COLLEGE OF BUILT ENVIRONMENTS
UNIVERSITY of WASHINGTON

URBDP 520: Quantitative Methods in Urban Design and Planning

AUTUMN 2021

Course Overview

The primary objective of this course is to familiarize planning students with methods and techniques they are likely to encounter and use in planning departments and organizations. Planners must be quite versatile, in that they must be knowledgeable of a variety of analytical methods, including statistical analysis and techniques, demographic techniques; economic analysis, project planning techniques, geographical and spatial analysis techniques and analysis, and various forms of transportation analysis.

This course cannot provide you with the knowledge of all these various methods and techniques. However, I will strive to provide you with a survey of some of these techniques and methods and the underlying logic behind various approaches. Our focus will be on basic statistical techniques required for analyzing data and information necessary for undertaking planning decisions. My hope is that the skills and knowledge you acquire during this course will provide you with a foundation from which you can quickly grasp and tackle new or alternative approaches you may encounter in your professional life and, most importantly, gain an understanding that will make you a critical and discerning consumer of more quantitative analysis and planning data.

Course Objectives

The fundamental task in all good planning activities is to have a good "fact basis" upon which to guide planning activities and to make sound and informed planning decisions. Two of the most important roles of planning departments in most communities are to provide the critical information making up the "fact basis" and then to help the community and its leaders undertake sound planning processes using these data. By "fact basis" I mean gathering data and transforming it into information (so called "facts") about the nature of the community. This often involves not only describing what things look like now, but also making reasonable projections about what a community's characteristics are likely to look like in some future time.

Developing the data and fact basis, or more simply the data necessary to know your community, demands the ability to employ a great variety of different types of data and analysis techniques to describe and make projections about a jurisdiction (community, county, region, etc.). The purpose of this course it to give students a broad survey of the variety of techniques often employed in planning departments. This course has three specific objectives:

1. The first objective is to explore the wealth of quantitative and mathematical approaches that can be utilized by planners to analyze and make sense out of the data that can be employed to understand the community's characteristics such as its population and economy as well as understand the nature and wishes of its populace or whether some policy, program or event has resulted in change or These techniques will range from simple statistical approaches for describing data, such as descriptive statistics, creating graphs and

charts and making inferences about the population to much more complex approaches for understanding the composition of a jurisdiction's population or economy.

2. The second objective is to explore the variety of data (from raw to processed) that one is likely to employ when working in planning departments. Examples of these data include: survey data, decennial census data (block, block-group, tracks, TAZ, etc.), census survey data such as the American Community Survey (ACS) and American Housing Survey (AHS), various forms of business and employment data collected by the US Census and a host of state and federal agencies, and even some examples of local data such as permit and tax assessors data. We will also address problems and issues associated with working with these data related to various forms of manipulation, merging, aggregating and restructuring. One of the most valuable skill sets you should develop in this program will be to gain technical knowledge of these various data sets and how to work with them. Another important skill is acquiring knowledge of GIS applications so you can take these data and portray them on maps. However, we will not cover GIS in this course, but I do recommend that you pursue this through other graduate courses in the
3. The third objective is to learn the use of statistical packages to manipulate and analyze data. In my research, I use many different packages such as SPSS, SAS, SYSTAT, BMDP, HLM, and EXCEL. I have learned that one package does not always do what you need it to do. In my opinion, at this point, Statistical Software - R offers several clear advantages for statistical analysis and programing. It also has well-developed user groups in which many users are developing and contributing new techniques and methods that can be incorporated into the program. And, to top it all off, it is not prohibitively expensive, it is available for free!!

Course Requirements

While **not mandatory**, class **attendance** and participation are integral parts of this course; much of the key material will be introduced and discussed in lectures. Good note-taking skills are essential, since the instructor often discusses material and provides examples that may not be directly quoted on the slides. The slides for every lecture will be posted on the course website (canvas) on the day following the lecture. Assigned **readings** are identified for each week classes, and should be completed as preparation ***before*** coming to class. Students are expected to keep track of the schedule, and assignment due dates. Teaching Assistant will use *Canvas* to communicate important information updates (such as new articles being added to ***Electronic Readings on the Course Website @canvas***), posting of test grades, etc. Students are advised to check this source (***canvas***) regularly.

Course Evaluation

Formal course evaluation occurs at the end of the quarter university-wide. If you are experiencing a problem with the class, please let the me know as soon as possible, as I might be able to correct for changes if needed within the course of the class.

Grade Distribution

The grade distribution for this course is follows:

1. Assignments (30%). There will be weekly assignments throughout the semester.
2. Class Participation (10%).
3. Reading Quiz (10%)

4. Mid-term Examination (25%).
5. Final Examination (25%).

All assignments/ submissions are due by 9 pm PT on the due date. Unless specified, all assignments are to be uploaded to the assignments folder on the Canvas course website.

Final Grade - Total scores will be transformed into the UW numerical grading system for graduate courses ranging from 4.0 to 1.7 in 0.1 increments.

Detailed Lecture Schedule

*(*articles and handouts available on canvas)*

Week	*Date*	*Topics and Assignments*	*Assigned Readings*
I	Oct 1	Orientation – Course organization Deliverables and Expectations Introduction to Research and Statistics	Tufte Reading*
	Oct 6 (Mor)	The What and The Why of Statistics	FL Chapter 1
I	Oct 6 (Eve)	Article Discussion	Articles: Chen&Short2008.pdf* McBrier&Wilson2004.pdf*
	Oct 8	Weekly Lab - Introduction to R	
II	Oct 13 (Mor)	Sources of Planning data and Information Organization and Graphical Presentation of Data Assignment 2	In-Class Data acquisition and cleaning FL Chapter 2
	Oct 13 (Eve)	Article Discussion	Articles: Joseph&Pearson2002.pdf* Venturelli2000.pdf*
	Oct 15	Weekly Lab - Graphical Representation of Data	
III	Oct 20 (Mor)	Measures of Central Tendency Measures of Variability	FL Chapter 3 FL Chapter 4

Week	*Date*	*Topics and Assignments*	*Assigned Readings*
III		Assignment 3	
	Oct 20 (Eve)	Article Discussion	<u>Articles:</u> Handel2005.pdf* Haynieetal2006.pdf* Ramirezetal2010.pdf*
	Oct 22	Weekly Lab - Descriptive Statistics	
IV	Oct 27 (Mor)	Normal Distribution Sampling and Sampling Distribution Assignment 4	FL Chapter 5 FL Chapter 6
	Oct 27 (Eve)	Article Discussion	<u>Articles:</u> Skaburskis2012.pdf* Ueno2010.pdf*
	Oct 29	Weekly Lab – Tests for Normality Mid-term Examination Assigned (Take-Home)	
V	Nov 3 (Mor)	Estimation Hypothesis Testing Assignment 5	FL Chapter 7-8
	Nov 3 (Eve)	Article Discussion	<u>Articles:</u> Jones&Rainey2006.pdf* Lee2008.pdf* Staceyetal2011.pdf*
V	Nov 5	Weekly Lab – Hypothesis Testing	
VI	Nov 10 (Mor)	Bivariate Tables Chi-square test and F-distribution Assignment 6	FL Chapter 9-10 Handout*

Week	*Date*	*Topics and Assignments*	*Assigned Readings*
	Nov 10 (Eve)	Article Discussion	<u>Articles:</u> Leite&McKenry2002.pdf* Levesque&Caron2004.pdf* Phillips&Smith2004.pdf*
	Nov 12	Weekly Lab – Chi-square test and F-distribution	
VII	Nov 17 (Mor)	Measures of Association Correlation Analysis of Variance - ANOVA Assignment 7	FL Chapter 11 Handout*
	Nov 17 (Eve)	Article Discussion	<u>Articles:</u> Fothergilletal2009.pdf* Pettinichio&Crutchfield2009.pdf* Vick&Packard2008.pdf*
VII	Nov 19	Weekly Lab – Correlation and ANOVA	
VIII	Nov 24 (Mor)	Regression Analysis - I Regression Analysis - II Assignment 8	FL Chapter 12 Regression Handout*
	Nov 24 (Eve)	Article Discussion Weekly Lab – Regression	<u>Articles:</u> Sirin__Rogers-Sirin_2004.pdf*
	Nov 26	Thanksgiving Holiday	
IX	Dec 1	Regression Diagnostics	Regression Diag. Handouts*

Week	*Date*	*Topics and Assignments*	*Assigned Readings*
	(Mor)	Assignment 9	
	Dec 1 (Eve)	Addressing Violation of Regression Assumptions	Regression Diag. Handouts*
	Dec 3	Weekly Lab – Regression Diagnostics	
X	Dec 8 (Mor)	Introduction to Logistic Regression Non-Parametric Tests	Log. Reg. Handouts*
X	Dec 8 (Eve)	Wrap-Up: Review of Key Topics	
	Dec 10	Weekly Lab – Logistic Regression and Non-Parametric Tests	