PLAN 720: Planning Methods

Course meeting time: Monday/Wednesday 10:50–12:05

I will arrive by 10:25 am, and am happy to answer any questions about the material during this informal "lab" time

Location: Phillips 328

Instructor: Matt Bhagat-Conway <mwbc@unc.edu>
Office: New East 320
Office hours: Mondays 2-3:30

TA: Yeri Choi <Yeri.Choi@unc.edu>
Office hours: Fridays 10–12

Course description

This course introduces a broad variety of methodological approaches, both qualitative and quantitative. The first part of the course will focus on methods broadly applicable to the social sciences. We will cover descriptive and inferential statistics, regression, causal inference, working with Census data, focus groups and interview techniques, qualitative data coding and analysis, and survey design. The latter part of the course will cover planning-specific methods: development finance, demographic projections, transportation modeling and engineering, and economic impact assessment.

This is a survey course; it is intended to expose you to a large variety of methods from across planning. You will almost certainly go into additional depth on some of these methods in your later classes; which ones depends on your specialization. The goal of this class is to provide a strong foundation as well as the ability to understand results from consultants and other planners who may have a different specialization. We will place a strong focus on interpretation, policy implications, and limitations.

Learning objectives

By the end of this course, students should be able to:

- Organize and communicate clearly using different types of data
- Manage data commonly used in planning practice, include metadata, data documentation, and data cleaning
- Identify and access data sources for important urban planning problems
- Select appropriate visualization techniques for different types of urban data, and create visualizations in Excel or R
- Write clearly and concisely to describe analyses and to critique others' analyses
- Understand common biases and selective representation in data sources
- Use spreadsheets for basic data analysis
- Interpret descriptive statistics and basic regression models

Required materials

All of the textbooks used in this course are available as ebooks through the UNC Library at no cost. We will read most of Li and Zhang, and small parts of the other books.

Textbooks:

- [Applied research methods in urban and regional planning](), by Yanmei Li and Sumei Zhang **free ebook available via UNC Library**
- Real estate development: principles and process, 5th ed., by Mike E. Miles, Laurence M. Netherton, and Adrienne Schmitz **free ebook available via UNC Library**
- City economics, by Brendan O'Flaherty **free ebook available via UNC Library**
- The effect, by Nick Huntington-Klein **open access ebook**
- Collecting, managing, and assessing data using sample surveys **free ebook available via UNC Library**

Please complete the assigned readings prior to the class for which they are assigned.

Many classes have optional readings. These are primarily academic journal articles which go more in-depth on the topics in the assigned readings. Some rely on fairly complex methods and jargon, please feel free to talk to me about any of them if there's anything you don't understand.

Grading

The course grade is based on 6 individual assignments, 2 group projects, a midterm exam, and a final exam. You are also required to take and pass the CITI (human subjects research) training in order to pass the course The final grade will be calculated as follows:

Item	Points	Due
Individual homework assignments	35 (7 x 5 points each)	September 6, September 20, October 4, November 8, November 13, November 27, December 4
Group homework assignments	20 (2 x 10 points each)	October 23, November 20
MP proposal draft	10	December 6
Midterm exam *take home*	15	Assigned October 4, due October 9
Final exam	20	December 15 (**4 PM**)
CITI training	0 (required to pass)	October 30
Total	100	

Graduate classes in DCRP are graded on a high-pass, pass, low-pass, or fail basis. I will assign these grades as follows:

Grade	Points
High pass	≥ 95
Pass	≥ 80, <95
Low pass	≥ 60, <80
Fail	< 60

Attendance

Most of the information presented in this class will be presented during lecture. That said, I understand circumstances such as illness or family committments may make it difficult to attend every session. You are graduate students, and I trust you to decide when it makes sense to skip class. In particular, if you are ill, please

stay home and rest. If you need to miss class, let me know so we can work together to ensure you don't fall behind.

The University has a policy to request University Approved Absences (described below), but it is not necessary to do so—an informal email to me is fine.

University Approved Absences are defined by the university at attendance.unc.edu: - Authorized University activities - Disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC) - Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

You can request a University Approved Absence through the University Approved Absence Office by using [this request form](#).

Group work

Planning is a collaborative field, and I encourage you to discuss the class topics and assignment with each other. The midterm and final exams (in class) are the only exceptions to this policy, though I encourage you to study and prepare together for them. For the group projects, you'll of course be working in groups. For the individual assignments, feel free to work together. The answers you submit should be in your own words, and you should perform any calculations yourself. For team assignments, each individual will also write a short (2-3 sentence) summary of what they contributed to the project.

Late work

To keep the class on schedule it is important to turn assignments in on time. That said, I understand that circumstances may arise that prevent this. Therefore, you may turn in one individual assignment up to one week late without penalty, no questions asked. Other late assignments will incur a 10% per day penalty. However, if circumstances beyond your control (illness, family emergency, etc.) prevent you from turning an assignment in on time, please let me know as soon as possible and I can grant extensions on a case-by-case basis. If circumstances beyond your control result in turning in a team project late, please let me and your team know as soon as possible so arrangements can be made.

I understand almost all of you are taking the same classes. If major due dates coincide between classes, let me know so we can coordinate schedules if possible.

Use of ChatGPT and other Large Language Models

ChatGPT and other Large Language Models are starting to be a topic of discussion throughout academia. If you use these, use them the way you might use a search engine: to find information—and be extra careful to verify that information. Do not copy and paste results or re-word them as the basis for an assignment. Any ideas you're taking from someplace else should be cited, from a source other than ChatGPT to ensure reliability.

Course schedule

August 21: What is research? What is a research question? What are planning methods?

In order to answer policy questions, we need to first formulate good questions. Discussion of what a good research question is, what knowledge is, and how to identify valuable research questions in planning. Discussion

of linkages between research questions and policy implications. Discussion of how to approach and evaluate an academic paper.

August 23: How to read an academic article

Readings: Li and Zhang, chs. 1–2 (21 pages), [Dancing with Professors](#) by Patricia Nelson Limerick

August 28: Preparing for research: literature review

Guest lecture from Phil McDaniel and Rolando Rodriguez, UNC Libraries: [materials](#)

How to search the academic and non-academic literature for useful references, and how to organize and manage those references.

Before class, install [Zotero](#) on your computer.

Readings: Li and Zhang, ch. 3 (13 pages)

August 30: No class

Class canceled

September 4: No class

Labor Day

September 6: Statistics I: descriptive statistics

In this class, we will cover basic descriptive statistics, primarily means, medians, standard deviations.

Readings: Li and Zhang, pp. 109–115

Reading assignment due September 6

September 11: Statistics II: Probability

In this class, we will discuss probability and statistical distributions.

Readings: Li and Zhang, pp. 115–125

September 13: Statistics III: Hypothesis tests

In this class, we will discuss hypothesis tests, which are a way of determining whether an observed outcome is consistent with random chance or not.

Readings: Li and Zhang, pp. 125–133

September 18, September 20: Statistics IV: Regression

Regression is a method for explaining the variation in an outcome based on one or more inputs. We will learn the mechanics and some of the mathematics behind regression, and run our own regressions in the R Statistical Programming Language.

Please bring your laptops to these classes

Before class, please download and install [R](#) and [RStudio](#).

Readings: Li and Zhang, remainder of ch. 7 (15 pages)

Descriptive statistics and hypothesis tests assignment due September 20

September 25: No class

Well-being day

September 27: Causal inference

All of the inferential statistics covered up to this point have been *correlational*—they indicate relationships, but not causes. In this session, we will discuss how to move beyond correlations and use statistical techniques to determine what causes what.

Readings: Huntington-Klein, ch. 5 Identification (19 pages)

October 2, October 4: Working with Census data

In these classes, we will discuss the different types of data collected by the Census bureau, focusing on the Decennial Census and American Community Survey. We will discuss how to retrieve Census data, what types of analysis are possible with Census data, and limitations of Census data. There will be hands-on in-class exercises to perform basic analyses with Census data.

Readings: TBD

Groups assembled for Group Project 1

Midterm assigned October 4

Midterm due October 9

Regression assignment due October 4

October 9, October 11: Quantitative data visualization

Discussion of visualizations of quantitative information; creating charts in Excel.

Readings: Li and Zhang, ch. 5 (21 pages)

Please bring your laptops to class.

Before class, install Excel. It's [free for UNC students](#).

October 16: Overview and ethics of data collection

There are many ways planners collect data—from surveys and focus groups to existing Census and administrative data. In this class, we will discuss the different methods for collecting data, as well as what types of existing data are available from the Census, other government agencies, and local administrative sources.

Readings: Li and Zhang, ch. 4 (26 pages)

October 18, October 23: Survey methodology

Surveys are one of the most common data sources for planning. In these classes, we will discuss how to design an effective survey, different sampling methods for reaching the populations you want to, survey representativeness, weighting for non-response, survey data cleaning, and tools for creating surveys.

Readings: Stopher, ch. 8, 9 (60 pages)

Optional readings: Stopher, ch. 5, 6

Group project 1 (Census data analysis) due

October 25: Interviews and focus groups

Another very common data source in planning is interviews with stakeholders or focus groups. In these classes, we will discuss how to structure interviews and focus groups, how to select questions, and how to recruit respondents.

Readings: Li and Zhang, ch. 8 (15 pages)

October 30, November 1: Qualitative data analysis

Qualitative data from interviews and focus groups requires different analysis methods than quantitative data from surveys or the Census. In these classes, we will discuss how to analyze the data from these types of data collection efforts, primarily through qualitative coding techniques.

CITI training due October 30

November 1: Guest lecture by Paul Mihas, Odum Institute

November 6: Demographic projections

In this class, we will discuss the tools of demographers–including population pyramids, dependency ratios, etc. We will also discuss how planners forecast the total population and population composition for future years.

Readings: Li and Zhang, ch. 9 (31 pages)

November 8: Land markets

Prices and uses of urban land vary, and the reason for this is a combination of planning and market economics. In this class we will discuss economic models and theories regarding land use.

Readings: O'Flaherty, ch. 1, 2, 6 (62 pages)

Qualitative data analysis due

November 13: The housing market and residential location choice

The housing market from the perpsective of renters and homeowners, and from the perspective of the market overall. Impact of housing construction and affordable housing policies on housing markets. How interest rates and mortgages work

Readings: Li and Zhang, ch. 15; TBD (30 pages)

Demographic projection due

November 15: Development finance

Land use plans can *guide* development, but in most cases do not directly *cause* development. Generally, the private sector instigates most development. For this to happen, development has to ``pencil''—i.e., be forecasted to turn a profit. In this class, we will discuss how developers make the decision whether to develop a property, and how that decision is affected by public policies such as impact fees, affordable housing subsidies, and inclusionary zoning.

Readings: Miles, Netherton, and Schmitz, ch. 9–11 (48 pages)

November 20: Quantifying inequality

One of the major goals of planning is to reduce inequality. In this class, we will discuss how social scientists have measured inequality, segregation, and gentrification, and how quantitative measures can fall short.

Readings: TBD

Original data collection project due

November 22: No class

Thanksgiving

November 27: Transportation modeling and forecasting

The transportation system is a major driver of the economy, a significant public investment, and a threat to the environment as well as the people using it. One of the key roles of transportation planning is making decisions for infrastructure investments. Since these are long-term investments, this requires forecasting travel demand into the future. In this session, we will discuss how these models work, what data they need, common criticisms of modeling, transportation network analysis, and alternatives to modeling.

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- role of travel surveys/NHTS

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Readings: Li and Zhang, ch. 13 (20 pages)

Optional readings:

- "[The broken algorithm that poisoned American transportation](#)," Aaron Gordon, *Vice*.
- "[Estimating the uncertainty of traffic forecasts from their historical accuracy](#)," Jawad Mahmud Hoque, Gregory D. Erhardt, David Schmitt, Mei Chen, Martin Wachs, *Transportation Research Part A: Policy and Practice*

Development finance assignment due

November 29: Transportation engineering

Transportation *engineering* is distinct from transportation *planning*. Transportation engineering focuses more on the physical aspects of transportation system rather than on travel demand, and primarily focuses on travel by

personal automobiles. In this class, we will discuss the broad-brush fundamentals of traffic engineering, including roadway geometry, signal design, the mathematics of traffic congestion, and roadway safety.

Readings: TBD

December 4: Economic analysis

Urban development changes the urban economy. In this class session, we will discuss urban economic development, imports and exports, and models for estimating economic impacts.

Readings: Li and Zhang, ch. 10; O'Flaherty, ch. 18 (82 pages)

Optional readings:

- *Cities and the wealth of nations*, Jane Jacobs. (I have a copy in my office if anyone wants to see it)

Transportation modeling assignment due

December 6: The future of planning methods? Big data, machine learning, and AI

Recent years have seen many developments in computational methods for forecasting outcomes, as well as new "big data" sources. Artificial intelligence has become generally available even more recently. In this session, we'll discuss how–-or if–-these new developments should change planning practice.

No required readings.

Optional readings:

- [The smart enough city](), Ben Green

MP idea due

December 15: Final exam

At 4 PM

Assignments

There are four types of assignments in this class: team projects, individual projects, CITI training, and a master's project preproposal.

Team projects

There are two team projects, that you will undertake in groups of 3–5. Each is worth 10 points.

Telling stories with Census data

Due: October 23

In this project, your group will use data from the US Census Bureau to answer a question or tell a story about a planning question or problem of your choosing, using descriptive statistics and data visualization. You will work in groups of 3–5.

Original data collection and research design

Due: November 20

In this project, your group will design a research project to collect data and answer a planning question of your choosing.

Individual projects

There are six individual projects, each worth five points

Reading an academic paper

Due: September 6

In this assignment, you will read an academic paper (you'll have several choices), and identify and summarize the research question, findings, and results.

Descriptive statistics and hypothesis tests

Due: September 20

In this assignment, you will compute and interpret descriptive statistics and hypothesis tests.

Regression

Due: October 4

In this assignment, you'll estimate and interpret a regression model, as well as use it to make predictions.

Qualitative analysis

Due: November 8

In this assignment, you'll analyze qualitative data.

Demographic projection

Due: November 13

In this assignment, you'll forecast the demographics of a region.

Development finance

Due: November 27

In this assignment, you'll evaluate the profitability of a proposed development.

Transportation modeling

Due: December 4

In this assignment, you'll work with a travel demand model to identify implications of an infrastructure or land use change.

MP idea

Due: December 6

As part of the MCRP program, you'll need to undertake a masters' project. Since the program is only two years, it's best to start thinking about ideas as soon as possible. In this assignment, you'll write a 3–5 page summary of a potential project, written in the form of a grant application. This will detail the purpose of the project, methods, expected findings and policy implications. It will also detail a budget: the expected time commitment from you, and any additional funding that the project may require (e.g. participant compensation, travel).

Honor code

All students are expected to follow the guidelines of the UNC honor code. In particular, students are expected to refrain from "lying, cheating, or stealing" in the academic context. If you are unsure about which actions violate the honor code, please see me or consult honor.unc.edu.

I will report any honor code violation to the Office of Student Conduct.

Title IX resources

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's Policy Statement on Non-Discrimination offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, creed, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (see contact info at safe.unc.edu) or the Equal Opportunity and Compliance Office, or online to the EOC at https://eoc.unc.edu/report-an-incident/.

Diversity statement

I value the perspectives of individuals from all backgrounds reflecting the diversity of our students and my goal is to create a safe space for everyone in this class. I broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. Please let me know if there is anything I can do to improve, I appreciate suggestions.

Accessibility resources and services

The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, including mental health disorders, chronic medical conditions, a temporary disability or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities.

Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: https://ars.unc.edu or email ars@unc.edu.

Counseling and Psychological Services CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: https://caps.unc.edu/ or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate support.

Resources

University resources In addition to class time and office hours, there are several resources on campus that may help you with the concepts and assignments in this course, and I encourage you to use them.

Davis Library Research Hub

https://library.unc.edu/data/
The Research Hub is a service provided by UNC Libraries to assist students with questions about R, GIS, and statistics generally.

Odum Institute Online Statistics Help Desk

https://odum.unc.edu/statistics-help-desk/
The Odum Institute provides online statistical support for R and statistics, generally for more advanced questions than the Research Hub can address.

Writing Center

https://writingcenter.unc.edu
The Writing Center provides one-on-one assistance with writing, editing, and proofreading; this may also be helpful for your final project.

Acceptable use policy

By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. In the context of a class, it's quite likely you will participate in online activities that could include personal information about you or your peers, and the AUP addresses your obligations to protect the privacy of class participants. In addition, the AUP addresses matters of others' intellectual property, including copyright. These are only a couple of typical examples, so you should consult the full Information Technology Acceptable Use Policy, which covers topics related to using digital resources, such as privacy, confidentiality, and intellectual property.

Additionally, consult the University website "Safe Computing at UNC" for information about the data security policies, updates, and tips on keeping your identity, information, and devices safe.

Syllabus changes

The professor reserves the right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.

Grade appeal process

If you feel you have been awarded an incorrect grade, please discuss with me. If we cannot resolve the issue, you may talk to our departmental director of graduate studies or appeal the grade through a formal university process based on arithmetic/clerical error, arbitrariness, discrimination, harassment, or personal malice. To learn more, go to the Academic Advising Program website.