DEPARTMENT OF CITY AND REGIONAL PLANNING
University of North Carolina at Chapel Hill

PLAN 721: Advanced Planning Methods

Professor Todd BenDor
Email: bendor@unc.edu
Phone: 962-4760
Office Hours: 3:45-4:45 M, and by Appt. (please email to confirm availability)
Office: New East 307

Spring 2015
2:30 – 3:45 MW (Lecture)
Location: Murphy 302
9:05-10:20 W (Lab)
Location: Saunders 322

Teaching Assistant: Helena Cardenas
Email: helena.ccd@gmail.com
Office Hours: 11:15am -12:15 pm T/TH and by Appt.
Office: New East Computer Lab (2nd Floor)

Course website: http://sakai.unc.edu

Objectives

This course is a continuation of PLAN 720 and will focus on improving the analytical repertoire of planning students by examining several statistical techniques that will be useful in analyzing economic development and transportation issues.

The goal of this course is to enhance student knowledge and skills in order to better understand planning problems, properly obtain and analyze data, and correctly interpret and present analysis results. Specifically, this course introduces topics in linear regression, logistic regression, and time series analysis. These topics will serve as important background for students’ future courses in transportation and economic development planning. The course will further familiarize students with the use of Microsoft Excel spreadsheets, as well as introduce students to statistical analysis using STATA (http://www.stata.com/). After taking the course students should be able to clearly analyze planning problems and issues using sophisticated statistical methods. Moreover, they should be able to support planning decisions based on empirical data and draw logical conclusions from statistical analysis.

We will maintain a course website that will contain course information, course readings, handouts, data and links to relevant websites. This website can be found at: http://sakai.unc.edu/

Approach

Quantitative methods are widely used in both public and private sector planning to inform decisions and build knowledge. This process is important since it helps reduce uncertainty in decision-making. Accordingly, this course emphasizes the following themes that are central to solving quantitative problems:

1. In order to solve planning problems, they need to be structured. Structuring a problem means that you must develop a plausible conceptual structure of a problem, usually by hypothesizing (‘guess’) and operationalizing (‘quantify and put into action’) the nature of relationships between the variables in a system.
2. Having structured the problem, you will need to design their investigation and collect data on important variables. The data can be obtained from secondary sources (such as the U.S. Census) or primary sources (e.g. telephone interviews, mail-back surveys of the selected population, or measurements in the landscape).
3. The data needs to be described, visualized and presented in a coherent manner.
4. Statistical tools are used to understand the nature and properties of specific variables and their inter-relationships. There can be considerable variation in the applicability of specific statistical methods, depending on the definition of the problem and availability of data.
5. Planners need to draw logical implications from statistically based studies (for decision-making) and understand a study’s contributions to planning knowledge, debate and human progress.

We will strive to help you think about planning issues in rigorous statistical terms. The statistical methods taught in the class will provide one of the key lenses with which you can view and analyze planning problems and evaluate solutions. You will learn about techniques that can help you make decisions in complex planning situations, where you can use powerful methods to develop insights, understand key relationships and predict outcomes. We will emphasize the application and interpretation of statistical concepts and output rather than mathematical theory.
Course Prerequisites

This course required for economic development and transportation planning students (1.5 credits). PLAN 720 (or equivalent training in basic statistics) is a required prerequisite for this course. This course becomes more mathematically intensive than PLAN 720, but all evaluations will focus on the correct interpretation and application of techniques rather than theory.

PLEASE REGISTER FOR BOTH THE LECTURE AND LAB PORTIONS OF THE COURSE.

Course Requirements and Grading

The requirements for the course include:

- Active class participation and attendance   10%
- In-Class Quizzes                         20%
- Assignments                             50%
- Final Exam                               20%

Assignments will include exercises that familiarize you with the methods of statistical modeling that we discuss in class. Assignments are intended to help students understand the class materials and students are thus expected to work on them individually. Assignments will be handed out (and due back) according to the schedule below.

Quizzes will be given in class and will consist of several short answer and multiple-choice questions on your knowledge of both the readings and the previous lectures. Quizzes will be announced beforehand and must be completed individually.

There will be a final exam that will test students’ knowledge of how to use and interpret the regression models presented in this course.

Important points:

1. Students are expected to complete all assignments individually. Discussions with classmates about assignments are encouraged, but all final work must be entirely your own.
2. You are expected to show all work on your assignments.
3. Assignments must be turned in at the beginning of class on the due date.
4. Please arrive on time and turn off cell phones in class.
5. Please contact the instructor or TA if you have any questions, problems with the readings or the course, or any other issues that you wish to discuss.

Grading Notes: Generally, an H grade is given for exceptional work that demonstrates a real mastery of course material. L or F work substantially fails to meet minimum requirements either due to incomplete coverage of required information, incorrect results, or sloppy, unprofessional reporting of results.

Other Academic Business

Missing Class: Students are permitted to miss class for EXCUSABLE absences only (for details about what an excused absence is, see UNC-Chapel Hill’s attendance policy below).

Resources: Our purpose as professors is to help you to excel in this learning environment. Should you need further assistance beyond the help of the professor, please consult the following on-campus resources:

- The Writing Center: http://www.unc.edu/depts/wcweb/
- Academic Success Program (for students with learning disabilities (LD) and/or attention-deficit/hyperactivity disorder (ADHD): http://www.unc.edu/depts/lds/
- Learning Center: http://www.unc.edu/depts/acadserv/learn.html
- Counseling and Wellness Services: http://campushealth.unc.edu
- UNC’s Attendance Policy: http://www.unc.edu/ugradbulletin/procedures1.html#class_attendance

The University’s Honor Code is in effect. The University of North Carolina at Chapel Hill has had a student-administered honor systems and judicial system for over 100 years. The Honor Code represents UNC-Chapel Hill students’ commitment to maintain an environment in which students respect one another and are able to attain their educational goals. As a student at Carolina, you are entering a community in which integrity matters--integrity in the work you submit, and integrity in the manner in which you treat your fellow Carolina community members. Because academic honesty and trustworthiness are important to professional planning, this is a significant University and Departmental tradition.
Your attention is called to the Instrument of Student Judicial Governance for policies and procedures pertaining to the honor system. We are committed to treating Honor Code violations seriously and urge all students to become familiar with its terms set out at http://honor.unc.edu/honor/code.html. If you have questions it is your responsibility to ask the professor about the Code’s application. Please consult with the instructor if you are uncertain about your responsibilities under that code with respect to this course.

The professor reserves the right to make changes to the syllabus, including project due dates, when unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.

The University of North Carolina – Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in difficulties with accessing learning opportunities. All accommodations are coordinated through the Accessibility Resources and Service Office. Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately early in the semester to discuss your specific needs. Students with documented disabilities should contact the Department of Disability Services at 919-962-8300 (SASB North, Suite 2126) to coordinate reasonable accommodations.

Course Materials

Required:

Additional:
This (now free!) book contains lots of information on discrete choice modeling and particularly useful for transportation planning issues.

Additional reading materials and links will be posted on the course Sakai website.

Software and Data:
Unlike some of the work you did in PLAN 720, many of the analyses we will use in this course are nearly impossible to complete by hand. Important statistical software tools that we will use in the DCRP computer lab include Stata – sophisticated statistical analysis software that is available in the DCRP computer lab, ODUM computer lab, the Virtual Computing Lab (‘VCL’; vcl.unc.edu), and UNC VirtualLab (virtuallab.unc.edu). We will be posting information on Sakai about accessing the VCL/VirtualLab during the first week of class.

If you are having problems with Stata, there are some great tutorials to better acquaint you with the software:
http://www.ats.ucla.edu/stat/stata/
http://www.cpc.unc.edu/research/tools/data_analysis/statatutorial
http://www.stata.com/links/resources-for-learning-stata/
Assignment and Lab Schedule

Quizzes

QUIZ #1: Review of basic statistics (January 21)
QUIZ #2: Bivariate regression (February 2)
QUIZ #3: Multivariate regression (February 11)
QUIZ #4: Time series (February 18)
QUIZ #5: Binomial logistic regression (March 2)

Assignments

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<thead>
<tr>
<th>HW</th>
<th>Due Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Feb. 25</td>
<td>Multivariate Regression/Time Series</td>
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<tr>
<td>2</td>
<td>Mar. 4</td>
<td>Logistic Regression I</td>
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<tr>
<td>3</td>
<td>Mar. 18</td>
<td>Logistic Regression II</td>
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Computer Lab Sessions

Optional computer lab sessions will be offered during the semester to help familiarize students with the software packages that will be used in the class. The schedule of these lab sessions is given below.

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<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Feb. 4</td>
<td>Linear Regression</td>
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<tr>
<td>2</td>
<td>Feb. 25</td>
<td>Binary Logistic Regression</td>
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<tr>
<td>3</td>
<td>Mar. 4</td>
<td>Multinomial Logistic Regression</td>
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<tr>
<td></td>
<td>Mar. 18</td>
<td>PLAN 721 FINAL EXAM (May CHANGE to 5 pm on 3/18)</td>
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Course Outline

***PLEASE READ THE ASSIGNED MATERIAL BEFORE EACH CLASS ***
PLEASE BRING CALCULATORS TO ALL CLASSES AND QUIZZES

Section 1: Statistics Overview

January 7. Class 1: Course and Statistics Overview

For preparation for this course I recommend reviewing:

- PLAN 720 textbook or other statistics textbooks – inferential statistics (central tendency and dispersion, hypothesis testing, and ANOVA)
- Two good review books can be found in the library:

Please also review:

- Long and Freese, Chapter 1 (Section 1.1-1.4) [helpful for understanding why we use certain models for certain purposes]
- **Sakai**: Alan Acock, A Gentle Introduction to Stata, Chapter 1, 3-5 (begins to overview the statistics software we will be using in this course)
- Kennedy, A Guide to Econometrics, Chapter 1, pgs. 1-5. (4E: pgs. 1-6; 5E: pgs. 1-6)

January 12 and 14. NO CLASS DUE TO TRANSPORTATION RESEARCH BOARD MEETING (JAN 12-16, WASHINGTON D.C.)

January 19. MLK HOLIDAY – NO CLASS!

Section 2: Linear Regression Analysis

Part 1: Bivariate Linear Regression

January 21. Class 2: Introduction to OLS

QUIZ #1: Review of basic statistics

- Kennedy, A Guide to Econometrics, Chapters 2 and 3, pgs. 11-25 and 40-44. (4E: pgs. 10-25 and 42-46; 5E: pgs. 11-28 and 47-52)
- Long and Freese, Chapter 2: Introduction to Stata. Pgs. 23-82.
  - Skim this reading - this chapter augments reading from Acock, A Gentle Introduction to Stata.

Additional Sources:


January 26 and January 28. Class 3 and 4: Regression Assumptions and Interpretation


Part 2: Multivariate Linear Regression

February 2. Class 5: Introduction to Multivariate Linear Regression

QUIZ #2: Bivariate regression

- **Sakai**: Acock, A Gentle Introduction to Stata, Chapter 10 (10.1-10.3)

February 4. Class 6: Model Building and Multicollinearity

• Kennedy, *A Guide to Econometrics*, Chapter 6 (Non-linearities; pgs. 93-99) (**4E**: pgs. 94-101; **5E**: pgs. 107-114), Chapter 7 (Nonzero Expected Disturbance; pgs. 109-111) (**4E**: pgs. 113-115; **5E**: pgs. 129-131), Chapter 8 (Non-spherical errors; pgs. 112-123) (**4E**: pgs. 116-126; **5E**: pgs. 133-144), and Chapter 12 (Multicollinearity; pgs. 192-198) (**4E**: Ch. 11, pgs. 183-189; **5E**: Ch. 11, pgs. 205-212).

• **Sakai**: Acock, *A Gentle Introduction to Stata*, Chapter 10 (10.4-10.6)

February 9. Class 7: Transformations and Important Data Points

• **Sakai**: Acock, *A Gentle Introduction to Stata*, Chapter 10 (10.7-10.11)

**Part 3: Time Series Analysis**

February 11-16. Class 8-9: Time Series Analysis

QUIZ #3 (February 11): Multivariate linear regression


Additional Reading

• Kennedy, *A Guide to Econometrics*, Chapter 19 (Time Series Econometrics; pgs. 296-303) (**4E**: Ch. 17, pgs. 263-270; **5E**: Ch.18, pgs. 319-328).

Section 3: Logistic Regression

**Part 1: Binary Logistic Regression**

February 18 – February 25. Class 10 - 12: Usage and Interpretation of Binary Logistic Regression

QUIZ #4 (February 18): Time series modeling


• **Sakai**: Acock, *A Gentle Introduction to Stata*, Chapter 11.

Part 2: Unordered (Multinomial) Logistic Regression

March 2 – March 4. Class 13-14: Usage and Interpretation of Multinomial Logistic Regression

QUIZ #5 (March 2): Binary logistic regression

- Kennedy, A Guide to Econometrics, Chapter 16 (16.3 – Multinomial Regression; pg. 245) (4E: Ch. 15, 15.3, pg. 236; 5E: Ch. 15, 15.3, pg. 263).

Additional Reading:

March 18. Class 15: Final Exam (During lab session; after spring break!) [MAY CHANGE TO 5 PM 3/18]