

Fall 2026 - Quantitative Geography- GEOG3003
Department of Geography and Environmental Studies
Carleton University

Instructor: Dipto Sarkar (dipto.sarkar@carleton.ca)

Lectures: Tuesday 12:35 - 14:25

Office Hours: Wednesday 10:30-11:30

Office Location: Loeb B341 (in person)

Brightspace: <https://brightspace.carleton.ca/d2l/home/450069>

I. Course description: This course focuses on quantitative methods for geographers using R - a popular, open-source statistical software and programming environment. Topics include data management, descriptive statistics, hypothesis testing, linear regression and correlation, multiple regression, principal component analysis, cluster analysis, descriptive spatial statistics and introductory geostatistics. A strong emphasis is placed on understanding and interpreting these statistical analyses and their results in relation to real-world questions, with a focus on geographically varying phenomena such as climate, pollution and socio-economic and demographic indicators of health and well-being. Students will acquire new skills in data-management, statistical analysis and scripting using a powerful (and freely available), command-line statistics and graphing environment. The course does not require any previous computer programming experience or major expertise in math, but an interest in problem-solving and computer-based learning is a must.

"I keep saying the sexy job in the next ten years will be statistician... The ability to take data—to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it— that's going to be a hugely important skill in the next decades, not only at the professional level but even at the educational level for elementary school kids, for high school kids, for college kids."

— Hal Varian, Chief Economist, Google Inc. 2009

II. Preclusions: None

III. Learning Outcomes: By the end of this course, students will be able to:

- Explain purpose of various statistical methods
- Perform statistical analysis on geographic data using R
- Explain assumptions associated with statistical methods
- Select appropriate statistical methods for different scenarios

IV. Texts:

1) Harris and Jarvis, 2011 Statistics for Geography and Environmental Science.

Weekly assigned resources, including online content and readings from this text will be clearly indicated on Brightspace. You will not be able to complete the quizzes successfully without the required textbook.

Costs of Educational Material: \$103.95 (based on Indigo)

V. Course calendar (tentative: dates and topics subject to change):

WEEK	QUIZ	CONCEPT/LECTURE	LAB	ASSIGNMENT
Week 1: September 9-13				
Week 2: September 14-20		Introduction	None (Buy book, setup R)	None
Week 3: September 21-27		Statistical Description I	Intro To R	A1 starts
Week 4: September 28- October 4	1	Stat. Description II	Descriptions	A2 starts A1 Due
Week 5: October 5-11	2	Inference	Hypo Testing	A3 starts A2 Due
Week 6: October 12-18	3	Inference Contd.	Sup. Work A3	A3 Contd.
Week 7: October 19-25	4	Relationships	Regression	A4 starts A3 Due
BREAK			WINTER BREAK	
Week 8: November 2-8	5	Multiple Regression	Mult. Regression	A4 Contd.
Week 9: November 9-15	6	ANOVA	ANOVA	A5 starts A4 Due
Week 10: November 16-22	7	Spatial Stats	Sup. Work A5	A5 Contd.
Week 11: November 23-29	8	PCA	PCA	A6 starts A5 Due
Week 12: November 30- December 6		QUIZ PREP. No class	Sup. Work A5	A6 Contd.
Week 13: December 7-13		THEORY QUIZ Take Home Exam Start	Sup. Work A6	A6 Due

VI. Evaluation:

- Online Quizzes: 15%
- Assignments: 45%
- Theory quiz: 15%
- Take-home exam: 15%
- Attendance and participation: 10%

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Late Policy: All submissions are online at BrightSpace. No late assignments will be accepted, with the exception of medical issues/illness or if you have already arranged for an academic accommodation as described in subsequent sections of this syllabus. In such cases you must make arrangements with the course instructor at least 24 hours prior to the due date. It is your responsibility to ensure that the instructor or TA receive your submitted hard copies. If you are unable to submit an assignment in Brightspace, it is recommended that you email the instructor or TA with a copy. However, this option should only be considered as a last resort.

Lecture/Lab attendance: Lab and Lecture attendance is required to succeed in this course. However, remember that attendance does not guarantee participation grades. Participation grades are based on interactions in class.

VII. Generative Artificial Intelligence (AI)

Use of AI to complete practice resources, lab assignments, or exams is not permitted.

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course

VIII. Statement on Academic Integrity

- a. submission of substantially the same piece of work more than once for academic credit without permission is not allowed.
- b. Unless explicitly stated in the assignment, group or collaborative work is not allowed.
- c. Permissibility of the use of generative artificial intelligence tools (e.g. ChatGPT) as per Section 7 above
- d. The University Academic Integrity Policy defines plagiarism as “*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.*” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, artworks, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one’s own; and
- failing to acknowledge sources through the use of proper citations when using another’s work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course’s instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of “F” for the course.

IX. Statement on Student Mental Health

As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. Here is a list that may be helpful:

Emergency Resources (on and off campus): <https://carleton.ca/health/emergencies-and-crisis/emergency-numbers/>

Carleton Resources:

- Mental Health and Wellbeing: <https://carleton.ca/wellness/>
- Health & Counselling Services: <https://carleton.ca/health/>
- Paul Menton Centre: <https://carleton.ca/pmc/>
- Academic Advising Centre (AAC): <https://carleton.ca/academicadvising/>
- Centre for Student Academic Support (CSAS): <https://carleton.ca/csas/>
- Equity & Inclusivity Communities: <https://carleton.ca/equity/>

Off Campus Resources:

- Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, <https://www.dcottawa.on.ca/>
- Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, <http://www.crisisline.ca/>
- Empower Me: 1-844-741-6389, <https://students.carleton.ca/services/empower-me-counselling-services/>
- Good2Talk: 1-866-925-5454, <https://good2talk.ca/>
- The Walk-In Counselling Clinic: <https://walkincounselling.com>

X. Requests for Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form ([click here](#)).

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details [click here](#).

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For

more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/equity/sexual-assault-support-services>

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>