

Department of Geography and the Environment (Orillia) GEOG 2271 FAO, Quantitative Methods in Geography Fall 2017

Instructor Contact Information

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NOTE: Please use your Lakehead University email account to contact your instructor. "GEOG-2271-FAO" <u>MUST</u> appear in the subject line and the message <u>MUST</u> include your *full name* and *student ID number*.

Course Information

Lectures: Tuesdays & Thursdays, 4:00 PM - 5:30 PM Class Location: OA 2010 Lab: Mondays, 8:30 AM - 10:00 AM Lab Location: OA 1002

Course Description

This course introduces fundamental statistical methods for handling, describing, and analyzing geographical data. Applications of statistical techniques in geography will be emphasized. Topics include descriptive statistics, probability theory, discrete and continuous probability distributions, inferential statistics, ANOVA, correlation and linear regression analysis, analysis of spatial patterns, factor analysis, and principal component analysis. Multiple regression and spatial regression will be covered, if time permits.

Lectures and labs are equally important for success in this course and to master several statistical and spatial statistical analytical tools. Lab exercises will emphasize practical applications using SPSS (or, STATA) and GeoDa softwares.

Prerequisite

GEOG 1150 or GEOG 1170 or permission of the Chair of the Department of Geography and the Environment.

Learning Outcomes

By the end of this course, students should be able to apply and demonstrate appropriate quantitative methods; interpret, analyze, and report statistical outcomes in geographical studies. More specifically, successful students will be able to: (i) describe statistical concepts and data using tables and graphs; (ii) interpret statistical hypotheses, assumptions, equations, and test the significance of hypotheses; (iii) be accustomed with linear regression, analysis of variance; and (iv) modeling multivariate spatial data using SPSS /STATA and GeoDa, and interpret the results.

Textbook (required)

Johnson, R., & Kuby, P. (2012). STAT2 (2nd ed.). Boston, MA: Brooks/Cole Cengage Learning.

NOTE: You may connect to http://login.cengagebrain.com/course/89HW-9S7X-3RS7 for accessing textbook resources along with practice problem sets online. Trial access is free for two weeks.

Additional Textbooks (optional)

- Rogerson, P. (2015). Statistical methods for geography: A student's guide (4th ed.). Los Angeles: SAGE.
- McGrew, J., & Monroe, C. (2014). An introduction to statistical problem solving in geography (3rd ed.). Waveland Press.

Course Assessment & Requirements

Assessment process is comprehensive and the weight of each component is as follows:

Component	Due Date	Weight
Attendance, Class Participation, & In-class exercise (5)	To be announced later (TBA)	10%
Midterm Exam (1)	Tuesday, Oct 17, 2017, @ (4:00-5:20) PM	25%
Assignment (2)	LA1: Thursday, Oct 5, 2017 @ 11:59PM LA2: Tuesday, Nov 14, 2017 @ 11:59PM	15%
Group Project & Presentation (1)	Presentation: Nov 23, 2017 @ (4:00-5:20) PM Paper Submission: Nov 28, 2017 @ 11:59PM	20%
Final Exam (Comprehensive)	TBA (Dec 7 -17, 2017 inclusive)	30%
	Total	100%

This grading scheme will be strictly implemented and the deadline for each component is FINAL for all registered students apart from verified illnesses, approved through Lakehead University "Certificate of Illness or Incapacitation", can be found at:

https://www.lakeheadu.ca/sites/default/files/forms/Certificate%20of%20Illness_Incapacity.pdf.

Attendance, Class Participation, & In-class exercise (10%)

- Student attendance will be regularly monitored. For active class participation, students are strongly encouraged to prepare before attending lectures by reading the materials listed in the tentative lecture schedule below. *Five* points will be allocated for active participation and class attendance.
- A maximum of *five* in-class exercises will be done through desire2learn, and will be assessed individually. In-class exercises will be weighted equally to a maximum of *five* points. The exact time for each exercise and any other relevant information will be announced in the D2L course announcement section. There will be no in-class exercises during the weeks of the midterms, fall study break, and during the last five days of classes. Please be aware about academic schedule of 2017-18 important dates, University closures, and no class schedule: http://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&cataloggroupid=25&catalogid=24&topicgroupid=19383&loaduseredits=true.

Midterm Examination (25%)

- One midterm exam will be held during regular class period which will count for 25% of the final grade. The format of midterm exam will be a combination of multiple-choice questions, analytical questions with basic and application exercises in the form of fill-in-the-blank, short answer, and short essay questions. This exam will test students' proficiency with the materials covered in the lectures, exercises, lab assignments, and practice problem sets.
- Midterm exam date is set and cannot be changed except university closure or official holiday.
- Midterm grades will be posted on D2L site, and exam papers will be handed out in the class.

Assignment (15%)

- There will be two lab / homework assignments throughout the term. Each will count for 7.5% of the final grade. Assignments will be posted in the "Lab Assignments" folder of D2L course site in due course. Submission deadlines for lab assignments are already SPECIFIED in the course assessment section. NO LATE ASSIGNMENTS WILL BE ACCEPTED, unless an arrangement has been made with the course instructor before the deadline.
- Lab assignments will require students to download data and then use of statistical software programs such as SPSS/STATA and GeoDa.
- Students are advised to submit their solutions to the respective DROPBOX folder of D2L course site either as a SINGLE PDF or word file only. *Hand written and/ printed versions (Hard copies) of any assignments will NOT be accepted and graded*. The file name for an assignment should include the student name, student ID, and the lab number as shown in the following example: "*StudentName_StudentID_AssignmentNumber*".

Group Project & Presentation (20%)

- Students are required to <u>choose</u> a topic (such as ANOVA, correlation analysis, linear regression, multiple linear regression, logistic regression, spatial correlation and regression, point pattern analysis, factor analysis), and to <u>design</u> a lab instruction for the chosen project immediately after the fall study break (October 9-13, 2017).
- Students should discuss and conduct meetings about their project in groups at least twice in four weeks over the fall term. The description of class project and the <u>rubric</u> of expectation of the class project will be posted in the D2L course site.
- Though students will have one lab session to design their group project related lab instruction on *October 16th (lhour and 20 minutes)*, more work will be required outside the class.
- Students are required to present their project work in groups on Nov 23, 2017 during regular lecture hours, and accommodate instructor as well as other group's feedback into their paper before final submission approximately a week later.
- The project paper needs to be submitted in the designated DROPBOX folder of D2L course site by no later than Nov 28, 2017 @ 11:59PM, either as a SINGLE PDF or word file only, following the file name such as "GEOG2271FAO_ClassProject_GroupName".
- Late submission policy will be the same as with the lab assignments.

Final Examination (30%)

- Final exam will be <u>comprehensive</u>; but it will mostly cover post midterm materials. The final exam period for the Fall 2017 is from <u>December 7 17, 2017</u>. Students are expected to be available during this time.
- Travel plans are not acceptable grounds for granting an alternative final examination time. Please read about examination regulations and related matters in the following webpage, <u>https://www.lakeheadu.ca/faculty-and-staff/policies/regulations</u>.
- The exact date and time for the final exam for this class will be determined by the Registrar's Office. The final exam schedule is posted in the website: http://examtime.lakeheadu.ca/ORIL/index_oril.html.
- Please note that the Registrar's Office can <u>only</u> issue final grades.

Tentative Lecture and Lab Schedule

This class schedule is ambitious. Modifications and/or eliminations of certain content might be required given our limited time together. Any necessary modifications or eliminations to the course content will be communicated to you in the regular class period.

Date	Lec & Lab #	Торіс	Textbook Reading
Sep 05 / 17	Lec-1	Introduction to the course and basic concepts of Statistics	Johnson, Ch. 1.1-1.3
Sep 07 / 17	Lec-2	Descriptive analysis and presentation of single-variable data	Johnson, Ch. 2.1-2.6

Sep 11 / 17	Lab-1	Introduction and Basics of SPSS /STATA	
Sep 12 / 17	Lec-3	Descriptive analysis and presentation of bivariate data	Johnson, Ch. 3.1-3.3
Sep 14 / 17	Lec-4	Descriptive spatial statistics: spatial measures of central tendency & spatial measures of dispersion	Rogerson, Ch. 2.6 McGrew, Ch. 4.1-4.2
Sep 18/17	Lab-2	Introduction and Basics of GeoDa	
Sep 19 / 17	Lec-5	Probability of events, conditional probability, rules of probability, mutually exclusive & independent events	Johnson, Ch. 4.1-4.6
Sep 21 / 17	Lec-6	Discrete Probability Distributions	Rogerson, Ch. 3 Johnson, Ch. 5.1-5.3
Sep 25 / 17	Lab-3	Descriptive Spatial Statistics	
Sep 26 / 17	Lec-7	Continuous Probability Distributions	Johnson, Ch. 6.1-6.3
Sep 28 / 17	Lec-8	Inferential statistics: confidence intervals, hypothesis testing, statistical sampling, spatial sampling	Rogerson, Ch. 5.1-4, 5.6-7; McGrew, Ch. 7.3
Oct 02 / 17	Lab-4	Inferential Statistics	
Oct 03 / 17	Lec-9	Inferential Spatial Statistics	Rogerson, Ch. 5.5, 5.8 McGrew, Ch. 13.1-13.3
Oct 05 / 17	Lec-10	Analysis of Variance (ANOVA): Example applications in Geography	Johnson, Ch. 12.1-12.2 McGrew, Ch. 11.3
	Fall Stu	dy Break: Monday October 9, 2017 - Friday October 13, 2	2017
Oct 16 / 17	Lab-5	Inferential Spatial Statistics & Lab Instruction for Group I	Project Paper
	Mid	term Exam: Tuesday, October 17, 2017 @ (4:00-5:20) PM	
Oct 19 / 17	Lec-11	Correlation analysis & Intro to Linear Regression	Johnson, Ch. 13.1-13.3 Rogerson, Ch. 7.1-7.6
Oct 23 / 17	Lab-6	Correlation Tests in SPSS /STATA	
Oct 24 / 17	Lec-12	Linear Regression Analysis: Assumptions, standard error of the estimate	Johnson, Ch. 13.4 Rogerson, Ch. 8.1-8.5
Oct 26 / 17	Lec-13	Regression Analysis: Linear vs. non-linear, relationship between correlation and regression, statistical inference on regression coefficients	Johnson, Ch. 13.5-13.6 Rogerson, Ch. 8.6, 8.8
Oct 30 / 17	Lab-7	One way ANOVA in SPSS /STATA	
Oct 31 / 17	Lec-14	Multiple Regression: Introduction, Misspecification error, Dummy variables	Rogerson, Ch. 9.1-9.3
Nov 02 / 17	Lec-15	Multiple Regression: Illustration, Variable Selection, Examples of Multivariate Problem-Solving in Geography	Rogerson, Ch. 9.4-9.5 McGrew, Ch. 18.1
Nov 06 / 17	Lab-8	Linear Regression in SPSS /STATA	
Nov 07 / 17	Lec-16	Summary of problems that may arise in Multiple Regression Analysis	Rogerson, Ch. 9.7
Nov 09 / 17	Lec-17	Logistic Regression: Categorical Dependent Variable	Rogerson, Ch. 9.6
Nov 13 / 17	Lab-9	Multiple and Logistic Regression in SPSS /STATA	
Nov 14 / 17	Lec-18	Spatial Patterns: Analysis of Point Patterns	Rogerson, Ch. 10.2 McGrew, Ch. 13.1, 14.1
Nov 16 / 17	Lec-19	Intro to Spatial Statistics & Spatial Autocorrelation	Rogerson, Ch. 11.1-11.2 McGrew, Ch. 13.2
Nov 20 / 17	Lab-10	Spatial Patterns: Finding Moran's I with GeoDa & Project	et Lab instruction updates
Nov 21 / 17	Lec-20	Spatial Aspects of Regression	Rogerson, Ch. 11.3-11.5
	Group Project	Paper Presentation: Thursday November 23, 2017 @ (4:0	0-5:20) PM
Nov 27 / 17	Lab-11	Spatial Autocorrelation & Spatial Regression with GeoDa	

Nov 28 / 17	Lec-21	Factor Analysis and Principal Component Analysis	Rogerson, Ch. 12.2
Nov 30 / 17	Lec-22	REVIEW for Final Exam & Tips for Success	
Dec 04 / 17	Lab-12	Data Reduction Methods in SPSS	

Teaching Philosophies

As an instructor of this course, I will guide and encourage my students to learn actively by adopting a set of cooperative learning strategies. This will facilitate my students learning how to work in a group or as a team, while enhancing critical thinking skills to be used further in the life-long learning process. Total number of registered students in the course will be divided into several working groups consisting of maximum three members who will have responsibilities to engage with pre-class readings, solving in-class exercises, discussing in the lectures, completing lab assignments, presenting group project works, writing group project papers, and assessing both own and other's work.

Other Policies

Electronic Device Policy

- THE CLASSROOM IS A HANDHELD-DEVICE-FREE ZONE.
- Turn off all handheld devices and put them away for the duration of the lecture.
- Laptop computers may only be used to view lecture materials and to work on lab materials.
- Photographic devices are not permitted in class due to copyright and privacy issues.
- Audio or video recording devices are not permitted in class due to copyright and privacy issues.
- You will need a standard scientific CALCULATOR for the class. Calculators that can store formulas or any large amounts of data are not allowed during the midterm and final exams.

Academic Misconduct

A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating and impersonation) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the dean of associated faculty. Students are encouraged to review Section IX of the University Regulations regarding academic dishonesty: http://navigator.lakeheadu.ca/Catalog/ViewCatalog.aspx?topicgroupid=9352.

Appeals

Students will be evaluated with fair treatment based on the course assessment criteria. However, students may follow the procedures and guidelines set forth in the <u>Senate Policy Regarding</u> <u>Academic Appeals</u> to appeal a final course mark or an academic decision other than a final course mark. It is the responsibility of each student registered in the course to review and be familiar with the Senate Policy regarding reappraisal and academic appeals: <u>https://www.lakeheadu.ca/faculty-and-staff/policies/regulations/reappraisal-and-academic-appeals</u>.

Accommodation for Students with Disabilities

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 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/.