



## Department of Geography and Geoinformation Science

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# GGS 300

## Quantitative Methods for Geographical Analysis

### General Information

<b>Instructor:</b>	Dr. Andreas Züfle
<b>Where:</b>	Exploratory Hall 2310
<b>When:</b>	Tuesday and Thursday 1:30-2:45pm
<b>Course website:</b>	Blackboard
<b>Credits:</b>	3 Credits
<b>Prerequisites:</b>	None
<b>Office Hours:</b>	Tuesday and Thursday 3-5pm.
<b>Registration Dates:</b>	Drop without, with tuition penalties: Jan 30 <sup>th</sup> , Jan 31 <sup>st</sup> – Feb 24 <sup>th</sup>

### Required Text

McGrew, Lembo, and 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 at [www.waveland.com](http://www.waveland.com)*

### OVERVIEW & OBJECTIVES

GGS 300 introduces students to the use of statistical techniques and quantitative methods in a spatial context. The course focuses on the basic components of quantitative research in geography: developing research questions, evaluating the questions via formal hypothesis testing, and interpreting the results of the tests (including the redevelopment of research questions). GGS 300 provides students with the ability to:

- Conduct rigorous statistical analysis of data and information commonly encountered in geographic research using a widely-used statistical software, and
- Understand statistical analysis that is commonly encountered in geographic research and the broader scientific literature.

GGS 300 is a Students as Scholars, Scholarly Inquiry course. In the course, students will learn about the broader process of conducting research in geography and geoinformation science. Importantly, students will learn that statistical testing and quantitative approaches are used to not only provide answers, but also to refine research questions and generate new questions, ideas, and hypotheses. This course will prepare students to conduct original, scholarly research. In GGS 300, students will learn to:

- Articulate and refine a research question
- Follow ethical principles in research
- Choose the appropriate process, approach, or methodology for scholarly inquiry
- Situate the scholarly inquiry within a broader context

### GGS COMPUTER LAB, ASSIGNMENTS, & EXPECTATIONS

GGS 300 Students have 24/7 access to the GGS Student Computer Lab located in 2102 Exploratory Hall. The computers in this lab have the software required for this course (SPSS). Mason also offers "remote" access to this software (and others) via the Virtual Computing Lab (<http://doit.gmu.edu/students/computer-labs/virtual-computing-lab/>). Lab assignments will be based on the lecture material and will be administered via Blackboard. Lab assignments will be assigned on Thursdays and will be due the following week prior to the start of the lecture (except where noted in the Course Schedule). Papers submitted after the due date will not be accepted. Exceptions to this policy may be made given serious circumstances at the discretion of the instructor. The course will be taught as a combination of lectures and tutorials.

**Outline and Schedule (subject to change)**

In this course we will cover the following topics (please note that the topics and their order are subjected to change at the discretion of the instructor, any changes will be announced in class):

Date	Day	Topic	Assignment
01/24	T	1 - Introduction to GGS 300, Data, and Statistics	McGrew, Chp 1
01/26	R	2 - Characteristics of Geographic Data	McGrew, Chp 2; Steneck, Chp 6 Lab 1: Introduction to SPSS & Data characteristics
01/31	T	3 - Descriptive Statistics	McGrew, Chp 3
02/02	R	4 - Descriptive Spatial Statistics	McGrew, Chp 4 Lab 2: Data Presentation & Description
02/07	T	5 - Basics of Probability	McGrew, Chp 5
02/09	R	6 - Probability	McGrew, Chp 6 Lab 3: Probability Theory
02/14	T	7 - Sampling	McGrew, Chp 7; Steneck, Chp 8; The Ethics of Scientific Collaboration (Discover Blog)
02/16	R	8 - Sampling (cont.)	Reading Reflection: Scientific Collaboration
02/21	T	9 - Estimation in Sampling	McGrew, Chp 8
02/23	R	10 - Estimation in Sampling (cont.)	Lab 4: Confidence Intervals
02/28	T	11 - Inferential Statistics	McGrew, Chp 9
03/02	R	12 - Inferential Statistics (cont.)	Lab 5: Hypothesis Testing
03/07	T	13 - Two-Sample and Matched-Pairs Difference Tests	McGrew, Chp 10
03/09	R	14 - Two-Sample and Matched-Pairs Difference Tests (cont.) Midterm Review	Lab 6: Two-Sample Difference of Means Test (due 03/21)
03/14	T	Midterm Exam	
03/16	R	15 - Three-or-more-Sample Difference Tests	McGrew, Chp 11
03/21	T	16 - Three-or-more-Sample Difference Tests (cont.)	Lab 7: ANOVA (due 03/30)
03/23	R	17 - Categorical Difference Tests	McGrew, Chp 12
03/28	T	18 - Categorical Difference Tests (cont.)	Lab 8: Distribution Test
03/30	R	19 - Introduction to Spatial Analysis	McGrew, Chp 13 and 14

04/04	T	20 - Introduction to Spatial Analysis (cont.)	McGrew, Chp 15 Lab 9: Spatial Patterns
04/06	R	21 – Correlation	McGrew, Chp 16
04/11	T	22 - Correlation (cont.)	Lab 10: Correlation Analysis
04/13	R	23 – Regression	McGrew, Chp 17
04/18	T	No class – Instructor out of Town	
04/20	R	No class – Instructor out of Town	
04/25	T	24 - Regression (cont.)	Lab 11: Regression Analysis (due 05/04)
04/27	R	25 - Multiple Regression	McGrew, Chp 18 (p.269-276)
05/02	T	26 - Applying Statistical Methods	Delamater et al. 2012
05/04	R	Review Session for Final Exam	
05/09	T	Reading Days – No class	
05/11	R	Final Exam	

#### Grading Schema

Assessment	Points	% (of final grade)
Lab Assignments	200	50%
Midterm Exam	100	25%
Final Exam	100	25%

Grades will be based on the following cut of values, although I reserve the right to alter the values at the end of the course: A (93%), A- (90%), B+ (87%), B (83%), B- (80%), C+ (77%), C (73%), C- (70%), D (60%)

#### Exams

The course includes a mandatory written mid-term and a mandatory written final exam. The material covered in the exams will be announced in class. A student who cannot write a course examination or complete a course assignment because of an incapacitating illness, severe domestic affliction or other compelling reasons can apply for extension of time to complete an assignment.

#### Assignments:

The course will include several written assignments on selected topics from the material covered in class and in the assigned reading. A

Assignments should be done **through the Blackboard course website**.

**Please note:** Assignments should be submitted only through the Assignment submission section of the Blackboard system - DO NOT email assignments directly to the instructor.

#### Late papers submission:

Papers submitted **after the due date will not be accepted**. Exceptions to this policy may be made given serious circumstances at the discretion of the Instructor.

**Please note:** Deferral of term work is a privilege and not a right; there is no guarantee that a deferral will be granted. Please make sure you notify the instructor as soon as you know a deferral is required.

### General guidelines for ASSIGNMENT preparation and submission

- a. Grades of assignments will be based on:
  - Academic merit** of your answers.
  - Conciseness** and **completeness** of your answers. Please write to the point and explicitly address the question or task. Avoid using unnecessary graphics (figures, tables, graphs etc.) unless they serve a specific purpose. Make sure to use captions and to refer to the graphics you include in your written answer. Graphics without any reference or accompanying explanation will be disregarded.
  - Organization** and **presentation**. Remember that your assignment report is a reflection of your thinking and learning process. Please organize your report in a logical fashion so that your answers could be easily identified. A general format for your presentation should, as a minimum, include the following components: (1) Question number, (2) Your written answer and/or description and discussion of your results, and (3) Visualization of your results, e.g. images, graphs, tables, as necessary.
- b. Please remember that your assignment is a **professional document**, and should therefore be formatted and constructed accordingly. All assignments are to be typed. Hand-written assignments will not be accepted.
- c. Submission of a hardcopy will be made in class; submission of a softcopy will be made through Blackboard.
- d. The electronic submission of your assignment report has to be in **PDF format**.
- e. If more than one file is submitted, you may submit a single **ZIP** file containing all the assignment files.
- f. Each assignment submission should include a cover page with the following information: assignment title, assignment number, student name, and submission date.
- g. Please make sure you have a backup of all the materials you submit.

### 8. Course website:

The course has a Blackboard website. This website will provide you a single portal through which you may obtain lecture notes, retrieve assignment data and, review links to additional materials, and receive special announcements. You are required to visit the course website **once per day**. Please notify ITU (and, if necessary, the instructor) if you encounter any problems accessing this website.

### 9. Electronic communication:

All course related email correspondence, including submission of assignments, should be made through the course Blackboard website. Please DO NOT send emails to the instructors' @gmu.edu address.

### 10. Student Expectations:

- **Academic Integrity:** Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a 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](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>].

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**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.

**Note:** Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.