick.

**Course Overview:** A survey of quantitative methods commonly used in geographic research. Emphasizes spatial analysis techniques.

Lab assignments will be based on the lecture material previously delivered and available as PowerPoints on Blackboard. Each lab assignment will be due one week after it is assigned (and at the start of the lecture). Late labs will only be marked for the usual documented medical reasons or by previous agreement with the instructor. Deployment of any family member is, of course, an acceptable reason for special arrangements to be made.

**Course Grading:**

Initial Test 5%

(Each student will be awarded 5% for completing this test i.e. every student will get an A since I simply want to see what you know at the start of the course)

Attendance 10%

Lab Exercises 30%

Mid-term Exam 25%

Final Project 30%

All parts of the course are graded with a letter grade e.g. A+ B C- etc. For the multiple choice tests and labs letter grades are assigned as follows:

**A+ 95% and over or top mark; A 91 to 94; A- 87 to 90**

**B+ 85 to 86; B 81 to 84; B- 75 to 80**

**C+ 67 to 74; C 64 to 66; C- 60 to 63**

**D+ 57 to 59; D 50 to 56; F less than 50**

**CLASS SCHEDULE (subject to change)**

**note: The lab dates below refer to the date they will be assigned!**

Schedule

**Lecture I**

**Introduction to the Course**

**Benchmark Test to Establish Student’s Level of Knowledge**

McGrew, Ch 1: The Context of Statistical Techniques

**Lecture II**

**Characteristics of Geographic Data: Concepts**

McGrew, Ch 2

**Lecture III**

**Descriptive Statistics**

McGrew, Ch 3

**Lecture IV**

**Descriptive Spatial Statistics**

McGrew, Ch 4

Lab 1: Context for Statistical Analysis: Questionnaires and Surveys

**Lecture V**

**Probability**

McGrew, Ch 5

Lab 2: Data Presentation & Description with SPSS

**Lecture VI**

**Sampling**

McGrew, Ch 6

Lab 3: Data Description Using SPSS (continued); Probability Theory

**Lecture VII**

**Estimation in sampling**

McGrew, Ch 7

Lab 4: SPSS, Normal Distribution; Standard Error of the Mean

**Lecture VIII**

**Elements of Inferential Statistics**

McGrew, Ch 8

**Mid-term exam**

**Lecture IX**

**Two Sample and Matched Pairs Difference Tests**

McGrew, Ch 9

Lab 5: Chi-Square One-Sample Goodness-of-Fit Test; Two Sample Difference Tests

**Lecture X**

**Three-or-More sample Difference Tests: Analysis of Variance**

McGrew, Ch 10

**Lecture XI**

**Goodness-of-Fit Tests and Categorical Difference Tests**

McGrew, Ch 11

Lab 6: Wilcoxon-Mann-Whitney Test for Two Independent Samples (using SPSS);

Chi-Square 2 to K Sample Test (Contingency Table Analysis).

**Lecture XII**

**Inferential Spatial Statistics**

McGrew, Ch 13 and 14

Lab 7: One and Two-Way Analysis of Variance Using SPSS

**Lecture XIII**

**Correlation**

McGrew, Ch 16

**Lecture XIV**

**Regression**

McGrew, Ch 17

Lab 8: Correlation and Regression Analysis

**Lecture XV**

**Multiple Regression**

Cluster Analysis

McGrew, Ch 18

**Lecture XVI**

**Epilogue: Statistical Problem Solving in Geography**

Final Project

**Student Resources:**

* **Academic Integrity:** Students must be responsible for their work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be the foundation of our university culture. [See http://academicintegrity.gmu.edu/distance].
* **Honor Code:** Students must adhere to the guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/the‐mason‐honor‐code/].
* **MasonLive/Email (GMU Email):** Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.

[See https://masonlivelogin.gmu.edu].

* **Patriot Pass:** Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See https://password.gmu.edu/index.jsp].
* **University Policies:** Students must follow the university policies.

[See http://universitypolicy.gmu.edu]. Responsible Use of Computing ‐ Students must follow the university policy for Responsible Use of Computing.

[See http://universitypolicy.gmu.edu/policies/responsible‐use‐of‐computing ].

* **University Calendar:** Details regarding the current Academic Calendar.

[See http://registrar.gmu.edu/calendars/index.html].

* **Students with Disabilities:** Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu].
* Students are expected to follow courteous Internet etiquette at all times; see http://www.albion.com/netiquette/corerules.html for more information regarding these expectations.

**2. Student Services:**

* **University Libraries:** University Libraries provides resources for distance students.

[See http://library.gmu.edu/distance and http://infoguides.gmu.edu/distance\_students].

* **Writing Center:** The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See http://writingcenter.gmu.edu]. You can now sign up for an Online Writing Lab (OWL) session just like you sign up for a face‐to‐face session in the Writing Center, which means YOU set the date and time of the appointment! Learn more about the Online Writing Lab (OWL).
* **Counseling and Psychological Services:** The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].
* **Family Educational Rights and Privacy Act (FERPA):** The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See http://registrar.gmu.edu/privacy].

**Academic Standards**

“Academic Standards exist to promote authentic scholarship, support the institution’s goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community that values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

* **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
* **Acknowledgement:** Giving proper credit for all contributions to one’s work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
* **Uniqueness of Work:** Ensuring that all submitted work is the result of one’s own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is [outlined in the university's procedures](https://academicstandards.gmu.edu/). Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

**Student responsibility:** Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them*.*

**Accommodations for Students with Disabilities**

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <https://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

**Student responsibility**: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

**FERPA and Use of GMU Email Addresses for Course Communication**

The [Family Educational Rights and Privacy Act (FERPA)](https://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html) governs the disclosure of [education records for eligible students](https://registrar.gmu.edu/ferpa/) and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

**Student responsibility**: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

**Title IX Resources and Required Reporting**

As a part of George Mason University’s commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all
non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the “Complainant”) will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see [University Policy 1202](https://universitypolicy.gmu.edu/policies/sexual-harassment-policy/): Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

**Student opportunity**:  If you prefer to speak to someone ***confidentially***, please get in touch with one of Mason’s confidential employees in Student Support and Advocacy ([SSAC](https://ssac.gmu.edu/)), Counseling and Psychological Services ([CAPS](https://caps.gmu.edu/)), Student Health Services ([SHS](https://shs.gmu.edu/)), and/or the [Office of the University Ombudsperson](https://ombuds.gmu.edu/).”

**Guiding Principles for Use of AI at George Mason University**

“These guiding principles seek to ensure the responsible, ethical, and effective use of AI tools and platforms at George Mason University by promoting accountability, transparency, critical thinking, privacy, accuracy, accessibility, and security among members of our community.

* **Human Oversight:** Humans must remain accountable for all decisions and actions, even when assisted by AI. Users must review all AI-generated material for accuracy, reliability, and appropriateness, ensuring outputs are verified and refined to reflect human judgment, ethical standards, and the expectations and values of their work and the university community.
* **Transparency:** Users must maintain the highest standards of transparency and integrity by clearly disclosing when and how AI has been utilized in their work. This includes explicitly identifying AI-generated content, the platform utilized, and the date of use.
* **Compliance and Data Security:** Users must follow all relevant laws and university policies regarding copyright, intellectual property, property rights, consent, data security, and confidentiality. This includes understanding and respecting the rules that protect creative works and personal information. Safeguarding data and respecting intellectual property are key to protecting yourself and your institution and upholding a culture of respect and integrity.
* **Data Privacy:** Users should protect their personal, confidential information and proprietary intellectual property when using AI tools, understanding how data is collected, stored, and used, taking the time to read privacy policies, using strong passwords, enabling two-factor authentication, and reviewing privacy settings regularly. Be cautious with sensitive information to ensure data privacy and maintain control over your professional and personal life.
* **Critical Thinking:** Users must cultivate AI literacy by understanding its workings, capabilities, and limitations, critically questioning AI content for validity and biases. Thoughtful engagement with AI ensures informed decisions, encourages independent thinking, and utilizes AI to enhance, rather than replace, personal reasoning and creativity.
* **Accuracy:** Users should ensure the accuracy of AI-generated content and always verify AI outputs by cross-referencing with reliable sources and using their own expertise to assess the information. This involves checking for any false, inaccurate, or misleading content before utilizing or sharing it. The responsibility of verifying AI output lies with each user, and this diligence is crucial to maintaining trust and upholding the integrity of our community.
* **Accessibility:** Users should ensure that AI tools and instructions are accessible to all members of our community, including those with disabilities or diverse learning preferences. Examples include providing resources in multiple formats and ensuring compatibility with assistive technologies to create an inclusive environment.”

**Disclaimer**: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported by the instructor.