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## UP 437: Public Transportation Planning

Department of Urban and Regional Planning

University of Illinois at Urbana-Champaign

Spring 2023

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<b>Office Hours:</b>	By appointment only. Please email me for an appointment.
<b>Course Sessions:</b>	Tuesdays and Thursdays 2:00–3:20 PM 225 Temple Hoyne Buell Hall

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### Course Description

Public transportation is one of the key modes of transportation in the United States. It is an important component of livable and sustainable cities, providing access to jobs, education, healthcare, and other services for those who cannot or prefer not to drive. Despite critical benefits for mobility, the environment, the economy, social equity, and safety, public transportation modes in the U.S. currently serve only 5% of trips to work and 2.8% of trips for all purposes (Source: US Census, 2019). Public transportation is not just a travel mode for urban areas. It is also beneficial mode for rural areas too. Public transportation has been experiencing a ridership decline since 2014, and Covid 19 had the biggest impact in transit ridership in 2020-21. As cities and regions strive to tackle the complex urban challenges that we face today, increasing the mode share of public transportation through improved planning, operations, and design will become an increasingly important objective. UP437 is designed to equip students with the knowledge and skills necessary to engage in this transformation. The course is divided into three major sections:

- *Section I: Introduction to Public Transportation Planning.* The first section of the course introduces the broad context of public transportation planning, including its historical evolution, recent ridership trends, major modes, key societal benefits, emerging “disruptive forces” that may reshape the nature of public transportation service, and connections between public transportation and other travel modes.
- *Section II: Agency Performance and Service Planning.* The second section of the course provides an overview of data analysis and service planning methods, introducing students to the types of data used to characterize agency performance and quality of service; major steps in the service planning process (e.g., network and route design, frequency determination, capacity analysis, scheduling); and methods for estimating the cost and ridership impacts of service changes.
- *Section III: Planning, Policy, and Governance.* The third section of the course describes key actors, procedures, and policy considerations in the decision-making process, including land use and transit-oriented development, public transportation finance, agency/organizational structures for service delivery, communications, fare policy, and social justice. This section also considers how public transportation planning might change in the context of emerging technologies and modes (e.g., autonomous vehicles).

### Course Format

This course will be taught through a combination of interactive lectures, discussions, and hands-on activities both within and beyond the classroom. A series of individual and group assignments will engage students in relevant issues, encourage critical thinking, build communication skills, and provide opportunities to apply course concepts

to community projects and needs. Guest speakers will also visit to share their experiences in public transportation planning, providing insight into how the ideas discussed in class are translated into on-the-ground action.

## Course Objectives

By the end of the semester, students in this course will be able to:

- Describe recent trends in public transportation ridership and discuss their implications
- Understand the key characteristics of, and tradeoffs between, various public transportation modes
- Summarize the benefits and challenges of providing public transportation services
- Discuss strategies for creating multimodal connections to public transportation systems
- Identify, collect, and analyze data describing agency performance and quality of service
- Understand and implement key service planning methods (e.g., network and route design, frequency determination, capacity analysis, scheduling)
- Estimate the cost and ridership impacts of changes to public transportation service
- Become familiar with key actors and processes in public transportation planning and decision making
- Articulate the connections between public transportation and land use, including transit oriented development (TOD) strategies
- Understand the fundamentals of public transportation policy, governance, and finance
- Recognize the implications of emerging technologies and trends in service provision

## 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 before class and to come prepared for thoughtful discussion. Lectures will be interactive, and students will be expected and encouraged to engage in active dialogue about key concepts and real-world examples.

Assignments. Students will complete five assignments that provide an enhanced understanding of public transportation planning and data analysis. These assignments will include a mix of individual and group projects, although the majority will be hands-on and collaborative (peer evaluations of individual contributions will form part of the grade for each group assignment). The assignments are designed to develop the written, oral, and visual communication skills necessary for success in planning practice. The five assignments are summarized in the table below; further details/instructions will be distributed as the semester proceeds.

	Assignment Title/Topic	Format	Product	Due
1	Transit Demand Analysis	Group	Presentation	Feb 7
2	On-Board Survey Design	Individual	Report	Mar 9
3	Transit Ridership Decline	Group	Report	Mar 13
4	Review of Public Transit Studies	Individual	Report	Apr 13
5	Final Assignment	Group	Poster + report	May 9

Public Transportation in the News. Staying engaged in the “real world” of public transportation planning is essential to making informed arguments and decisions. To bring this engagement into the classroom, we will devote the beginning of each class session to **brief** (2–3 minutes maximum) student updates about recent news items related to public transportation planning. News items may include events, policy decisions, planning efforts, projects, studies, or any other updates relevant to the course content.

Each student will provide a news brief once during the semester (sign-ups during first week of class). News briefs should be **informal** (no PowerPoint presentations needed) and designed to convey (1) concise background information, (2) a description of the event, decision, effort, project, study, etc., (3) a summary of the major implications for public transportation planning, potentially with the student’s critique, and (4) 1-2 discussion questions for the class. To keep the discussion current, students should focus on a news item that occurred in the week prior to their update. Students should send a link to an online article about their news item to the instructor **by 5:00 PM the day before their update** for dissemination to the class.

Below is a list of organizations that often feature relevant news (feel free to share others with the class):

- Transportation For America
- Smart Growth America
- CityLab
- Planetizen
- Next City
- Mobility Lab
- Shared-Use Mobility
- American Public Transport Association

### Readings

There are no required textbooks for this course; all readings will be posted on the course site. Readings for each session are listed at the conclusion of this syllabus.

### Grading

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

Course Requirements	Weight (%)
Attendance and Participation	10
Assignment 1: Transit Demand Analysis	15
Assignment 2: On-Board Survey Design	15
Assignment 3: Transit Ridership Decline	20
Assignment 4: Review of Transit Studies	10
Assignment 5: TBD	25
Public Transportation in the News	5

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+:** 97.0–100.0    **B+:** 87.0–89.99    **C+:** 77.0–79.99    **D+:** 67.0–69.99    **F:** Less than 60.0  
**A:** 94.0–96.99    **B:** 84.0–86.99    **C:** 74.0–76.99    **D:** 64.0–66.99  
**A-:** 90.0–93.99    **B-:** 80.0–83.99    **C-:** 70.0–73.99    **D-:** 60.0–63.99

Late assignments. Students are expected to turn in all assignments on time. Late work will receive a penalty of 5 percentage points per day beginning immediately after the assignment deadline (e.g., at 5:01 PM for an assignment due at 5:00 PM) **if the instructor is notified in advance of the deadline**. If the instructor is **not** notified in advance, this penalty increases to 10 percentage points per day.

## 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.

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](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. **Laptops will not be needed or permitted during guest lectures.** Additionally, students must silence or turn off their cell phones before class.

Academic accommodations. This course will accommodate students with documented disabilities. To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign; call 217.333.4603; email [disability@illinois.edu](mailto:disability@illinois.edu); or go to the DRES website (<http://disability.illinois.edu/>). Please also schedule a private meeting with the course instructor to discuss your needs and requirements. All accommodations will try to be met once you self-identify. Please note accommodations are not retroactive to the beginning of the semester but begin the day you contact your professor with a current letter of accommodation from DRES. Please refer to <http://disability.illinois.edu/disability-resource-guide> for more information.

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
<b>Section I. Introduction to Public Transportation Planning</b>			
1	Jan 17	Introduction and Course Overview	
	Jan 19	Historical Evolution and Recent Trends	
2	Jan 24	Modes (Part 1): Overview and Key Characteristics	
	Jan 26	Modes (Part 2): Comparisons	
3	Jan 31	Transit Demand Analysis	
	Feb 2	Pedestrian and Bicycle Access to Transit	
4.1	Feb 7	<i>Group Presentations:</i> Transit Demand	<b>Assignment 1 Due</b>
<b>Section II. Agency Performance and Service Planning</b>			
4.2	Feb 9	Data Types, Sources, and Collection Methods	
5	Feb 14	Data Types, Sources, and Collection Methods (continued)	
	Feb 16	Service Characteristics and Standards	
6	Feb 21	Service Characteristics and Standards (continued)	
	Feb 23	Network Design Principles	
7	Feb 28	Route Design Principles	
	Mar 2	Frequency	
8	Mar 7	Capacity, Speed, and Reliability	
	Mar 9	<i>Work Session:</i> Transit Ridership Decline	<b>Assignment 2 Due</b>
9	Mar 14	<b>NO CLASS</b> – Spring Break	
	Mar 16	<b>NO CLASS</b> – Spring Break	
10	Mar 21	<i>Field Trip:</i> Tour of CUMTD Facilities	
	Mar 23	Timetabling	
11	Mar 28	Vehicle and Crew Scheduling	
	Mar 30	Service Changes: Costs and Ridership Impacts	<b>Assignment 3 Due</b>
<b>Section III. Planning, Policy, and Governance</b>			
12	Apr 4	The Regional Planning Process	
	Apr 6	Land Use and Transit-Oriented Development	
13	Apr 11	<i>Guest Speakers:</i> TBD	
	Apr 13	Public Transportation Costs and Finance	<b>Assignment 4 Due</b>
14	Apr 18	Fare (Fair?) Policy	
	Apr 20	Equity and Social Justice	
15.1	Apr 25	Emerging Technologies and Modes	
<b>Course Wrap-Up</b>			
15.2	Apr 27	Call to Action for Planners	
16	May 2	Final Presentation/Assignment Discussion	
	May 9	Final Presentation Report Due	

## Readings

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- **[Walker]:** Walker, J. (2012). *Human Transit: How Clearer Thinking About Public Transit Can Enrich Our Communities and Our Lives*. Washington, DC: Island Press.
- **[TCQSM]:** TRB (2013). “Transit Capacity and Quality of Service Manual,” Third Edition, Transit Cooperative Research Program (TCRP) Report 165. Washington, DC: The National Academies Press.

### Introduction and Course Overview

- Schweitzer, L. (2017). “Mass Transit,” Chapter 8 in *The Geography of Urban Transportation*, Fourth Edition, Genevieve Giuliano and Susan Hanson, Editors. New York: The Guilford Press.
- [Walker, Chapter 1: “What Transit Is and Does”]

### Historical Evolution and Recent Trends

- (*skim*) Hughes-Cromwick, M. (2019). “2019 Public Transportation Fact Book.” American Public Transportation Association.
- Mallett, W.J. (2018). “Trends in Public Transportation Ridership: Implications for Federal Policy.” Congressional Research Service.
- Grisby, D., Dickens, M., and M. Hughes-Cromwick. (2018). “Understanding Recent Ridership Changes: Trends and Adaptations.” American Public Transportation Association.

### Modes (Part 1): Overview and Key Characteristics

- [TCQSM, Chapter 2: “Mode and Service Concepts” (read Sections 1 through 3)]
- (*skim*) Hughes-Cromwick, M. (2019). “2019 Public Transportation Fact Book.” American Public Transportation Association.

### Modes (Part 2): Comparisons and Debates

- Levine, J. (2013). Is bus versus rail investment a zero-sum game? *Journal of the American Planning Association* 79(1): 5-15.
- Rubin, T., Moore, J. and S. Lee. (1999) Ten myths about US urban rail systems. *Transport Policy* 6(1): 57-73.
- Stanger, R. (2000) Ten myths about US urban rail systems by Thomas Rubin, James Moore, and Shin Lee – a rejoinder. *Transport Policy* 7: 303-305.

### Pedestrian and Bicycle Access to Transit

- McNeil, N., Dill, J., DeVitis, D., Doubleday, et al. (2017). “Manual on Pedestrian and Bicycle Connections to Transit” (read Sections 1 through 9). Federal Transit Administration, FTA Report No. 0111.

### Data Types, Sources, and Collection Methods

- TCRP (2008). “Passenger Counting Systems” (read Chapter 3). Transit Cooperative Research Program (TCRP) Synthesis 77. Washington, DC: The National Academies Press.
- TCRP (2005). “On-Board and Intercept Transit Survey Techniques: A Synthesis of Transit Practice” (read Chapters 2 through 4). Transit Cooperative Research Program (TCRP) Synthesis 63. Washington, DC: The National Academies Press.

### Service Characteristics and Standards

- [Walker, Chapter 2: “What Makes Transit Useful? Seven Demands and How Transit Serves Them”]
- [TCQSM, Chapter 4: “Quality of Service Concepts” (read Sections 1 through 3)]

### Network Design Principles

- [Walker, Chapter 4: “Lines, Loops, and Longing”]
- [Walker, Chapter 10: “Ridership or Coverage? The Challenge of Service Allocation”]
- [Walker, Chapter 12: “Connections or Complexity”]
- [Walker, Chapter 13: “From Connections to Networks to Places”]

### **Route Design Principles**

- [Walker, Chapter 5: “Touching the City: Stops and Stations”]
- [TCQSM, Chapter 2: “Mode and Service Concepts” (read Section 4)]

### **Frequency**

- [Walker, Chapter 7: “Frequency is Freedom”]

### **Capacity, Speed, and Reliability**

- [Walker, Chapter 8: “The Obstacle Course: Speed, Delay, and Reliability”]
- [TCQSM, Chapter 3: “Operations Concepts”]

### **Timetabling**

- TCRP (2009). “Controlling System Costs: Basic and Advanced Scheduling Manuals and Contemporary Issues in Transit Scheduling” (skim Chapters 1 through 3; for Chapter 3, focus on Level 1 and skim others). Transit Cooperative Research Program (TCRP) Report 135. Washington, DC: The National Academies Press.

### **Vehicle and Crew Scheduling**

- TCRP (2009). “Controlling System Costs: Basic and Advanced Scheduling Manuals and Contemporary Issues in Transit Scheduling” (skim Chapters 4 through 6; for each, focus on Level 1 and skim others). Transit Cooperative Research Program (TCRP) Report 135. Washington, DC: The National Academies Press.

### **Service Changes: Costs and Ridership Impacts**

- [Walker, Chapter 6: “Peak or All Day?”]
- [TCQSM, Chapter 4: “Quality of Service Concepts” (read Section 4)]
- Litman, T. (2018). “Transit Price Elasticities and Cross-Elasticities.” Victoria Transport Policy Institute.

### **The Regional Planning Process**

- FHWA. (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.
- Hoover, J., McDowell, B., and G. Sciara. (2004). “Transit at the Table: A Guide to Participation in Metropolitan Decisionmaking.” Federal Transit Administration, U.S. Department of Transportation.

### **Land Use and Transit-Oriented Development**

- Guerra, E., and R. Cervero. (2012). Transit and the D word. *Access* 40: 2-8.
- (*skim*) TCRP (2008). “Effects of TOD on Housing, Parking, and Travel.” Transit Cooperative Research Program (TCRP) Report 128. Washington, DC: The National Academies Press.
- (*skim*) 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.



## Public Transportation Costs and Finance

- AASHTO (2018). “Survey of State Funding for Public Transportation” (read Part 1, skim Part 2). American Association of State Highway and Transportation Officials.
- Guerra, E., and R. Cervero. (2011). Cost of a ride: The effects of densities on fixed-guideway transit ridership and costs. *Journal of the American Planning Association*, 77, 3, 267-290.
- Kline, S. (2018). “The Benefits of Reliable Federal Funding for Public Transportation.” American Public Transportation Association.
- 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.

## Fare (Fair?) Policy

- [Walker, Chapter 11: “Can Fares be Fair?”]
- TCRP (2015). “Preliminary Strategic Analysis of Next Generation Fare Payment Systems for Public Transportation” (skim Chapters 1 through 6). Transit Cooperative Research Program (TCRP) Report 177. Washington, DC: The National Academies Press.
- TCRP (2003). “Fare Policies, Structures and Technologies: Update” (skim Chapters 1 through 5). Transit Cooperative Research Program (TCRP) Report 94. Washington, DC: The National Academies Press.

## Equity and Social Justice

- Grengs, J. (2002). Community-based planning as a source of political change: The transit equity movement of Los Angeles' Bus Riders Union. *Journal of the American Planning Association* 68(2): 165-178
- Kahn, M.E. (2007). Gentrification trends in new transit-oriented communities: Evidence from 14 cities that expanded and built rail transit systems. *Real Estate Economics* 35(2):155-182.
- Sanchez, T.W., Shen, Q., and Z. Peng. (2004). Transit mobility, jobs access and low-income labour participation in U.S. metropolitan areas. *Urban Studies* 41(7): 1313-1331.
- O'Regan, K., and J. Quigley. (1998). Cars for the poor. *Access* 12: 20-24.

## Emerging Technologies and Modes

- Clewlow, R.R., and G.S. Mishra. (2017). “Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States” (read Executive Summary, skim rest). Institute of Transportation Studies, University of California, Davis.
- Anderson, J.M., et al. (2016). “Autonomous Vehicle Technology: A Guide for Policymakers” (read “Summary” only). RAND Corporation.
- (browse) APTA. (2020). “Autonomous and Electric Vehicles.” <https://www.apta.com/research-technical-resources/mobility-innovation-hub/autonomous-vehicles/>.

## Call to Action for Planners

- Speck, J. (2017). “Ten Rules for Cities about Automated Vehicles.” Congress for the New Urbanism. <https://www.cnu.org/publicsquare/2017/10/16/ten-rules-cities-about-automated-vehicles>.
- Links to policy statements on autonomous vehicles:
  - [Human Factors and Ergonomics Society](#) (HFES)
  - [National Association of City Transportation Officials](#) (NACTO)
  - [Institute of Transportation Engineers](#) (ITE)
  - [Association of Pedestrian and Bicycle Professionals](#) (APBP)
  - [California Multi-Agency Workgroup on AV Deployment for Healthy and Sustainable Communities](#)