

GEOG 2271 Quantitative |Methods Course Syllabus

Welcome! Geography 2271 is structured as an introductory course in statistical analysis for geographers. **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 Grade 10/11 high school mathematics courses.

General 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: EXCEL (2010 version) and SPSS (Statistical Package for Social Sciences).

Purpose of this Manual

The manual packages together all the materials you will need for in-class workshops and lab Assignments. In addition, it contains information about the course project as well as a section of review questions. In most cases, answers are also provided for these questions. Please get in the habit of bringing the manual to class along with a calculator.

Course Text

Johnson, Robert and Patricia Kuby. *STAT. 2nd Edition*

A good supplementary text is:

Rogerson, Peter. *Statistical Methods for Geographers: A Student's Guide. 3rd Edition.*

Copies of these books are available in the bookstore; used copies may also be available as this text has been used before for this course. While the textbook is optional, you may find that **having a good statistical reference on hand is invaluable for future courses and even beyond your degree.** I strongly advise purchasing either one of these books or an equivalent. If you like, I can make alternate recommendations.

Computers and Computer Software

Knowing how busy the university computers are, I try to structure lab time such that you are able to complete all the work in the time allotted. If you need to work outside of class hours, two labs in ATAC have SPSS available: AT 3002 and AT 3003. The HELPDESK web page has schedules showing times when these labs are open for general use. We meet in ATAC 3003.

Many of you will have Microsoft Office on a home computer so you will have ready access to EXCEL. If you are interested, the campus computer store sells a student version of SPSS at a relatively low price. While the student version has all the capabilities that you will need for this course, you should be aware that it is not as powerful as the full version you will be using in the university labs.

Tutorial Help Available

There is no official tutorial period scheduled for the class. The practice during previous years was to set up a regular time for students to come by for extra help. Once we are a week or two into the course, I will discuss this with the class and try to find a time that suits the majority of people who are interested in attending a tutorial.

Assignments

Assignments for this course are included in this manual and may be completed at any time. The course schedule indicates the due dates and also the point at which we will have covered all of the necessary material in class (i.e. when you should get started).

Late assignments will be penalized at a rate of 10%/day of the mark allocation.

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 3 or 4 significant digits. Do *not* round off numbers during intermediate steps.**

Last Word

I hope you will enjoy the course. Please don't hesitate to ask questions or come by for help if you ever find yourself hopelessly confused or maybe just a bit perplexed. Please be advised that the lectures and assignments may change to accommodate other priority subject matter. These changes may come as substitutions or additions to the material in this manual.

Week-by-Week Draft Schedule for GEOG 2271

The following is the weekly plan for the course. Unforeseen circumstances may necessitate slight alterations to the schedule as we progress through the term. Chapter references are to the Johnson/Kuby text.

Week	LECTURE A (Tuesday)	LECTURE B (Thursday)	LAB PERIOD (1)
1	<p>September 9</p> <p style="text-align: center;">Slideshow 1 / Workshop 2</p> <ul style="list-style-type: none"> ▪ Course objectives ▪ Analyzing the distribution of a variable ▪ Constructing frequency tables and histograms <p>Reading: Chapter 2 (Sections 2.1 – 2.2)</p> <p><i>Get started on Assignment 2.</i></p>	<p>September 11</p> <p style="text-align: center;">Slideshow 2 / Workshop 3</p> <ul style="list-style-type: none"> ▪ Measures of Central Tendency ▪ Measures of Dispersion <p style="text-align: center;">Slideshow 3 / Workshop 3 (continued)</p> <ul style="list-style-type: none"> ▪ Spatial Means and Medians <p>Reading: Chapter 2 (Sections 2.3 – 2.6)</p>	<p>September 12</p> <p style="text-align: center;">Workshop</p> <p>Learn / practice basic</p> <ul style="list-style-type: none"> ▪ Entering / editing ▪ Formatting Data ▪ Sorting Data ▪ Building Equations ▪ Using Fill Down ▪ Built in Functions <p><i>Get started on Assignment 1</i></p>
2	<p>September 16</p> <p style="text-align: center;">Slideshow 4 / Workshop 4</p> <ul style="list-style-type: none"> ▪ Concept of Probability ▪ Discrete vs. continuous events ▪ Introduction to the binomial distribution ▪ Coin flipping experiment <p>Reading: Chapter 4 (Sections 4.1 – 4.3)</p>	<p>September 18</p> <p style="text-align: center;">Slideshow 5 / Workshop 6</p> <ul style="list-style-type: none"> ▪ Geographical applications of binomial distributions ▪ Geometric Distribution <p>Reading: Chapter 4 (Sections 4.4 – 4.6)</p> <p><i>Get started on Assignment 3.</i></p>	<p>September 19</p> <p style="text-align: center;">Workshop</p> <p style="text-align: center;">Descriptive Statistics</p> <ul style="list-style-type: none"> ▪ Use of built in functions: AVERAGE, STDEV ▪ Weighted Mean ▪ Creating Bar Charts <p><i>**Move Assignment 2 to Assignment 1 and 2</i></p>
3	<p>September 23</p> <p style="text-align: center;">Slideshow 5 / Workshop 6 (continued)</p> <ul style="list-style-type: none"> ▪ Concept of rare events ▪ Introduction to the Poisson distribution <p>Reading: Chapter 5</p>	<p>September 25</p> <p style="text-align: center;">Slideshow 6 / Workshop 8</p> <p style="text-align: center;">Continuous Probability Distributions</p> <ul style="list-style-type: none"> ▪ Intro to normal distribution ▪ Using a z table ▪ Exponential Distribution <p>Reading: Chapter 6</p> <p><i>Get started on Assignment 4.</i></p>	<p>September 26</p> <p style="text-align: center;">Workshop</p> <p style="text-align: center;">Importing Data</p> <ul style="list-style-type: none"> ▪ Accessing Statistical Data ▪ Review of spreadsheet: Workshops 1 and 2

Week	LECTURE A (Tuesday)	LECTURE B (Thursday)	LAB PERIOD (I
4	<p>September 30</p> <p>Slideshow 7</p> <p>The Central Limit Theorem</p> <ul style="list-style-type: none"> ▪ Concept of sampling ▪ Properties of a Sampling Distribution <p>Reading: Chapter 7 (Sections 7.1 – 7.2)</p>	<p>October 2</p> <p>MIDTERM 1</p> <p>Covers material up to and including Slideshow 7 and Workshop 9</p>	<p>October 3</p> <p>Wo</p> <p>Dimension</p> <ul style="list-style-type: none"> ▪ Identifying non interval/ratio d ▪ Coding a questi ▪ Entering survey <p><i>Assignment 3 due.</i></p>
5	<p>October 7</p> <p>Slideshow 8 / Workshop 11</p> <p>Confidence Intervals</p> <ul style="list-style-type: none"> ▪ Estimating a population mean based on large and small samples ▪ Estimating a proportion <p>Reading: Chapter 7 (Section 7.3) and Chapter 8 (Sections 8.1 – 8.2)</p>	<p>October 9</p> <p>Slideshow 9 / Workshop 11 (continued)</p> <ul style="list-style-type: none"> ▪ Estimating Sample Sizes Needed for Interval Estimates <p>Slideshow 10 / Workshop 12</p> <p>Introduction to Hypothesis Testing</p> <ul style="list-style-type: none"> ▪ Constructing null and research hypotheses ▪ One vs. two tailed tests <p>Reading: Chapter 8 (Sections 8.3 – 8.5)</p> <p><i>Get started on Assignment 5.</i></p>	<p>October 10</p> <p>Wo</p> <p>Probability Distrib</p> <ul style="list-style-type: none"> ▪ Using built in st: calculate probab exponential, bin distributions. <p><i>Assignment 4 due.</i></p>
6	<p>October 14</p> <p>Slideshow 11 / Workshop 12 (continued)</p> <p>Hypotheses about Means and Proportions</p> <ul style="list-style-type: none"> ▪ Testing hypotheses about population means with large and small samples ▪ Testing hypotheses about proportions. <p>Reading: Chapter 9 (Sections 9.1 – 9.2)</p> <p><i>Assignment 5 due.</i></p>	<p>October 16</p> <p>Slideshow 12 / Workshop 14</p> <p>Bivariate Analysis and Correlation</p> <ul style="list-style-type: none"> ▪ Constructing scatter plots ▪ Finding Pearson's r <p>Reading: Chapter 3 (Sections 3.1 – 3.2)</p> <p><i>Get started on Assignment 6.</i></p>	<p>October 17</p> <p>Wo</p> <ul style="list-style-type: none"> ▪ Descriptive stat ▪ Recoding / freq SPSS ▪ Use of the Com <p><i>Assignment 6 due.</i></p>
7	<p>October 21</p> <p>Slideshow 13 / Workshop 15</p> <p>Explanation using Regression</p> <ul style="list-style-type: none"> ▪ Determining Best Fit Equations ▪ Residuals ▪ Explained / Unexplained Variation <p>Reading: Chapter 3 (Section 3.3) and Chapter 13 (Sections 13.1 – 13.2)</p> <p><i>Get started on Assignment 7.</i></p>	<p>October 23</p> <p>Slideshow 14 / Workshop 15 (cont'd)</p> <p>Regression Hypothesis Tests</p> <ul style="list-style-type: none"> ▪ SPSS regression output ▪ Testing a slope for significance ▪ Assumptions and pitfalls of regression <p>Reading: Chapter 13 (Sections 13.3 – 13.6)</p>	<p>October 24</p> <p>Ass</p> <p>Applications o</p> <ul style="list-style-type: none"> ▪ Practice interpre output <p>Reading: Chapter 8 (</p> <p><i>Assignment 7 due.</i></p> <p><i>Get started on Assig</i></p>

Week	LECTURE A (Tuesday)	LECTURE B (Thursday)	LAB PERIOD (I
8	<p>October 28</p> <p>Slideshow 15 / Workshop 16</p> <p>Comparing Means – Independent Samples</p> <ul style="list-style-type: none"> Two sample difference of means t-test for independent samples Mann-Whitney U-Test <p>Reading: Chapter 10 (Sections 10.1, 10.3 and 10.5) and Chapter 14 (Section 14.4)</p>	<p>October 30</p> <p>Slideshow 16 / Workshop 16 (cont'd)</p> <p>Comparing Means – Dependent Samples</p> <ul style="list-style-type: none"> Matched Pairs t-Test Flex period (catch up if necessary) Review for test 2 <p>***Put Slideshow 15B here too.</p> <p>Reading: Chapter 10 (Section 10.2)</p>	<p>October 31</p> <p>Work/</p> <p><i>Assignment 8 due at</i></p>
9	<p>November 4</p> <p>MIDTERM 2</p> <p>Covers material up to and including Slideshow 16 and Workshop 16.</p>	<p>November 6</p> <p>Slideshow 17 / Workshop 17</p> <p>Comparing Two Proportions</p> <ul style="list-style-type: none"> test for comparing two sample proportions <p>Reading: Chapter 10 (Section 10.4)</p> <p>**Add a Mann-Kendall problem to Assign9</p> <p><i>Get started on Assignment 9</i></p>	<p>November 7</p> <p>Assi</p> <p>Comparin</p> <ul style="list-style-type: none"> Using SPSS to on means. <p>Reading: Chapter 5 (</p> <p><i>Assignment 9 due</i></p> <p><i>Get started on Assig</i></p>
10	<p>November 10</p> <p>Slideshow 18 / Workshop 18</p> <p>ANOVA</p> <ul style="list-style-type: none"> Analysis of variance technique Difference between multiple means <p>Reading: Chapter 12</p>	<p>November 12</p> <p>Slideshow 19 / Workshop 19</p> <p>Contingency Tables</p> <ul style="list-style-type: none"> calculation of expected values in a contingency table manual calculation of a chi-square statistic <p>Reading: Chapter 11</p>	<p>November 14</p> <p>Assi</p> <p>Contin</p> <ul style="list-style-type: none"> Using SPSS to g and the chi-squa <p><i>Assignment 10 due t</i></p> <p><i>Get started on Assig</i></p>
11	<p>November 18</p> <p>Slideshow 20 / Workshop 20</p> <p>Other Applications of the Chi-Square Test</p> <ul style="list-style-type: none"> Testing the representativeness of a sample Testing for randomness in a spatial pattern of residuals <p>Reading: Chapter 11</p>	<p>November 20</p> <p>Slideshow 21 / Workshop 21</p> <p>Point Pattern Analysis</p> <ul style="list-style-type: none"> Testing for Randomness Variance to Mean Ratio ***Candidate for removal 	<p>November 21</p> <p>Assi</p> <p>Patte</p> <ul style="list-style-type: none"> Using Excel for neighbour analy <p><i>Assignment 11 due t</i></p> <p><i>Get started on Assig</i></p>

Week	LECTURE A (Tuesday)	LECTURE B (Thursday)	LAB PERIOD (1)
12	<p>November 25</p> <p>Slideshow 22 / Workshop 21 (continued) Nearest Neighbour Analysis</p> <p>Slideshow 23 / Workshop 22 Multivariate Modelling</p>	<p>November 27</p> <p>Slideshow 23 / Workshop 22 (continued) Multivariate Modelling</p> <ul style="list-style-type: none"> ▪ The need for multivariate models ▪ Building a Multiple Regression Model ▪ Dummy variable in a regression model 	<p>November 28</p> <p>Dec Practic</p> <p>A test of your ability find answers to probl inferential statistics.</p> <p><i>Assignment 12 due t</i></p>
13	December Classes and Labs	Catch Up and Review and TBA	

Instructor: Dr. Mitchell Taylor

Office: RC 2006E

mktaylor@lakeheadu.ca

ph: 343-8430

Office Hours: 9:00-5:00 M,W,F. 1:00-5:00 T-Th.