
UP 430/CEE 417: Urban Transportation Planning

Department of Urban and Regional Planning
Department of Civil and Environmental Engineering
University of Illinois at Urbana-Champaign
Spring 2019

Instructor:	Dr. Lindsay Braun M208 Temple Buell Hall (TBH) lmbraun@illinois.edu
Office Hours:	Thursdays 11:00 AM – 12:00 PM (or by appointment), M208 TBH
Course Sessions:	Tuesdays and Thursdays 9:30–10:50 AM Weeks 1–8: Armory Building, Room 333 Weeks 9–16: Wohlers Hall Computer Lab (1206 S. Sixth St., Rooms 70A/B)
Teaching Assistant:	Muhammad Usman, usman2@illinois.edu
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Course Description

This course provides a broad overview of urban transportation planning in the United States, including historic and emerging issues faced in the field and the tools that are available to address these challenges. The course is designed for students who intend to specialize in transportation planning or engineering, as well as for those who would like an introduction to the field. The course is divided into three major sections:

- *Section I: Context, History, and Foundational Concepts.* The first section of the course describes the context of urban transportation planning in the United States, including past, present, and future travel patterns and trends; major phases and developments in transportation history; and key challenges that transportation planners and engineers currently face. This section also introduces concepts that are foundational to a thorough understanding of transportation planning, including the relationship between transportation and land use and perspectives on traffic congestion.
- *Section II: Institutions and Key Impacts.* The second section of the course outlines the institutional structure of transportation planning in the United States. This section describes the transportation planning process and introduces key decision makers and legislation at the federal, state, and regional levels. Additionally, this section explores several impacts of the transportation system, including air quality, greenhouse gas emissions, public health, and safety.
- *Section III: Standards and Analytical Tools.* The final section of the course introduces technical methods that planners and engineers commonly use to evaluate and plan for urban transportation systems. After describing standards and practices related to parking, street design, and traffic impact analysis, this section focuses primarily on the four-step travel demand model using the Cube software package. This section concludes with a critique of traditional transportation modeling methods and an overview of emerging alternatives.

Course Objectives

UP 430/CEE 417 is designed to establish a fundamental knowledge base for understanding and analyzing urban transportation systems. By the end of the semester, students will be able to:

- Explain the history and context of transportation planning in the United States
- Summarize travel patterns and trends in meaningful ways
- Describe foundational concepts such as the transportation-land use connection and congestion, and understand the implications of these concepts for policy and practice
- Recognize key decision makers and regulatory frameworks in the transportation planning process
- Identify and describe key impacts of the transportation system
- Assess the effectiveness of MPO plans in addressing transportation impacts
- Understand the evolution and policy implications of parking and street design standards
- Implement and critique methods used to analyze urban transportation systems, including traffic impact analysis and travel demand modeling
- Engage in meaningful dialogue about key policy issues and current events in transportation planning

Course Format

This course will be taught through a combination of lectures, labs, and discussions. The first eight weeks of the course will be taught primarily through lectures, while the second eight weeks will be taught through lectures and tutorials in a lab setting. Students are expected and encouraged to actively engage in both lectures and labs, contributing their questions, ideas, and experiences to a rich discussion of the course content.

Course Requirements

Attendance and Participation. Active participation—measured in terms of both strong attendance **and** regular engagement in class discussions and activities—is essential in this course. Students are expected to complete the assigned readings prior to class and to come prepared for thoughtful discussion. Although our class is large, the lectures will be interactive and students will be expected and encouraged to engage in active dialogue about key concepts and real-world examples. Lab attendance is also critical for success on the final project, as students will be developing and practicing the technical skills necessary to complete their project.

Memos. Students will complete three technical memos that require the use of analytical methods common in the field of transportation planning. Two of the memos will be completed on an individual basis; discussion among students about these assignments is allowed (and encouraged), but each student must turn in his or her own work. One memo will be completed in small groups assigned by the instructor. The three memos will cover the following topics/techniques:

- Memo 1 (individual): Travel Patterns/Trends Analysis
- Memo 2 (individual): MPO Plan Analysis
- Memo 3 (group): Traffic Impact Analysis

Lab Problem Set. During the second half of the semester, students will complete an extended problem set designed to reinforce and apply the principles of travel demand modeling. The problem set will be distributed several weeks before it is due, and students are encouraged to complete each section as the corresponding topics are covered in class.

Final Group Project – Report and Presentation. The final project in this course will require students to apply concepts and techniques learned throughout the semester to a hypothetical transportation planning problem. Students will complete this project in groups assigned by the instructor. Project deliverables will include (1) a presentation to the class during the final two sessions of instruction and (2) a technical report due on Friday, May 3. Further details will be distributed later in the semester.

Readings

All readings will be posted on Compass and/or available through the University of Illinois library. Readings for each session are listed at the conclusion of this syllabus. During the second half of the course, the readings will draw primarily from the following resources (abbreviations/keys provided in brackets):

- [O&W] Ortuzar, J.D. and Willumsen, L.G. (2011). *Modelling Transport*. Fourth Edition. Wiley.
- [NCHRP 365] NCHRP Report 365: *Travel Estimation Techniques for Urban Planning*.
- [NCHRP 716] NCHRP Report 716: *Demand Forecasting – Parameters and Techniques*.

Grading

Weights. Course requirements will be weighted in the final grade as follows:

Requirements	Weight
Attendance and Participation	15%
Memo 1 (individual): Travel Patterns/Trends Analysis	15%
Memo 2 (individual): MPO Plan Analysis	15%
Memo 3 (group): Traffic Impact Analysis	15%
Lab Problem Set	10%
Final Group Project – Report and Presentation	30%
Total	100%

Grading Scale. Numeric grades will be converted into letter grades using the scale outlined below. The course will not be graded on a curve, and **there will be no rounding** applied to numeric grades.

A: 94.0–100	B-: 80.0–83.99	D+: 67.0–69.99
A-: 90.0–93.99	C+: 77.0–79.99	D: 64.0–66.99
B+: 87.0–89.99	C: 74.0–76.99	D-: 60.0–63.99
B: 84.0–86.99	C-: 70.0–73.99	F: Less than 60.0

Late assignments. Students are expected to turn in all assignments on time. However, I understand that challenges arise in the busy lives of students. To accommodate these challenges, I will allow each student one “free pass” in which an assignment can be submitted up to one day (24 hours) late without penalty, regardless of the reason—no excuse or notification needed. This free pass is not divisible; it must be used in full if the assignment is submitted at any time past the deadline (i.e. at 5:01 PM or later on the due date). Once the free pass is used, late submissions will incur a penalty of 10 percentage points per day barring extraordinary circumstances (e.g., prolonged documented illness, family emergency); these circumstances may not be used to avoid use of the initial free pass. If the late submission is a group assignment, all group members must use their free passes and any group members who have already used their free pass will incur the 10-point penalty. Use your free pass wisely, and communicate with me proactively about any challenges, illnesses, or emergencies that arise—I am here to work with you and help you do your best!

Course Policies and Other Items/Resources

Attendance. Attendance is mandatory and necessary for adequate performance in this course, and will be taken at every class session. Attendance will be reflected not only in the “Attendance and Participation” portion of the final course grade as described above, but also in the quality of work submitted throughout the semester. Students are expected to notify the instructor in advance of any sessions that will be missed. Make-up lab sessions will not be offered.

It is the instructor’s decision as to when a student’s absences become excessive and should be reported. If in the opinion of an instructor the attendance of a student becomes so irregular that his or her scholarship is likely to be impaired, the instructor may submit an irregular attendance form to the Associate Dean of the student’s college. A copy is forwarded to the student, who should contact the instructor immediately to work out a solution. If irregular attendance continues without excuse, the instructor may request the student be withdrawn from the course. This request for withdrawal would result in a grade of E for the course. Extenuating circumstances will always be considered when supporting evidence is presented. See Rule 1-501 and Rule 1-502 in the Student Code for more information.

Academic Integrity. This course follows the guidelines set forth by the University Student Code. See http://www.admin.uiuc.edu/policy/code/article_1/a1_1-401.html for specific guidelines, examples, and punishment associated with academic dishonesty. In written work, any ideas that are not your own must be properly cited. The consequences for plagiarism may include receiving no credit for an assignment or, at the discretion of the instructor, failure of the course.

Class Climate. The Department of Urban and Regional Planning (DURP) is committed to maintaining a learning environment that is rooted in the goals and responsibilities of professional planners. By enrolling in a class offered by the Department of Urban and Regional Planning, students agree to be responsible for maintaining an atmosphere of mutual respect in all DURP activities, including lectures, discussions, labs, projects, and extracurricular programs. See Student Code Article 1-Student Rights and Responsibilities, Part 1. Student Rights: §1-102.

Electronic Devices. Research shows that students who use laptops in the classroom are distracting not only to themselves, but also to the students around them (Sana, Weston, and Cepeda, 2013). Furthermore, students who take notes by hand tend to retain information better than those who take notes by laptop (Mueller and Oppenheimer, 2014). To create a mutually beneficial learning environment, students are encouraged not to use their laptops in class. However, recognizing that everyone learns differently, I will allow laptops for classroom purposes only; all other programs, including Internet browsers and email, **must be turned off** before class begins. Students who use their laptops for non-classroom purposes will be asked to stop using them during class time, and this policy may be revised if excessive violations occur. Additionally, students must silence or turn off their cell phones before the beginning of class.

Academic Accommodations. This course will accommodate students with documented disabilities. Please refer to <http://disability.illinois.edu/disability-resource-guide> for more information and provide the appropriate documentation at the beginning of the semester.

Counseling. The University Counseling Center is committed to providing a range of services intended to help students develop improved coping skills in order to address emotional, interpersonal, and academic concerns. The Counseling Center provides individual, couples, and group counseling. All of these services are paid for through the health services fee. The Counseling Center offers primarily short term counseling, but they do also provide referrals to the community when students could benefit from longer term services. <https://counselingcenter.illinois.edu/>.

Safety and Security in the Classroom. Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with any kind of emergency—like fire, severe weather, or if someone is trying to hurt you—we have three options: run, hide, or fight. For more information please refer to the General Emergency Response Recommendations at <http://police.illinois.edu/emergency-preparedness/run-hide-fight/resources-for-instructors/>.

Course Schedule

(Subject to revision)

Week	Date	Topic	Notes
Section I: Context, History, and Foundational Concepts			
1	Jan 15	NO CLASS – TRB Annual Meeting	
	Jan 17	Course Overview and Major Themes	Course Entry Survey Due
2	Jan 22	Travel Patterns and Trends	
	Jan 24	Transportation History (Part 1)	
3	Jan 29	Transportation History (Part 2)	
	Jan 31	Transportation and Land Use Connections	
4.1	Feb 5	Congestion	
Section II: Institutions and Key Impacts			
4.2	Feb 7	Transportation Planning Process (Part 1)	
5	Feb 12	Transportation Planning Process (Part 2)	
	Feb 14	Environmental Impacts (Part 1)	Memo 1 Due
6	Feb 19	Environmental Impacts (Part 2)	
	Feb 21	Public Health and Safety	
Section III: Standards and Analytical Tools			
7	Feb 26	Parking	
	Feb 28	Street Design	
8	Mar 5	Traffic Impact Analysis	
	Mar 7	Introduction to Travel Demand Modeling	Memo 2 Due
9	Mar 12	Cube Introduction + Networks (lecture + lab)	
	Mar 14	Guest Lecture: Sharif Ullah, PE, PTP	
10	Mar 19	NO CLASS – Spring Break	
	Mar 21	NO CLASS – Spring Break	
11	Mar 26	Trip Generation Modeling (lecture)	
	Mar 28	Trip Generation Modeling (lab)	
12	Apr 2	Trip Distribution Modeling (lecture)	Memo 3 Due
	Apr 4	Trip Distribution Modeling (lab)	
13	Apr 9	Mode Choice Modeling (lecture)	
	Apr 11	Mode Choice Modeling (lab)	
14	Apr 16	Traffic Assignment Modeling (lecture)	
	Apr 18	Traffic Assignment Modeling (lab)	
15.1	Apr 23	Critiques and Emerging Practices	Lab Problem Set Due
Final Projects and Course Wrap-Up			
15.2	Apr 25	Final Presentations	
16	Apr 30	Final Presentations + The Future	
–	May 3	Final Report Due to Compass by 12:00 PM (noon)	Final Report Due

Readings

Course Overview and Major Themes

- Transportation Research Board (TRB). (2018). “Critical Issues in Transportation 2018.”
- Hanson, S. (2017). “Introducing Urban Transportation,” Chapter 1 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.

Travel Patterns and Trends

- Polzin, S., et al. (2013). Executive Summary (pages 6-38) of “Commuting in America 2013.” American Association of State Highway and Transportation Officials.
- (*skim*) McGuckin, N., and A. Fucci. (2018). “Summary of Travel Trends: 2017 National Household Travel Survey.” U.S. Department of Transportation, Federal Highway Administration.
- Choose **one** of the following:
 - Crane, R. (2007). Is there a quiet revolution in women’s travel? Revisiting the gender gap in commuting. *Journal of the American Planning Association* 73(3): 298-316.
 - Chatman, D., and N. Klein. (2009). Immigrants and travel demand in the United States: Implications for transportation policy and future research. *Public Works Management & Policy* 13(4): 312-327.
 - McDonald, N. (2015). Are Millennials really the “go-nowhere” generation? *Journal of the American Planning Association* 81(2): 90-103.

Transportation History (Part 1): The Walking City and the Rise and Fall of Transit

- Muller, P. (2017). “Transportation and Urban Form: Stages in the Spatial Evolution of the American Metropolis” (pages 57-69 only), Chapter 3 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- Morris, E. (2007). From horse power to horsepower. *Access* 30: 2-9.

Transportation History (Part 2): The Rise of the Automobile

- Muller, P. (2017). “Transportation and Urban Form: Stages in the Spatial Evolution of the American Metropolis” (pages 69-83 only), Chapter 3 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- Brown, J., Morris, E., and B. Taylor. (2009). Paved with good intentions: Fiscal politics, freeways and the 20th century American city. *Access* 35: 30-37.
- (*optional*) Wells, C. (2006). The changing nature of country roads: Farmers, reformers, and the shifting uses of rural space, 1880-1905. *Agricultural History* 80(2): 143-166.

Transportation and Land Use Connections

- Giuliano, G. (2017). “Land Use Impacts of Transportation Investments: Highway and Transit,” Chapter 9 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- Stevens, M.R. (2016). Does compact development make people drive less? *Journal of the American Planning Association* 83(1), 7-18.
- (*optional*) Ewing, R., and R. Cervero. (2010). Travel and the built environment: A meta-analysis. *Journal of the American Planning Association* 76(3): 265-294.
- (*optional*) Crane, R. (1998). Travel by design? *Access* 12: 2-7.

Congestion

- Downs, A. (2004). Why traffic congestion is here to stay...and will get worse. *Access* 25: 19-25.
- Taylor, B. (2002). Rethinking traffic congestion. *Access* 21: 8-16.
- Harsman, B., and J. Quigley. (2011). Political and public acceptability of congestion pricing: Ideology and self-interest in Sweden. *Access* 38: 2-7.
- (optional) Cervero, R. (2003). Are induced-travel studies inducing bad investments? *Access* 22: 22-27.
- (optional) Small, K. (2005). Unnoticed lessons from London. *Access* 26: 10-15.

Transportation Planning Process (Part 1): The Federal Role

- Federal Highway Administration. (2007). "Part I: Overview of Transportation Planning," in *The Transportation Planning Process Briefing Book: Key Issues for Transportation Decisionmakers, Officials, and Staff*. U.S. Department of Transportation.
- Nigro, N., and Burbank, C. (2014). "A Primer on Federal Surface Transportation Reauthorization and the Highway Trust Fund." Center for Climate and Energy Solutions.
- (skim) U.S. House of Representatives. (2015). "FAST Act: The Fixing America's Surface Transportation Act." Transportation and Infrastructure Committee.

Transportation Planning Process (Part 2): Metropolitan Planning Organizations

- Sciara, G., and S. Handy. (2017). "Regional Transportation Planning," Chapter 6 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- Handy, S. (2008). Regional transportation planning in the U.S.: An examination of changes in technical aspects of the planning process in response to changing goals. *Transport Policy* 15: 113-126.

Environmental Impacts (Part 1): The NEPA Process and Air Quality Conformity

- Federal Highway Administration. "Environmental Review Toolkit: NEPA and Project Development." Read the following two tabs (plus sub-tabs under each): "NEPA and Transportation Decisionmaking" and "NEPA Documentation." <https://www.environment.fhwa.dot.gov/projdev/index.asp>.
- Federal Highway Administration. (2010). "Transportation Conformity: A Basic Guide for State and Local Officials." U.S. Department of Transportation.

Environmental Impacts (Part 2): Transportation and Greenhouse Gas Emissions

- U.S. Department of Transportation. (2010). Executive Summary (pages ES1-ES11) of "Transportation's Role in Reducing U.S. Greenhouse Gas Emissions." Report to Congress.
- Schipper, L. (2009). Moving forward with fuel economy standards. *Access* 34: 11-19.
- Lutsey, N. (2012). New automobile regulations. *Access* 41: 2-9.

Public Health and Safety

- Frank, L., Kavage, S., and T. Litman. (2006). "Land Use and Transportation Impacts on Health Objectives," pages 24-40 of PDF in "Promoting Public Health through Smart Growth: Building Healthier Communities through Transportation and Land Use Policies and Practices." Smart Growth BC.
- Cambridge Systematics, and M. Meyer. (2008). Executive Summary (pages ES1-ES6) of "Crashes vs. Congestion: What's the Cost to Society?" American Automobile Association.
- Wolch, J.R., Byrne, J., and J.P. Newell. (2014). Urban green space, public health and environmental justice: The challenge of making cities 'just green enough.' *Landscape and Urban Planning* 125: 234-244.
- (optional) Pucher, J., et al. (2010). Walking and cycling to health: A comparative analysis of city, state, and international data. *American Journal of Public Health* 100(10): 1986-1992.

Parking

- Shoup, D. (1997). High cost of free parking. *Access* 10: 2-9.
- Shoup, D. (2007). Cruising for parking. *Access* 30: 16-22.
- Chester, M., et al. (2015). Parking infrastructure: A constraint on or opportunity for urban redevelopment? A study of Los Angeles County parking supply and growth. *Journal of the American Planning Association* 81(4): 268-286.

Street Design

- Dumbaugh, E., and M. King. (2018). Engineering livable streets: A thematic review of advancements in urban street design. *Journal of Planning Literature* 33(4): 451-465.
- MacDonald, E. (2007). The intersection of trees and safety. *Access* 31: 20-26.
- (optional) Southworth, M., and E. Ben-Joseph. (2004). Reconsidering the cul-de-sac. *Access* 24: 28-33.

Traffic Impact Analysis

- Papacostas, C., and P. Prevedouros. (2001). "Traffic Impact and Parking Studies," Chapter 9 (pages 456-479) in *Transportation Engineering and Planning*, Third Edition. Upper Saddle River, NJ: Prentice-Hall.
- Institute of Transportation Engineers. (2006). "Transportation Impact Analyses for Site Development."
- Schneider, R., Handy, S., and K. Shafizadeh. (2014). Trip generation for Smart Growth projects. *Access* 45: 9-15.
- Additional resources that may be helpful for Memo 3:
 - Bochner, B., et al. (2011). Summary (pages 1-6) of "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments." TRB, NCHRP Report 684.
 - Walters, J., et al. (2010). "Trip Generation for Smart Growth." San Diego Association of Governments.
 - U.S. Environmental Protection Agency. (2011). "Smart Growth: Trip Generation Tool for Mixed-Use Developments."

Introduction to Travel Demand Modeling

- Miller, H.J. (2017). "Theories and Models in Transportation Planning," Chapter 5 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- Beimborn, E.A. (2006). "A Transportation Modeling Primer." Center for Urban Studies, University of Wisconsin-Milwaukee.

Cube Introduction + Networks

- NCHRP 716, Chapter 3
- NCHRP 365, Chapter 2
- O&W, Chapter 15

Trip Generation Modeling

- O&W, Chapter 4
- NCHRP 365, Chapter 3

Trip Distribution Modeling

- O&W, Chapter 5
- NCHRP 365, Chapter 4

Mode Choice Modeling

- O&W, Chapter 6
- NCHRP 365, Chapters 5 and 6
- *(optional)* McFadden, D. (2002). The path to discrete-choice models. *Access* 20: 2-7.

Traffic Assignment Modeling

- O&W, Chapter 10
- NCHRP 365, Chapters 9 and 10

Critiques and Emerging Practices

- *(skim)* TRB. (2007). “Shortcoming of Current Forecasting Processes,” Chapter 5 in “Metropolitan Travel Forecasting: Current Practice and Future Direction,” TRB Special Report 288.
- Flyvbjerg, B., Holm, M., and S. Buhl. (2005). How (in)accurate are demand forecasts in public works projects? The case of transportation. *Journal of the American Planning Association* 71(2): 131-146.
- *(optional)* Cervero, R. (2006). Alternative approaches to modeling the travel-demand impacts of Smart Growth. *Journal of the American Planning Association* 72(3): 285-295.
- *(optional)* NCHRP 716, Chapter 6

The Future

- Guerra, E. (2016). Planning for cars that drive themselves: Metropolitan planning organizations, regional transportation plans, and autonomous vehicles. *Journal of Planning Education and Research* 36 (2): 210-224.
- National Association of City Transportation Officials (NACTO). (2016). “NACTO Policy Statement on Automated Vehicles.” <https://nacto.org/policy-2016/policy-statement-on-automated-vehicles/>.