



Department of Geography and Geoinformation Science

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GGG 300

Quantitative Methods for Geographical Analysis

Spring 2018

General Information

Instructor:	Dr. Andreas Züfle
Where:	Exploratory Hall 2310
When:	Tuesday and Thursday 1:30-2:45pm
Course website:	Blackboard
Credits:	3 Credits
Prerequisites:	None
Office Hours:	Thursday 4:30-6pm.
Registration Dates:	Drop without, with tuition penalties: Jan 29 th , Feb 23 rd

Required Text

None

Recommended (optional) Texts:

- Burt, James E., Gerald M. Barber, and David L. Rigby. *Elementary statistics for geographers*. Guilford Press, 2009.
- McGrew, Lembo, and Monroe. 2014. *An Introduction to Statistical Problem Solving in Geography (Third Edition)*. Waveland Press, Inc., Illinois. ISBN: 1478611197.

OVERVIEW & OBJECTIVES

GGG 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). GGG 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.
- Employ statistical software, including SPSS and R, to analyze data.

GGG 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 GGG 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

GGG COMPUTER LAB, ASSIGNMENTS, & EXPECTATIONS

GGG 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 (R, 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
01/23	T	1 - Introduction to GGS 300, Course Overview, Expectations	
01/25	R	2 – (Geographic) Data	Lab 1: Introduction to SPSS & Data characteristics
01/30	T	3 - Descriptive Statistics	
02/01	R	4 - Descriptive Spatial Statistics	Lab 2: Introduction to R & Data Description
02/06	T	5 - Basics of Probability	
02/08	R	6 – Discrete Probabilistic Distributions	Lab 3: Probability Theory (Two Weeks)
02/13	T	7 – Continuous Probabilistic Distributions	
02/15	R	8 – Probabilistic Theory: Review Session with Examples	Reading Reflection: The Ethics of Scientific Collaboration (Discover Blog)
02/20	T	9 – (Spatial) Sampling	
02/22	R	10 - The Central Limit Theorem	Lab 4: Confidence Intervals
02/27	T	11 – Confidence Intervals	
03/01	R	12 – Lab discussions	
03/06	T	13 – Midterm Q&A	
03/08	R	14 – Midterm Exam	

03/13	T	15: Introduction to Hypothesis Testing	
03/15	R	16: Hypothesis Testing	Lab 5: Simple Hypothesis Testing
03/20	T	17: Hypothesis Testing (cont.)	
03/22	R	18 -Two Sample Difference of Means Test	Lab 6: Advanced Hypothesis Testing
03/27	T	19 – The Multiple Test Problem	
03/29	R	20 – Goodness-Of-Fit Test	Lab 7: More Advanced Hypothesis Testing
04/03	T	20 – Introduction to Spatial Analysis	
04/05	R	21 - Introduction to Spatial Analysis (cont.)	Lab 8: Spatial Statistics
04/10	T	22 – Correlation	
04/12	R	23 – Correlation (cont.)	Lab 9: Correlation Analysis
04/17	T	24 – Simple Regression	
04/19	R	Columbus Day Recess (No Class)	
04/24	T	25 – Multiple Regression	Lab 10: Regression Analysis
04/26	R	26 – Tutorial: Multiple Regression in R	
05/01	T	27 – Lab Tutorial & Course Wrap Up	
05/03	R	28 - Review Session and Q&A for Final Exam	
05/08	T	Reading Days – No class	
TBA	TBA	Final Exam (date to be announced by the registrar’s office – see http://registrar.gmu.edu/topics/final-exam-locator/)	

Grading Schema

Assessment	% (of final grade)
Lab Assignments	20% Bonus
Midterm Exam	50%
Final Exam	50%

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 an. 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.

To pass the class, 50% of the points of the midterm, and 50% of the points of the final exam must be achieved.

Assignments:

The course will include several written assignments on selected topics from the material covered in class and in the assigned reading. 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 available 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.
- h. Submit your own work! Studying in team is allowed and recommended. But once you are ready to prepare an assignment, you have to do it alone. Submitting the work of someone else is plagiarism and will be detected by Plagiarism Check Tool (SafeAssign), and any detected case will be handled by the Office of Academic Integrity to judge.
- i. Ensure that nobody has access to your assignment answers. Keep your data safe and lock your computer when you leave your computer while working in a public space. You are responsible that no one copies your assignment.

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].
- **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>].

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.