Department of Geography. Orillia Campus. Autumn 2022.

Geography 2271 Quantitative Methods in Geography

Introduces methods and techniques for handling, describing, and analyzing data in the context of geography and studies of the environment. Topics may include: describing a distribution, discrete and continuous probability distributions, estimating means and proportions, hypothesis testing, linear regression, contingency tables and point pattern analysis. **Credit Weight:** 0.5 **Offering:** 3-1.5 **Course Classifications:** Type A: Humanities; Type C: Engineering, Mathematical and Natural Sciences.

Welcome! Geography 2271 is structured as an introductory course in statistical analysis for geographers and anyone else doing research where space and location are important. ***No previous statistical background is assumed.*** *The course does require some basic mathematical skills but nothing more sophisticated than what you have previously seen in high school mathematics courses.*

Meeting Schedule

Lectures   Mondays and Wednesdays 2:30-4pm in OA1022
Labs   Friday afternoons 4:00-5:30pm in OA1002

Lecturer: Lisa TUTTY, Email LTUTTY@LAKEHEADU.CA
Office hours:

Monday	Tuesday	Wednesday	Thursday	Friday
1:10-2pm	1:10-2pm	1:10-2pm	*Not available*	2:10-3pm

My office is OR1037 (first floor of the residence hall).

Required Textbook: Understandable Statistics, 13e by Brase and Brase. Cengage. *Check the course D2L site for the link to our course site on WebAssign please.*

Supplemental (optional) textbooks:
Bluman, A (2018). Elementary Statistics: A step by step approach 10th Edition. McGraw Hill.
Johnson, R. and Kuby, P. (2012) STAT2, Cengage Publishers.

Other Supplies
• You will need a pencil and eraser
• A pocket calculator with scientific functions (factorials, logarithms, exponents) is essential

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

Accuracy
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.

Course website
This course makes use of the Desire2Learn (D2L) Courselink web portal. This is a "flipped" classroom – you watch the lectures online on your own time and come to class to work through practice problem sets and labs. Slides (for making notes) from slideshows used in asynchronous lectures can be printed in pdf format from the course site before you watch the lecture (use the little printer symbol in the bottom right hand corner of the lecture). D2L also hosts the assignments, tests, labs, etc. There will also be announcements and updates concerning tests, assigned exercises, etc posted on D2L so please do check it regularly. We also use the WebAssign website that is part of the textbook package.

Marks breakdown
Weekly assignments **25%**
Midterm test 1 **10% Midterm test 1 Wed Oct 5**
Midterm test 2 **10% Midterm test 2 Wed Nov 9**
Lab test 1 **10% Lab test 1 - Excel Fri Oct 21**
Lab test 2 **10% Lab test 2 - SPSS Fri Nov 25**
Final examination **35%**
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.

A+	90 to 100%	Outstanding understanding of the course concepts including integration of materials and ideas, ability to apply knowledge to situations
A	80 to 89%	
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

Mark descriptions from Lakehead University. 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 lateness: Due to the pandemic there has been a change for this term in the policies around illness. You may receive consideration for your late work (meaning no late penalty) if you submit an email to me at LTUTTY@LAKEHEADU.CA with this format:

Student Self-Declaration Email:

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) 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).

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.

The late penalty for assignments (without consideration as described above) is 10% per day late, including weekends. Late assignments should be submitted to Lisa in the exact same manner as the on time assignments (i.e. NEVER submit by email – submit it via D2L or via LUGDC.maps.arcgis.com as was originally requested).

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.

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 statistical analysis;
    (b) interpret the results of statistical analysis and convey them to an audience that is not necessarily versed in those techniques;
    (c) understand and follow the content of articles in academic journals that make use of statistical analysis.
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 Policies
Behavioural standards – Speak, email, and listen with respect.

Attendance – To succeed in this course, regular attendance at asynchronous lectures and asynchronous labs is absolutely essential. As persons aspiring to be professionals, whether in geography or any other field, it is expected that you will be present at all lectures and labs.

Group work/collaboration – The weekly assignments are individual work, *not* group work.

Nettiquette – If you post on the D2L Discussion Board or email please do so with respect. Please also consider that everyone in the course can see your posting, so don't include personal information. If you email the Lecturer, please 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.

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.
> (a) 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.
> (b) 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:
1. 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.

2. 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.

3. Plagiarism of ideas and words as 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.

Specific *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: Subject to change.

DATE	TOPICS	LAB	READING in Brase and Brase (required)	ASSIGNMENT
Sept 6-9	**1.** Analyzing the distribution of a variable; Constructing frequency tables and histograms.	N/A	Chapter 1 and 2	A1 due on Se 12
Sept 12-16	**2.** Measures of central tendency; Measures of dispersion; Spatial measures.	Lab – Intro to Excel AND Descriptive stats and charts with Excel.	Chapter 3	A2 due on Se 19
Sept 19-23	**3.** Concept of probability; Discrete vs continuous events; Binomial distributions; Geographical applications of binomial distributions; geometric and Poisson distributions.	Lab - Importing CANSIM data into Excel.	Chapter 4 and Chapter 5	A3 due on Se 26
Sept 26-30	4. Continuous probability distributions - Normal and Exponential distributions; The central limit theorem - Concept of sampling; Properties of a sampling distribution.	Lab - Probability distribution functions in Excel.	Chapter 5 and Chapter 6	A4 due on Oc 3
Oct 3-7	**5.** Confidence intervals – estimating a population mean based on large and small samples; estimating a proportion; estimating sample sizes needed for interval estimates	Lab - A database in SPSS. *You will be working with SPSS this week and beyond, not with Excel.*	Chapter 7	A5 due on Oc 17 **Midterm test 1 Wed Oc 5**
Oc 10-14				
Oc 17-21	**6.** Introduction to hypothesis testing – Constructing null and research hypotheses, one vs. two tailed tests; Hypotheses about means and proportions – testing hypotheses about population means with large and small samples; testing hypotheses about proportions.	**LAB TEST 1 Excel Fri Oc 21.** *If you haven't done the prep labs (Excel) then you will almost certainly fail folks, fair warning.*	Chapter 8	A6 due on Oc 24
Oct 24-28	**7.** Bivariate analysis and correlation - Constructing scatter plots; Finding Pearson's r; Explanation using regression – Determining best fit equations; Residuals; Explained/unexplained variation	Lab - SPSS: Descriptive stats; recoding/frequency count, compute.	Chapter 9	A7 due on Oc 31
Oct 31 - Nov 4	**8.** Regression hypothesis tests – testing a slope for significance; assumptions and pitfalls of regression; Comparing means: Independent samples – Two	Lab- SPSS: Applications of regression analysis. *(Workshop 9, Assignment 8)*	Chapter 9	A8 due on Nov 7

	sample difference of means t-test for independent samples; Mann-Whitney U-Test;			
Nov 7-11	**9.** Comparing means: Dependent samples – Matched Pairs t-Test.	Lab - SPSS: Comparing means *(Workshop 10, Assignments 9 & 10)*.	Chapter 9	A9 due on Nov 14 **Midterm test 2 Wed Nov 9**
Nov 14-18	**10.** Comparing two proportions – test for comparing two sample proportions; ANOVA – analysis of variance technique; difference between multiple means.	Lab - SPSS: Contingency tables *(Workshop 13)*.	Chapter 9	A10 due on Nov 21
Nov 21-25	**11.** Contingency tables – calculation of expected values in a contingency table; manual calculation of a chi-square statistic; Other applications of the Chi-Square Test – testing the representativeness of a sample; testing for randomness in a spatial pattern of residuals.	**LAB TEST 2 – SPSS Fri Nov 25** *If you haven't done the prep labs (SPSS) then you will almost certainly fail folks, fair warning.*	Chapter 10 and 11	A11 due on Nov 28
Nov 28-Dec 2	**12.** Point pattern analysis – testing for randomness; Nearest neighbour analysis; Multivariate Modelling – The need for multivariate models; Building a multiple regression model; Dummy variable in r. model.	Lab - Statistics in ArcMAP and GEOMAPAPP.		A12 (Stats in GIS) for bonus marks due on Dec 5
Dec 5	Classes end – catchup class on Monday afternoon			
Dec 8-18 (19)	*Don't plan events/travel/vacation until the exam schedule has been printed. Exams run day/night/weekends between Dec 8-18 inclusive with Dec 19 as a contingency.*			

Student Supports

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

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.