

Statistics and Spatial Analysis (GEOG202)

Department of Geography

McGill University

Fall 2018

Thursdays, 11:30 - 14:30, room BH511

Instructor: Dr. Tim Elrick tim.elrick@mcgill.ca
Office hours: Wednesdays, 14:00 - 15:00 or by appointment, room BH515

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Course Objectives & Outline

This course is intended to introduce you to basic statistical concepts of spatial and non-spatial analysis. The emphasis is on understanding how to select an appropriate descriptive tool or analytical test for different types of data, how to manage particularly spatial problems in statistical analysis, how to conduct basic analyses using different statistical software packages, and how to interpret the output of analyses.

The course aims to enable you to acquire

- a knowledge and understanding of basic statistical concepts
- analytical methodological skills, to apply basic spatial and non-spatial analysis
- analytical writing skills, to produce, read and interpret analytical reports
- an introductory understanding of the software packages R, GeoDa and SatScan
- confidence in dealing with numeric and spatial analysis

Required Reading

McGrew, J. Chapman Jr. et. Al. (2014): An Introduction to Statistical Problem Solving in Geography. 3rd edition. Waveland Press, Long Grove, IL.

This textbook is readily available for purchase at Paragraphe bookstore (right on McGill College St at the intersection with Sherbrooke St W) for about \$70. You can also rent it as an e-book for half a year at <http://www.coursesmart.com/9781478611196> for about \$40. It is accessible free of charge at McGill library where I arranged course reserves at Schulich Library (48 hours loan) and McLennan Library (3 hours loan), see <https://mcgill.on.worldcat.org/courseReserves/course/id/14030979>. Please make sure you only work with the 3rd edition of the book! Additionally, some sessions contain assigned readings which can be accessed on-line via MyCourses at least one week prior to the session in question.

The required readings represent the foundation of the course content. The obvious assumption is that you have read these texts to be able to follow the lecture and contribute to classroom discussions. Not every aspect of these readings may be discussed during course sessions; however, all aspects of these texts may be part of a course assignments or exams.

Course Evaluation & Assignment Details

Your final mark will be composed of

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|--------------------|--------------------|
| 1. Quizzes | 15 % of final mark |
| 2. Lab assignments | 35 % of final mark |
| 3. Mid-term exam | 20 % of final mark |
| 4. Final exam | 30 % of final mark |

The **mid-term** and **final exam** will involve defining and discussing and applying key concepts developed in class and in the readings. The mid-term exam will comprise all session material from weeks 1 through 6 and will be 1.5 hours long, taking place in the first half of session 7; the final exam will comprise all session material from weeks 1 through 13, with a special focus on weeks 7 through 13 and will be 3 hours long. The final exam will take place outside regular course hours; the exact date will be announced.

The five **lab assignments** will comprise applied questions of the material discussed in class that you either have to answer on paper or with assistance of one of the software packages. They have to be handed in *at the beginning of the class after next class (i.e. you have two weeks)* in which they were assigned. *Assignments submitted after 11:30 two weeks after will be considered one day late.* Students who choose not to attend classes are responsible for completing the assignment independently. For all assignments, assessment will be based not only on content, but also on structure, clarity, presentation and organization of material and results.

Each week there will be a **quiz** to answer online through MyCourses in which you apply your knowledge on the content and readings of the last class. They are also designed to encourage attendance at lectures (questions may refer exclusively to the lecture) and regular engagement with the readings. *They must be completed by midnight the day prior to the next class (i.e. at 23:59 on Wednesday before class).* You will always have up to two attempts during a 60 minutes' duration maximum for each quiz. *Requests for additional attempts will not be considered.* Quizzes count only towards the final mark after the drop-out deadline has passed.

Academic Integrity

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see <http://www.mcgill.ca/students/srr/honest> for more information). (approved by Senate on 29 January 2003)

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/).

Language of Evaluation

"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded." (approved by Senate on 21 January 2009)

"Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue)."

Attendance

The class will meet 13 times; each session is three hours long (with a short break in-between). Full and complete attendance is suggested as not all content will be covered by the textbook. If you choose not to attend classes, please make sure you *regularly check your e-mail account registered with MyCourses* as I will post

required organisational messages there additionally to announcing them in class. Classroom participation like taking part in discussions or posing questions to clarify content is not evaluated, but highly welcome and appreciated, both by me, your instructor, and your fellow students to make classes a less 'monologic' experience. I assume that you are interested in the course content; therefore, you will respect usual customs of behaviour in a learning environment. I will make any relevant announcements in regards to assignments and/or other housekeeping matters when classes start (i.e., within the first 10 minutes of class). If you are late, *I will not repeat announcements or reply to e-mails in regards to such matters* not to bore fellow students who attend classes on time. It is your responsibility to enquire as to what was said from other students in the class *after* the session.

Grading

You can find McGill grading policies here: https://www.mcgill.ca/study/2018-2019/university_regulations_and_resources/undergraduate/gi_grading_and_grade_point_averages

Grade appeals

Instructors and teaching assistants take the marking of assignments very seriously, and we work diligently to be fair, consistent, and accurate. Nonetheless, mistakes and oversights occasionally happen. If you believe that to be the case, you must adhere to the following rules:

- If it is a mathematical error simply alert a TA of the error.
- In the case of more substantive appeals, you must:
 1. Wait at least 24 hours after receiving your mark.
 2. Carefully re-read your paper/assignment/test, all guidelines and marking schemes, and the grader's comments.
 3. If you wish to appeal, you must submit to the instructor a written explanation of why you think your mark should be altered. Please note statements such as "I need a higher grade to apply to X" are not compelling. Also, please note that upon *re-grade your mark may go down, stay the same, or go up*.

Missed Assignments and late submission

In fairness to those of you who complete assignments on time, *late assignments will be penalized by 10 % per day* (including Saturday and Sunday), and will not be accepted at all after 3 marked assignments have been returned to other students. You must contact the TA directly to arrange submission of a late assignment.

In cases of personal or academic difficulty, consideration may be given. Requests for consideration should be made well before the assignment due date, and must be accompanied by documentation with sufficient detail to describe whether a student can perform academic assignments and the duration of the problem (open-ended medical notes will not be accepted). In this case, contact the instructor not the TA.

Excuses for missed assignments and examination will not be accepted, except in serious cases for which written proof from an appropriate authority must be provided to: (a) the instructor for the mid-term exam or assignments; (b) the Associate Dean of Science for the final exam. A student can have a deferred final exam only if approved by the Associate Dean. Requests for consideration of late submissions should be made to the instructor and not the TA. *Please note that the deferred/supplemental exam for this course may vary in form and content from the mid-term/final exam given during the regular exam period.*

Queries

I am open to discuss matters related to course topics, assignments, exams or your academic interest related to the course content. Please approach me during office hours or by e-mail. In line with McGill policy, I prefer correspondence via your McGill e-mail addresses. In e-mails, please insert your full name (additionally, please insert also your student ID if approaching me via other e-mail addresses not being McGill addresses like Hotmail, Sympatico, etc. – otherwise I might consider them as spam). E-mail is a piece of formal correspondence and should be treated as a permanent record of communication. I will endeavor to respond to e-mails within 48 hours, but this may not always be possible. Please note that I am generally offline weekdays after 6pm and on weekends. E-mails containing questions that can be answered by referring to this syllabus, or to administrative matters discussed in class or posted on MyCourses (e.g. specifics of assignments, instructions on how best to prepare for the exam) may not receive a response.

MyCourses Policy

Please check MyCourses regularly for updated course information, required readings or materials. All use of MyCourses, especially ‘Discussions’ content, must relate to the content of course material. MyCourses should not be used as a forum for evaluations about the course or other content that is unrelated to sessions or readings (You will have a chance to evaluate the course near the end of the term). All student posts are expected to be respectful in tone and content. Violations of this policy will result in restricted access and other penalties at the instructor’s discretion.

Course content

This course focuses on basic spatial and non-spatial statistical analysis. We will begin the course by covering basic concepts in understanding datasets and probability distributions. The course focuses on helping students to understand the data they are working with, describe the data, select an appropriate statistical test, use common software packages to run that test, understand the output, and interpret results. The figure below provides a schematic of the key foci of the course. The second component of the course focuses more specifically on spatial analyses. Students will have the opportunity to learn and apply common spatial statistical techniques and use a number of freeware packages available for analysis. The statistical concepts and theories introduced in this course are equivalent to standard introductory statistics course credits.

What will not be covered in the course

This is not a standard statistics course – we will not focus on detailed mathematics of statistical theory. While brief forays into the equations and math behind statistical approaches will be provided, the course focuses on application and understanding. This is not an advanced spatial statistics course. Such courses usually require at least one prerequisite in basic statistics. GEOG 202 provides such a prerequisite (including introduction to statistics), but goes a little further by introducing spatial concepts and delving into some spatial statistics.

This course will not cover basic GIS techniques, and we will not use standard GIS software (e.g. ArcGIS) during labs. For students particularly interested in the spatial aspects of analysis, a GIS course would be an excellent complement to GEOG 202.

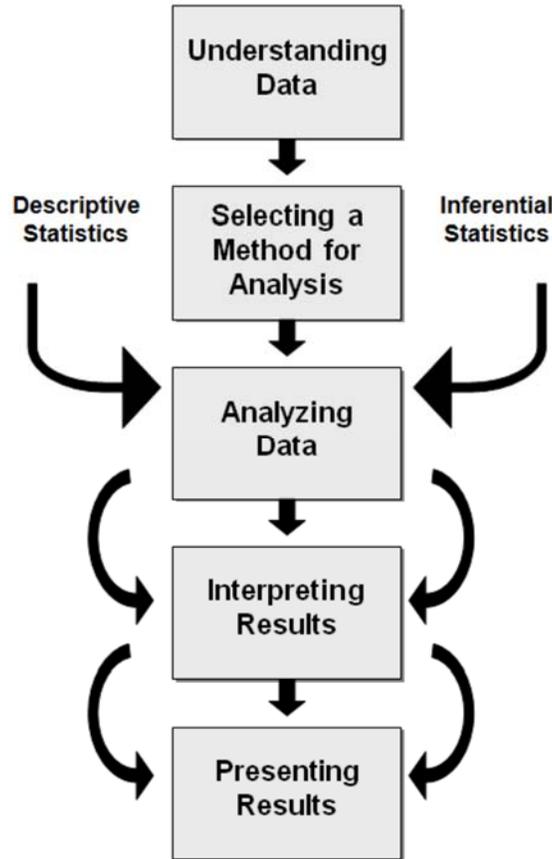


Figure: Camille Ouellet Dallaire

Course schedule

Week	Date	Topic	Pre-class prep	Assignments/Exams
Week 1	6 September	Introduction and basic terms & concepts, Introduction to R	Module 1	
Week 2	13 September	Descriptive statistics	Module 1	
Week 3	20 September	Probability distributions	Module 1 & 2	Assignment 1
Week 4	27 September	Sampling & Intro to inferential statistics	Modules 2 & 3	Assignment 2
Week 5	4 October	Inferential statistics I	Modules 3 & 4	
Week 6	11 October	Inferential statistics II	Module 4	Assignment 3
Week 7	18 October	Mid-term review	Module 5	
Week 8	25 October	Introduction to spatial analysis	Module 6	Mid-term
Week 9	1 November	Spatial analysis I – Point data	Module 7	
Week 10	8 November	Spatial analysis II – Area data	Module 8	Assignment 4
Week 11	15 November	Correlation & regression	Module 9	
Week 12	22 November	Multivariate regression I	Module 10	
Week 13	29 November	Multivariate regression II	Module 11	Assignment 5

More policies

Student Rights & Responsibilities

Policies governing academic issues which affect students can be found in the Handbook on Student Rights and Responsibilities, Charter of Students' Right: <https://www.mcgill.ca/apo/new-tsas-guide/student-life-learning>

Policy Concerning the Rights of Students with Disabilities

If you need any accommodation, please contact the Office for Students with Disabilities (<http://www.mcgill.ca/osd> or 514-398-6009). You may also contact me directly. I will make every reasonable effort to accommodate you.

Copyright of course material

Instructor generated course materials (e.g. Power Point slides, handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures. Recording and distributing recordings of lectures is prohibited unless the instructor gives written consent.

Course Changes in Extraordinary Circumstances

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.