Quantitative Methods in Geography
Geography 2271 (and 2271L)

Department of Geography, Orillia Campus
Autumn 2023

Course Syllabus

Professor: Megan Sheremata, Assistant Professor, Department of Geography and the Environment
Office: OR 1037 (in Residence building)
Office hours: Tuesday 1-2 PM
Additional email office hours: Monday 3-4 PM
Email: msherema@lakeheadu.ca

Welcome to Geography 2271! This course will introduce you to the methods and techniques most commonly used when handling, describing, and analyzing data in the fields of geography and environment science. No previous statistical background is assumed. The course does require you to have some basic mathematical skills, but nothing more sophisticated than what you have previously seen in high school.

Topics in this course will include: describing the nature of quantitative data, data distribution, probability distributions, estimating means and proportions, hypothesis testing; correlation and regression, contingency tables, and others.

Course credit Weight: 0.5 Offering: 3-1.5 Course Classifications: Type A: Humanities; Type C: Engineering, Mathematical and Natural Sciences.

Course learning objectives
This course will not turn you into an expert statistician. Rather the goal is to give you a better appreciation of statistical methods in order that you may:

(a) recognize situations amenable to particular types of analytical methods;
(b) interpret the results of statistical analysis and convey them to an audience that may not be versed in those techniques;
(c) apply your understanding of statistics to solve environmental problems.

A more specific objective of the course is to give you practical experience using two computer software programs: Microsoft Excel and IBM SPSS (Statistical Package for Social Sciences).

Course details

Format
In person

Weekly meeting schedule
Lectures: Weekly on Tuesdays from 2:30 – 4PM
Labs: Weekly on Tuesdays from 5:30 – 7PM

Note: Lab will commence during the second week of classes.

Course D2L site
This course makes use of the Desire2Learn (D2L) Courselink web portal. Slides will be available in pdf format from the course site. D2L also hosts course assignments and labs. Regular announcements will be made on D2L so check the site regularly.

Textbook
Required: Harris, R. Quantitative Geography (2016). Sage (ON ORDER AT BOOKSTORE)

Recommended:
Illowsky, B and Dean, S (2020). Introductory Statistics.
https://openstax.org/details/books/introductory-statistics

Recommended if you would like extra practice:
Johnson, R. and Kuby, P. (2012) STAT2, Cengage Publishers.

Other required supplies
You will need a pencil, eraser and spiral notebook to bring to each lab
A calculator with scientific functions (factorials, logarithms, exponents)

Software
While some assignments should be completed with a calculator, others will be completed using two main software packages: Microsoft Excel and SPSS.

Lakehead University supplies you with Microsoft Office 365 (including Excel) here:
https://www.lakeheadu.ca/faculty-and-staff/departments/services/helpdesk/software/software_available/office-365-for-students

Lakehead University supplies you with SPSS software, which you can use online on a virtual machine here: http://lakeheadu.ca/labs or better still you may download it for usage on your own machine here: https://www.lakeheadu.ca/faculty-and-staff/departments/services/helpdesk/software/software_available

Assessment

Lab assignments – Ten lab assignments will be assigned on a near-weekly basis. These are due by 5PM the Friday following the lab in which they were assigned. It's recommended to try to finish them as soon as possible. All assignments must be done independently and responses should be written in full sentences in your own words where indicated. Students are encouraged to discuss assignments in lab but must submit their own work.

> Note on accuracy in assignments:
> Assignments will include mathematical calculations typically performed with the aid of calculators or software packages. These can give the illusion of greater accuracy than is logically possible. Unless otherwise required (by the question or by logic) all final answers should be rounded to 1 more significant digit than was given in the question. Do not round off numbers during intermediate steps.

Midterm – This will cover all topics covered up to and inclusive of October 16th lecture and lab

Final lab test – Covers computer-based lab activities through the semester. Lab assignments are due the Friday following lab at 5PM

Final exam – Written exam will cover concepts from lectures and lab activities. Students will need a scientific calculator for the final exam.

Attendance - Attendance and lateness is a critical part of your grade. Attendance will be taken at either the start or end of lecture and labs starting on September 19th, 2023. As per the LU student handbook: late arrivals, leaving early or not returning from break disrupts classes. If you miss more than 15 minutes in total of any class, you will be marked absent. However, one exception is if you have completed and handed in your lab assignment during the lab in which it was assigned, you may leave lab early without penalty.

Marks breakdown:

Lab assignments (9 total) 30%
Midterm lab and lecture test 15% October 23.
Final lab test 15% Nov 15
Final examination 30% - To be held during the final examination period
Attendance 10% To be taken at either the start or end of class

Mark descriptions from Lakehead University.

A+ A	90 to 100% 80 to 89%	Outstanding understanding of the course concepts including integration of materials and ideas, ability to apply knowledge to situations
B	70 to 79%	Above average to excellent knowledge, ability to apply knowledge to situations
C	60 to 69%	Satisfactory knowledge including ability to recognise and apply major course concepts, and to progress to next level of course
D	50 to 59%	Some grasp of course concepts; will likely encounter difficulty with higher levels
E	40 to 49%	Failed to meet minimum requirements of the course
F	1 to 39%	Failure
F	0	Failure resulting from academic dishonesty

Students are advised to refer to the University Calendar to ensure that they have adequate grades and/or average to proceed in their program. Grades in this course are numerical (not letters)

Absences and late assignments: *Late penalty is 10% per day, including weekends. No late assignments will be accepted after the marks and/or assignments have been returned to the class*.

You may receive consideration for your absence or late work if you do any of the following:
1. Have arranged for accommodations **both** with Student Accessibility Services and with me to define your accommodations prior to the due date of the assignment(s) in question;
2. Meet with me during office hours to discuss your circumstances; or
3. In the case of a short term illness (cold, COVID, etc) in which you have not seen a doctor, email me at msherema@lakeheadu.ca with the following format and details:

Declaration of absences

SUBJECT LINE: Student Self-Declaration GEOG 2271

"I am submitting this self-declaration as a request made in good faith for academic consideration due to illness that has temporarily impaired my physical health and ability to (write my exam/test) (submit my "X" assignment)(attend class) as scheduled.

By making this declaration I am affirming these statements to be true. Once I have returned to good health, I will contact my professor directly via email to (arrange a new exam date) (arrange a new assignment submission date) (return to class) and meet with them during office hours to arrange a new due date for missed work.

I understand that providing any false or misleading information, or using this self-declaration to delay or avoid fulfilling academic requirements, constitutes a breach of academic integrity as outlined in the Lakehead University's Academic Integrity and Policies.

[INSERT YOUR NAME]"

The late penalty for assignments (without consideration as described above) is 10% per day late, including weekends. Late assignments should be submitted to the course professor in the same manner as the on-time assignments (i.e. DO NOT submit by email).

Students will not be given another opportunity to write the lab tests or midterm tests if it is missed a second time. In some cases, when extraordinary circumstances beyond a student's control prevent him/her from completing the rescheduled lab test or midterm test, a student may be eligible to petition Enrolment Services to explain the circumstances.

For students who are parents or primary caregivers, please communicate any scheduling challenges as soon as possible. You are always welcome to bring your children to class if you find yourself in a childcare emergency and they have no infectious illness. If they are sick, please send me a Self-Declaration email (as above, substituting your

Other course policies

Office hours – Office hours will be held weekly on Mondays from 3-4 PM and Tuesdays from 1-2PM. Additional email office hours will be available prior to tests and exams.

Email – Because of the potential volume of inquiries, please do not ask questions that can be answered in lecture slides. If you email the professor, always use your LU email and include the course code as the subject line so that I know which of my classes you are emailing about. For lengthy questions, accommodations, absences and sensitive matters, please come to office hours.

Email office hours – Most emails will be responded to during weekly office hours. Additional email office hours will be available prior to tests and exams.

Behavioural guidelines – Appreciate that we are all teachers and learners, each with a unique life experience and distinct prior knowledge. Discuss, email, and listen with a spirit of respect for peers and those outside of class who pertain to the discussion.

Group work/collaboration – The weekly assignments are individual work, *not* group work. You may discuss concepts and questions in class and lab, but you must each perform your labs independently.

Accessibility

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit: http://studentaccessibility.lakeheadu.ca. The office of Student Accessibility Services is located in OA1030.

Academic Integrity

The University takes a most serious view of offences against academic honesty such as plagiarism, cheating and impersonation. Penalties for dealing with such offences will be strictly enforced.

The "Code of Student Behaviour and Disciplinary Procedures" including sections on plagiarism and other forms of misconduct may be found on the Lakehead University Senate website. See the Code under Policies - Student Related in the University Policies at www.lakeheadu.ca/faculty-and-staff/policies

The following rules shall govern the treatment of candidates who have been found guilty of attempting to obtain academic credit dishonestly.
The minimum penalty for a candidate found guilty of plagiarism, or of cheating on any part of a course will be a zero for the work concerned.
A candidate found guilty of cheating on a formal examination or a test, or of serious or repeated plagiarism, or of unofficially obtaining a copy of an examination paper before the examination is scheduled to be written, will receive zero for the course and may be expelled from the University.

Students disciplined under the Code of Student Behaviour and Disciplinary Procedures may appeal their case through the Judicial Panel.

Note: "Plagiarism" shall be deemed to include:
Plagiarism of ideas as where an idea of an author or speaker is incorporated into the body of an assignment as though it were the writer's idea, i.e. no credit is given the person through referencing or footnoting or endnoting.
Plagiarism of words occurs when phrases, sentences, tables or illustrations of an author or speaker are incorporated into the body of a writer's own, i.e. no quotations or indentations (depending on the format followed) are present but referencing or footnoting or endnoting is given
Plagiarism can occur with paraphrasing – i.e. of ideas are where words and an idea(s) of an author or speaker are incorporated into the body of a written assignment as though they were the writer's own words and ideas, i.e. no quotations or indentations (depending on format followed) are present and no referencing or footnoting or endnoting is given.

Examples of cheating

- Turning in an assignment previously submitted for another class Paraphrasing ideas without documenting the source
- Using information considered common knowledge without citation Having someone in your

class check over a paper before turning it in Working with others on a project to be completed individually Asking someone who's already taken the exam what's on it

- Making suggestions about what to study to someone who hasn't yet taken the exam Including references on a bibliography that were not used in the paper
- Taking credit for participation in a group without doing a fair share of the work Making up an excuse for missing an exam or assignment due date
- Using your phone to look up an answer during an exam but not finding it Knowing that someone is cheating but not reporting it
- Being in a study group that divvies up homework problems and then shares and discusses the problem solutions
- Falsifying data from experiments, surveys, or other research activities

Course schedule

Important dates

Final Day of Classes: Monday, December 4, 2023
Final Date to Withdraw: Friday, November 3, 2023
Examination Period: Thursday, December 7, 2023 - Sunday, December 17, 2023 (11 Days)
Exam Contingency Date: Monday, December 18, 2023

Note: Lecture and lab schedule is subject to change. There is no lab in the first week of class. Readings will be updated soon!

DATE	LECTURE TOPIC	LAB TOPIC	READING TBD on Sept 7th	Statistics topics in lecture and lab	ASSIGNMENT
Sept 5-8	**Introduction to course**		Syllabus		
Sept 11-15	**1.** The nature of data and statistics	Lab 1 – Install Excel and intro to Excel exercise		The nature of data and data distributions Frequency tables Histograms	A1 due on Se 18, 5PM
Sept 18-23	**2.**Descriptive statistics	Lab 2 - Descriptive stats and charts with Excel.		Measures of central tendency Measures of dispersion Spatial measures	A2 due on Se 25, 5PM
Sept 25-30	**3.** Probability	Lab 3 - Importing data into Excel.		Discrete & continuous events Binomial distributions Geographic applications Geometric and Poisson distributions	A3 due on Oct 6, 5PM
Oct 2-6	4. Probability (cont'd)	Lab 4 - Probability distribution functions in Excel.		Continuous probability distributions Normal and Exponential distributions The central limit theorem Sampling Properties of a sampling distribution	A4 due on Oct 16 5PM (or earlier if you want to have reading week clear and free)
Oct 9-13	STUDY WEEK				
Oct 16-20	**5.** Confidence intervals	Lab 5 - A database in SPSS. *You will be working with SPSS not with Excel.*		Estimating a population mean based on large and small samples Estimating a proportione Estimating sample sizes for interval estimates	A5 due on Oct 23, 5PM

Oct 23-27	**6.** Hypothesis testing –	**Midterm test: Oct 24** ***(to be held in lab)***		Constructing null and research hypotheses One vs. two tailed tests Hypotheses about means and proportions	
Oct 30-Nov 3	**7.** Regression and correlation **-**	Lab 6 - Descriptive stats;		Bivariate analysis and Correlation Constructing scatter plots Finding Pearson's *r* Explanation using regression Determining best fit equations; Residuals; Explained/unexplained variation	A6 due on Nov , 5PM

Nov 6-10	**8.** Regression hypothesis tests	Lab 7 - Applications of regression analysis.		Testing a slope for significance assumptions Pitfalls of regression	A7 Due on Nov 13, 5PM
Nov 13-17	**9.** Comparing means:	Lab 8 - Comparing means		Independent samples – Two sample difference of means t-test for independent samples; Mann-Whitney U-Test; Comparing means: Dependent samples – Matched Pairs t-Test.	A8 due on Nov 20, 5PM
Nov 20-24	**10.** Variance	Lab 9 - Analysis of variance		Comparing two proportions Test for comparing two sample proportions ANOVA (analysis of variance) Difference btwn multiple means.	A9 due on Nov 27, 5PM
Nov 27 - Dec 1	**11.** Point pattern analysis	**FINAL LAB TEST Nov 27**		Testing for randomness Nearest neighbour analysis Multivariate models	

Nov Dec 4	**12.** Lab test handed back; Final Exam Q & A				

Dec 5-16	**Final Exam See LU exam schedule**		

Student Supports

Student Health and Wellness Centre https://www.lakeheadu.ca/students/wellness- recreation/student-health-and-wellness

Student Success https://www.lakeheadu.ca/students/academic-success/student-success- centre

Library https://libguides.lakeheadu.ca/home
Please note: the librarians can be an excellent help for research, referencing, etc.

Scholarships *https://www.lakeheadu.ca/studentcentral/financing-budgeting*