Overview

In these jointly-taught courses we will study basic characteristics of transportation systems, including functions, organization, operations, planning, ownership and finance. I want to show you how things work, why transportation is important and even interesting. We will address both passenger and freight transportation, including urban and intercity services. We will do this by stepping through a generic transportation planning process, addressing in sequence: problem definition, identification and design of options, analysis and forecasting, and evaluation and finance. In the process we will study some contemporary problems facing transportation, including changing demographics, congestion and disruptions, sustainability, deteriorating infrastructure, and strained finances.

In the process we will learn some useful tools for analysis, problem solving and design of solutions, including

- Conceptual modeling to define and frame systems and problems.
- Qualitative analysis for planning and supporting transportation decisions.
- Elements of travel behavior modeling to predict how travelers move through networks.
- Methods to design scheduled services such as bus or rail transit.

Our method will be a combination of lectures and discussions, individual homework, some guest lectures, and a team-based projects. The project teams will meet at least once– and on an as-needed basis – with me to seek guidance and report progress. At the end of the course each team will present its results to the entire class.

The two courses (371 & 479) are taught jointly to encourage interaction among students with a wide range of experiences and perspectives, permitting peer teaching and learning. However, project teams, assignments, and exams will be separate for graduate and undergraduate students. We have different expectations for learning in each course and each will be graded separately.

We will not use a text book. Readings will be posted on Canvas as files or links: http://www.it.northwestern.edu/education/learning-management/login.html. There is a link to this site on the main NU Web page. Assignments will be posted on Canvas, and they must be
handed in electronically by uploading them to the assignment link in Canvas. Do not use cover sheets, but be sure to put your name on all documents submitted for grading.

**Expectations of Students**

- Please come to class prepared to participate based on readings, assignments, and observations of the world that relate to transportation. Participation in class discussions will contribute about 10% of your term grade. We will assess both the quality and quantity of your contributions to class discussions – this will give you an incentive to read the assigned materials and think about their meaning.

  **This is real! If you don’t participate effectively in class, your grade will suffer**

- A good thing to do for class participation: briefly report on a current news story relevant to our class, and explain how it is relevant to what we are learning.
- Attendance and attention are required. When you are missing, I worry. If you must be absent, please let both Amr and me know in advance if you can. I will do the same for you.
- Do bring laptops and smartphones to class, but do not use them to play games, send e-mail, texts, or tweets. Use them to search for information that is immediately useful for class discussions and in-class problem solving. This does not apply to exams!
- Students will conduct a quarter-long project, selected from a list of candidate topics, in 3-4 person groups; the product must be both a short, well written report and an oral briefing for the class delivered during the final week of the quarter. These projects will be policy analysis and problem solving exercises. The products will (in most cases) be advisory briefings intended for senior decision makers facing important transportation choices. Both oral and written products must be a sharply focused, well-researched, and professionally executed.
  
  We will form the teams; you may switch teams once at the start of the quarter if you can negotiate an even exchange – body for body, but you must let us know when this happens. Candidate topics are listed below. Each team must choose a different topic. If you do not like these topics, you can come up with your own but I must approve it in advance. Select your topic before the end of the second week of classes and submit a document of no more than two pages stating the problem, outlining background information, resources you are using, and your proposed approach, and listing team members.
- Projects will be worth about 30% of the term grade, and we will ask each student to evaluate the contributions of each person on his/her team, so be sure to carry your fair share of the load.
- There will be about 5 written homework assignments posted on the Canvas. We will usually allowing one week for completion. These must be submitted electronically in editable form (no PDFs). They will contribute 20% to your term grade.
- There will also be a one-hour midterm (20%) and a two-hour final (20%) examinations. The final will mainly cover material presented after the midterm... but it may include major topics students missed in the midterm!
- Please stay in touch through the Canvas site, in the classroom, and e-mail.
Written Assignments and Submission Guidelines

Homework assignments and project reports must be written in correct and mature English – that will count in your grade – and be submitted as editable documents, e.g., MS Word documents, so we can write comments into them - no PDFs or Excel files will be accepted. Text should be double spaced in 12 point font, with decent – e.g., one inch – margins all around. Page limits will be specified, and you must observe them, as we will in grading your work. Obviously, don’t submit work copied from other people or other sources.

Schedule

Class meets Mondays, Wednesdays and Fridays from 2:00 until 3:50. We will meet in Tech A110 on all days. Civ-Env 371 and 479 will meet separately on alternate Fridays, starting on 2 October with 479.

THERE WILL BE NO CLASS ON WEDNESDAY, 23 SEPTEMBER; THIS WILL BE MADE UP ON FRIDAY, 25 SEPTEMBER

Normally, Friday meetings will be used for discussions, sometimes on additional topics or current transportation problems. Topics and relevant readings will be announced in advance of Friday sessions. Friday attendance is required. If you must miss a Friday session (e.g., athletes, musicians), please attend the next one (it will be for the other class, but try to deal with it). I am usually available to meet students after class and at other times by appointment - use e-mail to schedule. If you want to meet me, just ask.

Teaching Team

Instructor: Prof. Joseph L. Schofer Tech L-272 – second floor, administrative corridor. j-schofer@northwestern.edu
I have had many years of experience in transportation research, teaching, and applications in policy analysis, planning, and evaluation. I am active nationally through the Transportation Research Board (part of the National Academies), focusing on data and information programs and their relationship to transportation decision making. I am or have been on advisory committees for the U.S. Department of Transportation’s Bureau of Transportation Statistics, Pace, the suburban bus operator on the Chicago Region, the Chicago Transit Authority, and the Chicago Metropolitan Agency for Planning, the regional planning agency. And, I host an interesting podcast on infrastructure on which I interview technical experts on the subject: www.theinfrastructureshow.com. Listen to learn about U.S. infrastructure.

Teaching Assistant: Amr Elfar (AmrElfar2014@u.northwestern.edu), a second year PhD student in transportation engineering.
Guest Lecturer: Amanda Stathopoulos, Assistant Professor of Civil and Environmental Engineering, whose expertise is in the areas of travel behavior modeling and forecasting. a-stathopoulos@northwestern.edu

Team Projects

Team policy analyses projects will be conducted over the entire quarter, with final reports due on the last week of classes. Remember, we will form the teams. There are separate teams for 479 and 371. The objectives for these projects are (a) to engage students in deeper study of an important transportation problem, and thereby (b) to build technical knowledge, and (c) to share that knowledge across groups through presentations. Do not write a book report! You will be evaluated on the basis of your creative, thoughtful, and practical technical contributions in the report. If all you do is tell us what others have said and done, you will not get a favorable evaluation. These reports should address a real problem, identify key stakeholders and their views, discuss possible actions (options), analyze and evaluate the options, and make a recommendation supported by evidence. This is just like a real planning or policy analysis process. {Note: when you read about a project, existing or proposed, be careful not to accept everything you read on the Internet as truth. It’s not.}

Four separate, written reports are required:

1. **Initial report:** The problem, background information, resources you are using, and your approach. Two pages or less, including references/sources. **Due October 2nd**
2. **Progress report 1:** What have you accomplished, how have you changed your scope, what resources have you accessed, what problems have you experienced, and how can we resolve them? Does everyone on the team have an assignment? Is he/she delivering? Three pages or less. **Due October 23rd**.
3. **Progress report 2:** What have you accomplished since progress report number 1? What options/actions/designs are you exploring? How will you evaluate those options? What data/information do you have, and what more do you need? Are you on track and is everyone working effectively? Three pages or less. **Due November 13th**.
4. **Final report:** Putting it all together. Add to pieces from the previous three reports and complete the job. Describe the problem, the data/information, your analysis, the options you considered, evaluation, and recommendations. What action should we take, and why? References. 10 pages or less, no cover sheets. **Due December 4th**.

Each team must meet with me at least once about mid-quarter for progress reporting and consultation. You are responsible for scheduling these meetings. At the end of the course each team will deliver a final report in the form of both a presentation and written document sent electronically to Amr Elfar at AmrElfar2014@u.northwestern.edu. Class presentations will be November 30, December 2 and 4. Written reports must meet these standards:
Three pages or less (ten for the final report), double-spaced, 12 point font, 1” margins. Up to 5 pictures or graphs do not count in page limits. No cover sheet, well-written (writing counts), carefully referenced. Word (.doc/.docx) or similar, editable file, NOT PDF!

The presentations must meet these standards:

The time limit will be 15 minutes (plus 10 minutes for questions and discussion). Presentation grades will be based on organization and clarity, identification and explanation of key points, response to questions and time management. It is not necessary for every team member to speak during the presentation.

Suggested Team Project Topics

These topics are suggestions. You can select one, adapt one, or choose something different. If you select a different topic, you must clear it with me in advance. Note that we have tried to provide at least one reference for each. Some of these will be helpful, others not. Some will be objective, others not. Be careful.

1. Over the river... or not. The states of Washington and Oregon have long been discussing replacing the exiting I-5 bridge over the Columbia River. In the absence of an acceptable financing plan, the project was cancelled. Is there a need? How might it be met? How could it be paid for? Here's the dead website – there is a lot of information here. [https://www.oregonlegislature.gov/citizen_engagement/Reports/ColumbiaRiverCrossing.pdf](https://www.oregonlegislature.gov/citizen_engagement/Reports/ColumbiaRiverCrossing.pdf) Figg Engineer has offered to build a Columbia Crossing a short distance away. How will they pay for it? [http://www.oregonlive.com/business/index.ssf/2014/07/columbia_river_crossing_clark.html](http://www.oregonlive.com/business/index.ssf/2014/07/columbia_river_crossing_clark.html)

2. If they build it, who will come? The Illiana Expressway is a proposed 47-mile east-west bypass highway that would be about 30 miles south of downtown Chicago. The Illinois Department of Transportation and some local officials strongly support it, but the Chicago Metropolitan Agency for Planning and non-governmental organizations do not. Consider the needs, options, costs and impacts and make a recommendation – build it or not. Initial readings on Canvas.

3. Who can compete with the Panama Canal? The 100-year-old Panama Canal is being expanded with a new set of larger locks to accommodate larger, and more economical, cargo ships. The new locks are scheduled to open at the end of 2015. Recently a proposal has arisen from Chinese media magnate Wang Jing to build a new canal connecting the Atlantic and Pacific Oceans through Nicaragua. This canal would be 173 miles long – the Panama version is 48 miles long – but it would utilize Lake Nicaragua for much of the distance. Nicaragua, a poor country with an apparently corrupt government, has signed a 50 years concession with the Hong Kong-based HKND company to build and operate the canal.

4. **Will self-driving cars drive transit away...or save it?** What does the prospect of self-driving vehicles mean for public transit and its customers? Self-driving highway vehicles might address a variety of mobility problems. Some thought this idea was impossible, but Google has made real progress, and all of the major manufacturers are working on self-driving vehicles. Is this good news or bad news for the transit industry? Explore opportunities and obstacles and recommend support, discouragement, or something in between for vehicle automation. See the Canvas site, search the TRB TRID database: [http://trid.trb.org/].

5. **BRT near DC** - Montgomery County, Maryland, is adjacent to Washington, D.C. and is mainly suburban, with a mix of residences, offices and retail establishments. Its arterial streets are very congested. The county government is considering a Bus Rapid Transit (BRT) network. This is a strongly auto-oriented community, and the proposal is controversial. Review the situation in detail and prepare an action recommendation for the county executive. [http://www.montgomerycountymd.gov/RTS/; http://www.montgomerycountymd.gov/transit-authority/Resources/Files/TTFConsolidatedFinalReport05-10-12.pdf]

6. **Uber, the Ridesharing Economy, and Taxi Regulation:** In this policy analysis, examine the nature of livery companies, mainly taxis and limos, and regulations surrounding them. Explore the policy issues surrounding the startups Lyft and Uber, including but not limited to technology access, ADA accessibility, competition, and equity. Each state has different regulations, so focus on one or more major cities (Chicago, LA, San Francisco, New York City). See the Canvas site, search the TRB TRID database: [http://trid.trb.org/].

7. **High speed rail to O’Hare** – is this a good idea, or what? Some rail service to airports have been highly successful – Chicago Midway, Washington Reagan, San Francisco. CTA service to O’Hare is well-utilized, but it is slow and less than convenient for business travelers. CrossRailChicago.org (a project of the Midwest High Speed Rail Association) proposes such a service; there are other proposals, as well. What are the options? What is worthwhile? [http://www.midwesthsr.org/]

8. The Louisiana International Deep Water Gulf Transfer Terminal Authority proposes to build an intermodal port in deep water off the end of the Mississippi River: [http://ligtt.com/](LIGTT). This would be a break-bulk ship-to-ship terminal connecting ocean ships with the inland waterway network. What’s the potential, the competition, the policy recommendation?

9. **Performance of the inland waterways system:** what do we know about performance of our inland waterways system? What are the sources of delays, how important are they, and what can be done about them? What data do we need that we do not currently have about waterways system performance?
10. A little bit of town planning: can we live without cars (for short periods, in small spaces)? Many towns around the world have established auto-free zones, some tiny, some a little larger (https://en.wikipedia.org/wiki/List_of_car-free_places#United_States). The phenomenon is not new – Sweden has done this for 40 years or more. (Of course all towns were auto free until about 110 years ago!) Is a part of Evanston a good target? What are the reasons (objectives)? What are the negative consequences? Develop a policy paper that tells us, “no,” or that sketches a plan to keep the cars out of some places. Sometimes this comes under the heading “traffic calming.” See: http://www.ite.org/traffic/tcstate.asp

11. Study an interesting problem from your home town or country. To select such a custom topic, you MUST be able to get objective information about the problem, the setting, and options. Not government propaganda or someone’s opinion.

JLS
November 6, 2015