CP 6322 · Fall 2026

Urban Transportation Planning Methods & Investment Decisions

Instructor: Professor Gulsah Akar
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Drop-in hours & location: By appointment
Class schedule: Mon/Wed 11:00am to 12:15pm
Location: Arch. West 260

General Information

Description

Transportation planners and engineers are responsible for estimating where and when future travel will occur, by what means, and on what routes. This information informs infrastructure and policy decisions. This course introduces the modeling techniques used for forecasting travel flows in urban and regional areas, and how these outcomes may change under different infrastructure patterns and policy decisions. The course will also discuss data collection processes and limitations, land-use and transportation interactions, transportation access, and new mobility technologies and their implications for infrastructure decisions and investments.

Prerequisites and Co-requisites

There are no pre- or co-requisites for this course. No credit for students who have taken CP 6321 or CP 8883 Transportation Decisions.

Course Goals and Learning Outcomes

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

- Understand the basic principles of transportation supply and demand.
- Understand the role of urban transportation demand forecasting in cost-benefit analysis-based decision- and policymaking.
- Explain the links between different land-use patterns and their implications for urban transportation at different resolution levels.
- Understand the considerations behind models used for transportation demand forecasting.
- Develop skills in estimating demand forecasting models using travel data and statistical methods.
- Acquire exposure to contemporary urban transportation technology and service developments.
- Understand the roles of government, the private sector, and research communities in advancing urban transportation.
- Formulate a research question, select appropriate data and methods to address it, and translate the results into a recommendation for a planning agency.
- Effectively communicate the results of empirical studies in written and oral form.

Assignments and Grading

Graded component	Weight
HW 1 — Trip generation	10%
HW 2 — Mode choice	15%
Interpretation Checks (in-class – Check I 10%, Check II 15%)	25%
Discussion lead	20%
Final project	25%
Participation and reading checks	5%
Total	100%

Description of Graded Components

Detailed instructions for each assignment will be provided as it is assigned. Below are general guidelines.

HW 1 — Trip generation. Students will estimate and apply trip generation models, and work through a set of trip production, attraction, and balancing problems.

HW 2 — Mode choice. Students will estimate mode choice models using NHTS or other data, and interpret the results in terms of value of time and investment implications.

Discussion lead. Each group leads one class session on a contemporary transportation debate. Your group presents the question and the assigned readings for 15 minutes, takes a position, and then facilitates a discussion for the remainder of the class. Topics and dates are listed below. All students are responsible for reading the assigned articles before class. Readings will be provided with detailed instructions.

Interpretation checks. Two individual in-class checks. You are handed a set of results, a cross tabulation, a regression table, a set of logit coefficients, and asked what they mean: what a coefficient says and relative to what, what value of time calculations imply, what happens to a predicted share when an input changes, and what a planner can or cannot conclude from the output. Open notes, calculator welcome, laptops closed, on paper. Individual work.

Final project. Working in the same groups, students will pose a transportation research question, answer it using data, and close with a recommendation to a named planning agency. The project runs from mid-October through the end of the semester. See the Final Project section below.

Participation and reading checks. Students are expected to attend class, ask questions, provide examples and commentary, and contribute to the intellectual environment of the classroom. A short three-question reading check will be given at the start of each student-led discussion session. Your lowest score is dropped; if you miss a session, that absence counts as your dropped score.

Grading Scale

A 90–100% B 80–89% C 70–79% D 60–69% F 0–59%

Course Text

There are no textbooks required for this course. All reading materials will be provided on Canvas.

Course Expectations and Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, see the Georgia Tech Academic Honor Code and Student Rule 18.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, which will investigate the incident and identify the appropriate penalty.

Accommodations for Students with Disabilities

If you are a student with learning needs that require accommodation, contact the Office of Disability Services at (404) 894-2563 or visit the Georgia Tech Office of Disability Services website as soon as possible to make an appointment and obtain an accommodations letter. Please also email me as soon as possible so we can discuss your learning needs.

Attendance and Participation

Students are expected to attend class regularly. Much of the second half of the semester is discussion-based and depends on people having done the reading and being in the room. If you have to miss a session, let me know in advance where you can.

Collaboration and Group Work

This course requires group work. Groups are formed in Week 2 and stay together for HW 1, the discussion lead, and the final project. Group members ordinarily receive the same grade. I reserve the right to adjust an individual grade based on documented contribution and on responses during presentation question periods. If your group has a problem with contribution, raise it with me early rather than after a deliverable is submitted.

Extensions, Late Assignments, and Missed Deadlines

Students are expected to complete all reading assignments before class. Assignments must be submitted by 5:00 p.m. on their due date unless otherwise stated. A 10% penalty will be applied for every day an assignment is late, and late work will not be accepted after 10 days. No late submissions will be accepted for the final project paper, because grades are due shortly after the deadline. If there are special circumstances, please discuss them with me as soon as possible.

Student Use of Mobile Devices in the Classroom

Laptops are welcome for in-class exercises and note-taking. Please keep phones away during class.

Use of Generative AI

AI tools are part of how this work gets done now, and learning to use them well is part of your training. What follows is about where they help and where they get in the way of what this course is trying to teach.

Permitted, no disclosure needed: help with R or other coding syntax, debugging code, understanding a statistical concept, or editing your own prose. None of these are what I am assessing.

Not permitted: substantive use in your final project, including generating or restructuring analysis, drafting sections, or producing a literature review. Also not permitted: generating your position or discussion questions for your student-led session, or your reading-check answers.

In all cases, you are responsible for what you submit. A fabricated citation, a coefficient interpreted backwards, or a number that does not appear in your own output is your error regardless of where it came from. Check every figure against your log file before submitting. You will be asked about your results during presentations, and everyone in the group should be able to explain any coefficient in your table.

Tentative Course Schedule

This schedule may change due to unforeseen events or the availability of guest lecturers. Session types are labeled in the Topics column.

Week	Dates	Topics	Deliverables
1	Aug 24–26	Introduction and overview, Transportation trends and critical issues, Transportation data	Complete Class Ex 00 on your own before Aug 31.
2	Aug 31–Sep 2	Intro to R, NHTS data, IPUMS data In-class data exercises	Form Groups for projects and student led discussions.
3	Sep 7–9	Sep 7: No class — Labor Day Sep 9: Trip generation	—
4	Sep 14–16	Sep 14: Guest lecture: Professor Kristina Currans, Land Use and Trip Generation Sep 16: Trip generation exercise	—
5	Sep 21–23	Sep 21: Trip distribution Sep 23: Trip distribution, continued	HW 1 due Sep 23
6	Sep 28–30	Sep 28: Mode Choice Sep 30: **Interpretation Check I**	—
7	Oct 5–7	Oct 5: No class — Fall Break Oct 7: Mode choice — in-class exercise	—
8	Oct 12–14	Oct 12: Guest lecture — Ron Knezevich, GDOT: Safety Oct 14: Mode choice, continued	Project proposal due Oct 14
9	Oct 19–21	Oct 19: Trip assignment Oct 21: Facility evaluation	HW 2 due Oct 21
10	Oct 26–28	Oct 26: Student-led discussion 1: Car access and poverty Oct 28: Student-led discussion 2: Accessibility versus mobility	—
11	Nov 2–4	Nov 2: Student-led discussion 3: Telework and the post-pandemic demand curve Nov 4: Guest lecture: Bryon Rushing, Active Transportation	—

Week	Dates	Topics	Deliverables
12	Nov 9–11	Nov 9: Student-led discussion 4: Pricing and demand management **Nov 11: Interpretation Check II**	—
13	Nov 16–18	Nov 16: Student-led discussion 5: Automated vehicles and long-range plans Nov 18: Student-led discussion 6: Induced demand and forecast credibility	—
14	Nov 23–25	Nov 23: Project work session and progress checks Nov 25: No class — Thanksgiving	—
15	Nov 30–Dec 2	Nov 30: Final project presentations (3 groups) Dec 2: Final project presentations (3 groups)	—
16	Dec 7	Dec 7: Course wrap-up	Final paper due Dec 11

Methods Readings

NCHRP Report 716, *Travel Demand Forecasting: Parameters and Techniques*, is available on Canvas and from the Transportation Research Board.

Week	Reading
Week 1	Critical Issues in Transportation for 2024 and Beyond, TRB. https://www.nationalacademies.org/units/TRB-Transporta-23-P-586/publication/27432
Week 2	Review the National Household Travel Survey website and the IPUMS USA website.
Week 4	NCHRP Report 716, Chapter 4.4 — Trip Generation
Week 6	NCHRP Report 716, Chapter 4.5 — Trip Distribution
Week 7	NCHRP Report 716, Chapter 4.7 — Mode Choice
Week 9	NCHRP Report 716, Chapters 4.11 and 4.12 — Trip Assignment

Student-Led Discussions

Each group leads one session. Start thinking now about which question you want; take either position below or write your own. Full reading citations and instructions are in the Discussion Lead handout on Canvas. All students read both assigned articles before each session.

Session	The question	Two positions you could take
Oct 26 · Car access	If car access measurably improves life outcomes, should the response be to get more people into cars, or to build places where you do not need one?	1. Cars are the fastest intervention available. 2. Treating cars as the remedy ratifies the problem.
Oct 28 · Accessibility vs mobility	Should accessibility replace mobility as the metric that drives investment decisions?	1. Yes, what holds it back is institutional habit, not method. 2. No, the operationalization problem is fatal, not incidental.
Nov 2 · Telework	Did hybrid work reduce travel, or just redistribute it?	1. Redistributed, not reduced. 2. Reduced, and the peak is what counts.

Session	The question	Two positions you could take
Nov 9 · Pricing	If we cannot build our way out, can we price our way out — and who pays?	1. Price it. Free roads are regressive too. 2. Not here, not yet.
Nov 16 · Automated vehicles	What should a region assume about AVs in a 2050 forecast, and what is the cost of being wrong?	1. Silence was the right call. 2. Silence is abdication.
Nov 18 · Induced demand	Do the models we just estimated predict anything, and what happens to the projects they justify?	1. The problem is institutional, not technical. 2. The problem is structural, and no reform fixes it.

Final Project

In your assigned groups you will pose a transportation research question, answer it with data and close with a recommendation to a named planning agency. The question is yours: that is the point, and the hardest part.

In the homework you estimate models on data someone else chose, for questions someone else asked; here you decide what is worth asking, and what a planner should do about the answer.

Proposal (one page) due Oct 14 — 5% · Progress check (in class) Nov 23 — required, ungraded · Presentation (12 minutes) Nov 30 or Dec 2 — 5% · Final paper (4–6 pages) due Dec 11 — 15%

Project Ideas

Here are a few examples to show the scope that works: a question you can answer by December, with data you can open this week. The NHTS 2022 national file, ACS PUMS for the Atlanta PUMAs, are all workable. Talk to me early about anything else.

Density and trip-making. Does density reduce household daily trip-making once income, household size and workers are controlled? *NHTS 2022 · trip generation regression · ARC forecasting assumptions*

Telework and non-work travel. Do teleworkers make more non-work trips than comparable non-teleworkers? *NHTS 2022 telework variables · trip generation · regional model assumptions*

Deliveries and shopping trips. Do households that receive frequent deliveries make fewer shopping trips? *NHTS 2022 · trip generation · freight and land use planning*

Who has no car in Atlanta. What predicts zero- and one-vehicle households across Atlanta PUMAs? *ACS PUMS · ordered or count model · MARTA, ARC analysis*

Transit commuting in Atlanta. Which characteristics predict transit commuting, and how much of the variation is locational rather than personal? *ACS PUMS · multinomial logit · MARTA service planning*

Transit supply and transit use. Do Atlanta PUMAs with more weekday transit service have higher transit commute shares, net of income and density? *ACS PUMS + MARTA GTFS + Smart Location Database · share or logit model · MARTA*

Commute length and income. How far do Atlanta workers travel to work by income group, and which job centers draw the longest trips? *LODES + ACS PUMS · descriptive and regression · ARC*

Young adults and car use. Do 18–34 year olds make fewer vehicle trips once income, household size and density are controlled? *NHTS 2022 · trip generation · long-range forecast assumptions*

Other datasets that may be useful: LODES, GTFS and the Smart Location Database – if you are data savvy.