

Enst::Geog2006a w21

Quantitative Research

Geography and Environmental Studies

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preclusions: BIT 2000; NEUR 2002; PSCI 2702; STAT 2507; STAT 2606

Course Description

We create massive amounts of numerical data, everything from measurements of historic temperature patterns, to political opinion polling, and even counts of COVID-19 cases.

Quantitative measurements are increasingly being used to make resource management decisions and to set social policy. In our everyday lives quantified information plays a role in our social media popularity, in the way we plan our exercise, in terms of economic opportunities, and the ways in which we interact with the rest of the environment.

In this course we will review different ways to capture and create quantified data, think about how we make sense of this data including organizing, analyzing, interpreting and visualizing data. Finally we will consider the ethics and protocols around quantitative research, thinking about both the harm and benefit that we can do or provide with these methods.

Learning Outcomes

Participation in this course provides opportunities to:

1. review and demonstrate fundamental numeracy skills;
2. practice and apply descriptive statistical methods;
3. practice and apply methods for hypothesis and correlation testing;
4. recognize and practice skills related to the specific characteristics of spatial data;
5. describe ethical questions related to quantitative data its analysis, capture and management.

Active Learning, Care and Accessibility

First a reminder that this isn't a normal term!

We're online because of a global pandemic with health alongside social, political and economic impacts. So there will be difficulties related to both online learning and the pandemic as we make our way through the term, and we all need to find ways to be kind to ourselves and to each other as we make our way through. But there are also opportunities, for example, when it comes to numbers and math we've all had different experiences from these being our favourite courses to our worst nightmares. So we will take advantage of being online to build flexibility into the design of the course and accommodate our varied experiences.

Learning online also means that to get the most out of the course, even more than ever, you need to take an active part in your learning. This includes asking questions and seeking help when you are unsure of something, or even when you just want to hear more about a topic. It also means taking advantage of the learning success resources at the university. Active learning in this course also means a willingness to engage, take risks, try new things and be surprised.

Additionally active learning means taking care of yourself and your health, because school is really important, but taking care of ourselves, especially now, is more important!

Health and Counseling Services [carleton.ca/health] provide a variety of services, and you should consult with them if you find yourself in need of specific physical or mental health support, and for preventative care and health promotion.

Awards and Financial Aid [carleton.ca/awards/other-assistance-2/] provides support for unexpected expenses or economic hardship.

Your stories including medical diagnosis, financial and family circumstances are your own to share or not. But letting the teaching team know, in general terms, about circumstances that might impact your learning as soon as possible means that we can work with you around accommodations, adjustments, and alternatives, to help you meet the learning requirements of the course.

The teaching team also believes the course will be made stronger through the participation of students with a wide range of abilities, disabilities, identities, skills and experiences. As such, we're working to make this course as accessible as possible for all students so please do not hesitate to approach us, if you require particular accommodations or supports including, or in addition to/distinct from, those listed at the end of the syllabus.

Texts and Tools

There is no required textbook for the course.

Required readings will be posted on cuLearn

Some useful references that we will discuss at different points in the term:

Jones, Rhys. 2020. Essential Maths Skills for Exploring Social Data: A Student's Workbook. London: Sage.

O'Sullivan, David and David Unwin. 2010. Geographic Information Analysis, 2nd Edition. Hoboken, NJ: Wiley.

Walter, Maggie and Chris Andersen. 2013. Indigenous Statistics: A Quantitative Research Methodology. London: Routledge.

You will primarily need access to spreadsheet software (Excel, for example) to complete assignments.

We will also use GIS for some portions of the course a variety of systems can be used and we will discuss details on the course site.

Course Calendar and Evaluation

As mentioned above we're going to take advantage of being online to add some flexibility to the course design to accommodate the wide variety of skills coming into the course, interests and areas of expertise, goals for your learning, and even locations and access this term.

In addition to the outline here, we will go over the details on the course site.

The course is broken into a series of units.

Each unit can be completed asynchronously and will include readings, short lectures and evaluations including quizzes, short problem sets or short writing assignments.

Final grades will be based on your scores from the evaluations for units 1-6.

Your scores from units 7-10 will only be included if they improve your overall grade.

The deadline to complete evaluation exercises is April 27.

Scheduled lecture and lab times will be used for optional synchronous course question and practice sessions, and 'Quantitative Research in the Wild' presentations.

Unit 1: Introductions and Self-Evaluation

Unit 2: Foundations`

- Addition, subtraction, multiplication and division
- Equations and inequalities
- Tables and ordering
- Quantitative research where and why

Unit 7: Learning and Modelling topics including:

- Categorization
- Bayesian probability
- Machine learning

Unit 3: Getting Started

- Rounding
- Percentages
- Ratios and proportions
- Variables and variable types

Unit 8: Spatial is Special topics including:

- Tobler's law
- Nearest neighbours
- Weights

Unit 4: Getting to Know Your Data

- Descriptive statistics - central tendencies
- Descriptive statistics - spatial central tendencies
- Descriptive statistics - spread
- Histograms and thematic maps

Unit 9: Representing Data topics including:

- Sonification
- Colour theory
- Lying with data

Unit 5: Looking for Patterns

- Normal distributions
- Point pattern analysis
- Box-plots and cartograms
- Sampling

Unit 10: Capstone Project

- An opportunity to apply skills

Unit 6: Looking for Relationships

- Hypothesis testing - central tendency
- Bi-varient correlation
- Scatterplots and bar graphs
- Data protocols

Remember that: "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."

University 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 the professor 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 see <https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

Religious Obligation: write to the professor 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 <https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

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 your Letter of Accommodation at the beginning of the term. After requesting accommodation from PMC, meet with the professor to ensure accommodation arrangements are made.

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 must 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>

University Definitions of Plagiarism:

The University Senate defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This can include:

- 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;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another's data or research findings;
- failing to acknowledge sources through the use of proper citations when using another's works and/or failing to use quotation marks;
- handing in "substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs."

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.

(all of the text on this page is quoted from: Faculty of Arts and Social Science, Undergraduate Teaching Regulations and Procedures 2020-2021)