

## **Quantitative Methods in Geography**

Geography 3190

Fall 2011: MW 9 – 10:20 pm

Lab 1: Friday 9 – 9:50 am

Lab 2: Friday 10 – 10:50 am

Lecture in ENV 391, Labs in ENV 336

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Office Hours: M 10:30 am to 12:00 pm or by appointment

### **Course Objectives:**

This course is designed to immerse students in descriptive and inferential statistics in a problem-oriented research context, primarily within geography. In order to succeed in the course, students must comprehend and be able to communicate the complete analytical process from:

*Framing a research question*

*Generating statistical hypotheses related to that research question*

*Choosing the appropriate statistical test to test those hypotheses*

*Interpreting results of the statistical test*

*Drawing conclusions from the analysis*

Students who fully understand the subject matter should be able to accomplish each of these tasks by the end of the class and should be able to read and comprehend analytical publications including scholarly journal articles and research reports that incorporate the use of basic quantitative analyses.

### **Required Texts:**

Cronk, B. C. 2008. *How to Use SPSS, Fifth Edition*. Pyrczak Publishing, Glendale, CA.

## **Cumulative Final Exam Wednesday Dec. 14<sup>th</sup>, 8 am**

### **DISABILITY ACCOMODATION**

The Department of Geography, in cooperation with the Office of Disability Accommodations, complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request by the second lab.

### **EXTRA CREDIT**

The Department of Geography does not allow extra credit assignments (work not specified on a course syllabus).

### **ACADEMIC DISHONESTY**

Students caught cheating or plagiarizing will receive a "0" for that particular assignment or exam. Additionally, the incident will be reported to the Department of Geography for deliberation. According to the UNT catalog, the term "cheating" includes, but is not limited to: (a) use of any unauthorized assistance in taking quizzes, tests, or examinations; (b) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (c) the acquisition, without permission, of tests or other academic material belonging to a faculty or staff member of the university; (d) dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor(s); or (e) any other act designed to give a student an unfair advantage. Altering a returned test and claiming a grader or scanning machine made an error is also considered cheating. The term "plagiarism" includes, but is not limited to: (a) the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment; and (b) the knowing or negligent unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

### **CLASSROOM/OFFICE COURTESY**

Please follow these guidelines to avoid disrupting the class:

- (1) Turn off cell phones before arriving.
- (2) Do not arrive late or leave early (except for a bathroom break or emergency).
- (3) Do not sleep or eat during class.
- (4) Do not work on other assignments during class.
- (5) Do not talk when the instructor is lecturing, unless prompted for feedback by the instructor.

## **ATTENDANCE/TARDINESS POLICY**

After missing (*excused* or *unexcused*) 5 class periods a student will receive a WF (F if after the WF deadline) for the course. Students who are greater than 5 minutes late should come to class so as not to miss the material, but they will be counted absent for the period.

## **MISSED-CLASS POLICY**

Neither the professor nor the TA re-teaches the course outside of lecture or lab; we are happy to answer questions, clarify content, and provide guidance for those who attend class and come in with informed questions after they have attempted the work themselves. Students who miss class must secure notes from another student in the class; notes will not be provided by the instructor.

## **Project Based Learning Schedule**

### **Block 1 – Statistical Description**

#### Goals

- 1) Learn parametric and non-parametric forms of description
- 2) Apply descriptive statistics and five types of graphs to summarize data
- 3) Learn to write about descriptive statistics and graphs

*Time to learn = 3 weeks*

*Products = 1 mini report, Quiz 1*

**September 16<sup>th</sup>, report due, Quiz 1**

### **Block 2 – Probability**

#### Goals

- 1) Learn to use curves to think about probability of events
- 2) Learn to create confidence intervals using probability curves
- 3) Learn to use probability curves to test null hypotheses

*Time to learn = 2 weeks*

*Products = Quiz 2, Practicum 1*

**September 28<sup>th</sup> Quiz 2, September 30<sup>th</sup> Practicum 1**

### **Block 3 – Inferential Tests of Difference**

#### Goals

- 1) Learn parametric and non-parametric tests of difference
- 2) Learn the null and alternative hypotheses for each test
- 3) Learn test statistics for each test
- 4) Reinforce using probability to test null hypotheses
- 5) Learn to write about results of tests of difference

*Time to learn = 3 weeks*

*Products = 1 mini report, Quiz 3, Practicum 2 (cumulative)*

**October 19<sup>th</sup> report due, Quiz 3; October 21<sup>st</sup> Practicum 2**

### **Block 4 – Inference using Correlation and Regression**

#### Goals

- 1) Learn about independent and dependent variables
- 2) Learn parametric and non-parametric correlation
- 3) Learn how regression differs from correlation
- 4) Learn how to write about results of correlation and regression

*Time to learn = 3 weeks*

*Products = 1 mini report, Quiz 4, Practicum 3 (cumulative)*

**November 9<sup>th</sup> report due, Quiz 4; November 11<sup>th</sup> Practicum 3**

## **Block 5 – Categorical Tests**

### **Goals**

- 1) Learn about Chi-square
- 2) Learn  $\chi^2$  Goodness of Fit tests
- 3) Learn  $\chi^2$  Test of Independence
- 4) Learn how to write about results of Chi square tests

*Time to learn = 3 weeks*

*Products = 1 mini report, Quiz 5, Practicum 4 (cumulative)*

**November 30<sup>th</sup> report due, Quiz 5; December 2<sup>nd</sup> Practicum 4**

### **Mini-reports**

The mini-reports are projects done in *groups of three*. Groups will be shifted for each project, and reports are authored by the group members together, who share the grade.

### **Quizzes**

Quizzes are individual, *open notebook*. The instructor keeps the quizzes after grades have been disseminated.

### **Final Graded Material**

*Final Exam* = Cumulative Short Answer Exam on choosing appropriate tests; includes knowing all null and alternative hypotheses and all test statistics for all tests.

*Final Notebook* = a compilation of all lecture notes, all projects, all quiz material, and all documents from the class in an organized, neat, three ring binder.

### **Policies**

All tests are open notebook.

You may use a calculator for all tests.

PowerPoints will rarely be used in this class. The entire class is project based, all lessons will be taught around working with datasets for mini-projects. Lectures will combine brief introductions of relevant material using the greaseboard, but will be brief and spotty. Much of the class will be based on in-class group work and discussion.

### **Grading Breakdown**

5 Quizzes @ 50 pts each	= 250 pts
4 mini-reports @ 50 pts each	= 200 pts
4 Practicae @ 50 pts each	= 200 pts
1 Notebook @ 250 pts	= 250 pts
1 cumulative final exam @ 300 pts	= 300 pts
<u>Total</u>	<u>= 1200 pts</u>

**University of North Texas  
Department of Geography**

**Matrix Summary of Comparative Methods**

Number of Samples	Type of Test		
	Non-Parametric		Parametric
K	$X^2$ K-Sample Test	Kruskal-Wallis H-test	Analysis of Variance
2	$X^2$ Two Sample Test	Mann-Whitney U-test	t-test of difference between means
1	$X^2$ One Sample Test	Kolmogorov- Smirnov D-Test	t-test
Relationships and Trends	N/A	Spearman Rank Correlation	Product-Moment Correlation  Simple Linear Regression
Measurement Scale	Nominal	Ordinal	Interval/Ratio

Adapted from Shaw and Wheeler, *Statistical Techniques in Geographical Analysis*.

**Email received in August from Spring 2009 Student**

Dear Dr. Wolverton,

I would like to thank you so much for serving as a reference for my interview with Wood Mackenzie. They offered me the job and I accepted about two weeks ago. I've already moved to the Houston area and start on August 17th.

Many of the skills that I acquired from your course proved to be extremely valuable for the interview. Before the interview started, they had me perform quantitative analysis on energy and pricing data for the North American power grid that I would present to the manager and head analysts in a powerpoint presentation. If it had not been for the knowledge that I gained from your course, the interview might have been over at that point. In fact, the head analyst complemented me for including a wider variety of statistical information than any of the other candidates.

Thank you so much again for serving as a reference and for teaching the Quantitative Methods course, without which, I may have never landed this job.

Best Regards,

Student

*I promised the student they would remain anonymous.*