

**Quantitative Techniques in Planning
UAP 5224**

**Tuesdays, 12:30 – 1:45
Thursdays 11:00 – 1:15**

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Course Description

Quantitative analysis is the craft of “painting with numbers.” The researcher is an artist that applies technique, intuition, and creativity toward the investigation of a particular research question. Effective researchers learn to be explorers, designers, analysts, and communicators, often assuming all four of these roles within the span of a single research project. Researchers must also learn to be inventors. When the researcher’s toolbox of techniques becomes outdated or is not well-suited to address a particular research question, the researcher must create new tools or techniques and learn how to modify these new tools to meet the demands of a changing research environment.

The purpose of this course is to introduce students to the craft of quantitative data analysis as it is practiced in the profession of urban and regional planning. Although “planning methods” consist primarily of standard statistical analysis techniques, the analytic tools employed by planners are unique in several respects:

1. Planning methods are employed to understand and craft solutions to policy problems. This has important implications, including the following:
 - a. Most research conducted for planning and policy analysis purposes is conducted in a short period of time with limited resources. Since research results are usually needed *yesterday*, analysts often rely on *back-of-the-envelope* calculations and quick methods of analysis.
 - b. The research questions addressed by planners and policy analysts are value-laden, which suggests that researchers must not only *analyze* the different solutions to a particular research problem, but they must also *criticize* and *evaluate* proposed solutions using normative criteria.
 - c. The research questions and problems addressed by planners and policy analysts are often *wicked* or *messy* problems that are ill-defined and complex.
 - d. Planners and policy analysts simultaneously serve many different clients with a range of (often competing) interests.
2. Given the inherently spatial nature of urban problems, planners often work with techniques which are uniquely designed to quantify spatial relationships.
3. Given our interest in preparing for the future, planners must often make use of specialized techniques designed to analyze and understand temporal (time series) data.

4. Most local planning offices make heavy use of two common software packages: Microsoft Excel and SPSS. As such, computer implementation of the techniques discussed in class makes frequent use of these packages.

Course Objectives

This course has the following objectives:

1. Introduce students to basic concepts in statistics and probability.
2. Introduce students to common data sources used in planning and policy analysis.
3. Teach students to think logically about policy problems and to employ quantitative methods when appropriate toward that end.
4. Develop a working knowledge of Excel and SPSS software packages and learn elegant methods of computation in those environments.
5. Teach students to effectively communicate their research findings.
6. Provide an introduction to specialized methods used in planning analysis, particularly those designed to describe spatial and temporal phenomena.

The course places heavy emphasis on “learning by doing.” As such, students will learn to explore, describe, analyze, and interpret quantitative data through exercises that are designed to replicate the types of projects encountered by professional planners.

Course Requirements

Grading: Your grade in the class will be determined by your performance in the following areas:

- *Assignments* (30%) – Quizzes and homework assignments will be assigned periodically to assess students’ understanding of lecture material. In-class pop quizzes are possible at any time and may cover any material covered during previous class lectures, including assigned weekly readings from the text and any supplemental readings distributed in class or posted in Blackboard. The instructor may also post online quizzes or homework assignments in Blackboard. Lab exercises may be assigned periodically.
- *Project 1* (30%) – During the first half of the course, students will apply the methods learned towards a project emphasizing descriptive analysis of secondary data.
- *Project 2* (40%) – During the second half of the course, students will apply the methods learned towards a second project emphasizing inferential statistical analysis of microdata. Results from the second project will be presented orally during the final week of class.

Course Policies

Policy on Late or Missed Assignments

All work must be submitted by the due date. Work that is submitted late will receive reduced credit, except in highly unusual instances. Usually, ten percent of the total possible points will be deducted for each school day that an assignment is late. It is extremely important that you stay current in this course. Once you fall behind, it is difficult to get caught up, due to the pace of the course and the cumulative nature of the material.

Attendance Policy

I realize that extenuating circumstances often preclude students from attending every class. If you are absent from class, you are still responsible for ensuring that any labs, quizzes, or other assignments are completed by the due date. Students who are absent during lab are responsible for completing the lab assignment by the due date. Students who are absent during a day that a pop quiz is administered will receive a grade of zero for that day's quiz. Students that fail to submit an online quiz by the due date will likewise receive a grade of zero for the assigned quiz.

Special Needs of Students

If you need course adaptations or accommodations due to a disability, if you have any emergency medical information that the course instructor should know about, or if you need special arrangements in the event the building must be evacuated, please consult Professor Dawkins to make necessary arrangements. Virginia Tech procedures regarding students with disabilities are detailed on the following website:

<http://www.ssd.vt.edu/accommodationsmain.htm>.

Policy on Plagiarism and Academic Honesty

The Virginia Tech Honor System is in effect for this course. Please take the time to read this document and make sure that you understand your responsibilities as a student. The Graduate Honor System can be accessed online at <http://filebox.vt.edu/studentinfo/gradhonor/>. The Undergraduate Honor System can be accessed online at <http://www.honorsystem.vt.edu/>. The following statement, taken from the Graduate Honor System, describes the types of violations covered under the Honor System:

All forms of academic work performed by any graduate student enrolled on a part-time or full-time basis under any of the admission categories shall be subject to the stipulations of the Graduate Honor Code. Such work includes, but is not limited to, course work, labwork, thesis or dissertation work, research, teaching, and extension. Violations of the Graduate Honor Code are categorized as follows: *Cheating, Plagiarism, Falsification, and Academic Sabotage* Cheating is defined as the giving or receiving of any unauthorized aid, assistance, or unfair advantage in any form of academic work Plagiarism is a specific form of cheating, and is defined as the copying of the language, structure, idea, and/or thoughts of another and claiming or attempting to imply that it is one's own original work Students who falsify, orally, in writing, or via electronic media, any circumstance relevant to their academic work shall be guilty of a violation of this Code Academic sabotage is purposeful vandalism directed against any academic endeavor or equipment (from the Virginia Tech Graduate Honor System, accessible online at: <http://filebox.vt.edu/studentinfo/gradhonor/>).

We do not wish to discourage legitimate interchange and learning between students. You are encouraged to work in a collaborative manner on lab exercises and group projects. This means that you should work on the lab exercises on your own initially. Then, you may organize a group of your classmates to discuss your assignment, compare approaches, and/or argue about the right way to approach a problem. You will learn a great deal from this interaction and sharing ideas with your fellow students. **You must, however, submit your own work for grading.** Plagiarism or other forms of violations of the Virginia Tech Honor System will not be tolerated.

Due to limited computing facilities, you may find it necessary to share a computer with another student while working on an in-class lab assignment. In this case, each student must still complete and submit his or her own lab work for grading. Do not simply copy the work completed by another student and turn it in as your own.

Course Readings

Required Texts

James E. Burt and Gerald M. Barber. 1996.
Elementary Statistics for Geographers, 2nd Edition.
New York: Guilford Press.
ISBN: 0898629993
Paperback.

Marija J. Norusis. 2005.
SPSS 13.0 Guide to Data Analysis.
Upper Saddle River: Prentice Hall.
ISBN: 0131865358
Paperback.

Other assigned course readings will be posted within Blackboard. Students are required to read all assigned readings *prior* to the class in which the readings are assigned. Remember to check Blackboard frequently for assigned supplemental readings.

Other Required Purchases

Students are required to purchase a calculator for the class. Most of the calculations that we will be performing in class will consist of simple arithmetic, so most any calculator will do. At a minimum, the calculator should be capable of performing simple addition, subtraction, multiplication, and division, as well as performing a square root operation. Calculators such as this are available at most department stores for \$10 or less. Since we will be conducting many hands-on exercises during class time, students should always remember to bring their calculators to class.

Blackboard

The Virginia Tech *Blackboard* will be an important component of this course. Blackboard is an online environment created for use by Virginia Tech students and faculty. Each course is assigned a separate *page* within the Blackboard system and is accessible only by the course instructor and the students enrolled in the course. This system provides a convenient way to post announcements, grades, assignments, and online quizzes or homework. You are responsible for any announcement or assignment posted on Blackboard, regardless of whether the announcement or assignment was discussed in class, so check Blackboard often! Blackboard can be accessed from the Virginia Tech website by navigating through the link, [Current Students](#), to [Blackboard](#).

Tentative Course Outline and Reading List

(Readings followed by “**B**” can be accessed from Blackboard.)

Descriptive Methods

Week 1 (Aug. 23, 25):

Lab: Course Introduction
Lecture: Overview of Project 1, Introduction to Census Geography
Reading: Census 2000 Basics (**B**)
Frey, et al., 2004 (**B**)

Week 2 (Aug 30, Sept. 1):

Lab: Working with Online Data
Lecture: Conceptualization, Measurement, Data Types and Sources
Reading: Cortright and Reamer, 1998 (**B**)

Week 3 (Sept. 6, 8):

Lab: Introduction to Excel
Lecture: Describing Local Areas using U.S. Census Data
Reading: Myers, Ch. 3, 6 (**B**)

Week 4 (Sept. 13, 15):

Lab: Introduction to Excel
Lecture: Descriptive Statistics I, Traditional Approaches
Reading: Burt and Barber, Ch. 2
Governor’s Housing Conference

Week 5 (Sept. 20, 22):

Lab: Mapping / Spatial Analysis Lab
Lecture: Descriptive Statistics II, Advanced Techniques
Reading: Burt and Barber, Ch. 3 & 16

Inferential Statistics and Prediction

Week 6 (Sept. 27, 29):

Lab: Asking the Right Questions: Overview of Survey Research
(Project 1 Due)
Lecture: Probability
Reading: Burt and Barber, Ch. 5 & 6
HUD Conference

Week 7 (Oct. 4, 6):

Lab: Introduction to SPSS: Coding Survey Responses
Lecture: Sampling and Estimation
Reading: Burt and Barber, Ch. 7 & 8

Week 8 (Oct. 11, 13):

Lab: Working with Census Microdata in SPSS
Lecture: Hypothesis Testing
Reading: Burt and Barber, Ch. 9

Week 9 (Oct. 18, 20):

Lab: Hypothesis Testing in SPSS and Excel
Lecture: Hypothesis Testing
Reading: Burt and Barber, Ch. 10

Week 10 (Oct. 25, 27):

Lab: Hypothesis Testing in SPSS and Excel
Lecture: Nonparametric Methods / Methods for Categorical Data
Reading: Burt and Barber, Ch. 11
ACSP Conference

Week 11 (Nov. 1, 3):

Lab: Overview of Advanced Statistics in SPSS
Lecture: Correlation Analysis and Simple Linear Regression
Reading: Burt and Barber, Ch. 12 & 13

Week 12 (Nov. 8, 10):

Lab: Regression in SPSS
Lecture: Multivariate Regression
Reading: Burt and Barber, Ch. 13

Week 13 (Nov. 15, 17):

Lab: Regression in SPSS
Lecture: Multivariate Regression
Reading: Burt and Barber, Ch. 14

THANKSGIVING BREAK

Week 14 (Nov. 29, Dec. 1):

Lab: Forecasting Lab
Lecture: Predicting the Future, Alternative Approaches
Reading: TBA

Week 15 (Dec. 6, 8):

Presentations (Project 2 Due)

Week 16 (Dec. 13, 15):

Finals Week