NORTHWESTERN UNIVERSITY MASTERS OF SCIENCE PROGRAM IN TRANSPORTATION SYSTEMS ANALYSIS AND PLANNING (2025-2026)

Track		1st Quarter/Fall	2nd Quarter/Winter	3rd Quarter/Spring
Core curriculum Required courses		Transportation Systems Planning and Management (CIV_ENV_371)	Infrastructure Systems Analysis (CIV_ENV_483)	Data Analytics for Transportation and Urban Infrastructure Applications (CIV_ENV_474)
		Introduction to Transportation Engineering (CIV_ENV_376)	Travel Demand Analysis & Forecasting 1[1] (CIV_ENV_480-1)	Choice Modeling in Engineering (CIV_ENV_377)
			Transportation System Operations and Control: Scheduled Modes and Real-Time Systems (CEE472-2)	Transportation Systems Analysis I (CIV_ENV 471-1)
		Seminar in Transportation Engineering (CIV_ENV 517) – no tuition zero credit seminar is required for MS+PhD. Writing Requirement (CIV_ENV 508): A zero-unit independent study course is required for MS.		
Tracks Recommendation for Electives	Track 1: Transportation Systems and Operations Research	• **Deterministic Models and Optimization (IEMS 313[2], &)** • Mathematical Programming (IEMS 450-1, **&**)	• Mathematical Programming (450-2)	
	Track 2: Data Science for Transportation	• **Intermediate statistics (IEMS 401)** • **Introduction to Applied Econometrics (ECON 281-0[3])** • Stochastic models and simulation (IEMS 315) • Uncertainty analysis (306) • Statistical Methods for Data Mining (IEMS 304)	• Statistical Learning (IEMS 402) • **Data Science for Urban Systems (CIV_ENV 374)**	• Statistical Learning (IEMS 402) • COMP-SCI: Social Network Analysis 3:30-6:20 Th
	Track 3: Transportation Economics and Policy	• Microeconomics (Econ 310) • **Transportation Economics and Public Policy (ECON 355)**	• Urban Politics (POLI_SCI 321-0-20) • Climate and Energy - Law and Policy (CIV_ENV 309)	

		• Supply-Chain Modeling and Analysis (IEMS 381[4]) • Introduction to Econometrics (ECON 480)		

Overall structure	**For MS Students in the TRN Program:** The program requires **12 course units**, in addition to the **writing requirement** and the **Seminar**. Please refer to **Appendix A** for important notes on the MS Program Table. For the electives, we encourage students to take courses in areas of their professional interest. **For PhD Students in the TRN Program:** Barring exceptional circumstances (e.g., work on a funded research project), PhD students are expected to complete the **12-unit MS course requirements** during their **first year** in the TRN program, as well as the **Seminar.** For electives We encourage students to take advanced courses to build research skills.
MS Writing requirement	Please see Appendix B for detailed requirement.

Notes about

[1] Pre-requisites: any course from ECON 281, CIV_ENV 306, IEMS 304, IEMS 315, IEMS 401, ECON 480-1, or equivalent.

[2] IEMS 313 is more suitable for those who do not have a strong background in this area (comparing IEMS 313 and 450-1)

[3] ECON 281-0 would NOT count towards the degree requirement because it is a 200-level course. However, it is highly recommended for both MS and PhD students who need a solid introductory course to applied econometrics.

[4] Requires prereq. IEMS 313

Appendix A: Important notes on MS Program Table

A. Recommended courses/projects are in **bold** face in the table.
B. Recommended courses without any marks are *required*; Recommended courses marked with "$" are electives.
C. The students are recommended to take one of the two courses marked with "&". While both courses cover optimization, IEMS 313 is more suitable for those who do not have a strong background in this area.
D. CivEnv 517: Seminar in Transportation engineering. All students need to register and attend the seminar series through the year.
E. Seminar in Responsible Conduct for Research. Researchers and MS/PhD students are required to attend. MS students with PhD aspirations are encouraged to attend.
F. Electives are not limited to the courses listed in the table. Other 300 level courses or above may be taken as electives, subject to the faculty supervisor's approval. Students may also take up to 3 research/independent-study units, which also requires the faculty supervisor's approval.

Appendix B Transportation System Program Writing Requirement for the M.S. Degree

In addition to satisfactory completion of required coursework, M.S. students must conduct an independent research effort and prepare a research report. This could focus on a subject covered in the coursework of our program, or it may go beyond into an area of special interest to the student. The work and the product must have these characteristics:

- The work may be basic or applied research, an innovative analysis and solution to a practical problem, evaluation or development of a transportation policy, etc.
- It must be an original effort which, though limited in scope, demonstrates an interesting contribution to transportation and significant growth in the student's knowledge.
- By "original" we mean that the work must feature a contribution from the student him/herself, rather than being merely a survey of what others have done.
- The topic must be mutually agreed upon by student and his/her faculty advisor, which is to say that the advisor has a role in selection of topic from the outset.
- Students should consult with their advisors in the design of the effort, selection of tools and data, and interpretation of results.
- Any transportation faculty member may serve as principal advisor. Another Northwestern faculty member, or (if the substance of the topic so warrants) even an outside senior professional in the field, may serve as principal advisor with the consent of student, the candidate advisor, and the Transportation Program area coordinator, Prof. Stathopoulos.
- The effort should reflect approximately one month or 180 hours of full-time work. Of course, the effort itself may be spread over a much longer time period.
- The final product must be a well-written report which is:
    - Suitable for use as a professional report or a paper for submission to a journal.
    - In clear and correct English
    - Structured with a title page, executive summary, table of contents, lists of figures and tables, main text including a review of the literature and/or work of others, structured with thoughtful headings, graphics integrated in the text, and references presented in proper and consistent format.
- Draft reports should be presented for review by the principal advisor and second faculty member prior to completion. Advisors must be given ***a minimum of two weeks*** for report review. Students must address all significant comments from the advisor.
- When the report is found to be satisfactory, advisor and secondary reader will clear the student for graduation.

Appendix C: Sample Course Planner (Instructor or schedule may vary, please verify schedule in Ceasar)

Fall Quarter		
Course	**Instructor**	**Time Schedule**
CIVENV 376, Intro. to Transportation Engineering	Nie	MW 8-9:50
CIVENV 471, Transp. Systems Planning and Management	Stathopoulos	MW 2-3:50 F (Lab) 2-3:50
CIVENV 517-1, SEMINAR IN TRANSPORTATION ENGINEERING	CHEN	TH 3:30-5
Additional courses (select 2)		
ECON 281-0, Introduction to Applied Econometrics	Lewis	MWF 12- 12:50 PM
IEMS 313, Deterministic Models & Optimization	Wilson	MWF 11-11:50, M 4-4:50
IEMS 450-1, Mathematical Programming	Nohadani	MW 12:30-1:50
IEMS 401, Intermediate Statistics	Apley	MW 11-12:20
Econ 355, Transportation Economics and Public Policy	Savage	MWF 11-12:20
CIVENV 303, Environmental Law and Policy	Harley	Th 3:30-6:20
CIVENV 368: Sustainability: Issues & actions, near & far	Gray	T: 3:30-6:20
CIVENV 306, Uncertainty Analysis	Chen	MWF 12-12:50, T 9-9:50
Econ 331, Economics of Risk and Uncertainty	Siniscalchi	TTh 2-3:20
Econ 480-1, Introduction to Econometrics	Manski	TTh 1:00-2:50, F 9-10:50
PROJ_MGT 487: Management of Operations in Transportation	Audenard	F 3-5.45
CompSci-337 Intro to natural language processing	Birnbaum	MW 3:30-4:50 MW
Other electives: In EECS, Statistics, IEMS, Applied Math, Math, Economics. For example, Econ 309, 310, 326. IEMS 415, 464.		

Winter Quarter		
Course	**Instructor**	**Time Schedule**
CIVENV 480-1, Travel Demand Modeling I	Stathopoulos	MW 2-3:50
CIVENV 483, Infrastructure Systems Analysis	Durango-Cohen	TTh 9:30-10:50 (Lab: F 10:00-10:50)
CIVENV 517-2, Seminar in Transportation Engineering	Chen	Th 3:30-5

Data Science for Urban Systems (CIV_ENV 374)	Chen	MW 10:00 -10:50am, F 11:00 - 11:50am
Elective: HISTORY 322-2 Development of the Modern American City: 1880-Present; Introduction to Stochastic Simulation (IEMS 435), others in EECS/Stats/IEMS/Applied Math/Economics		

Spring Quarter		
Course	**Instructor**	**Time Schedule**
CIVENV 471-1, Transportation Systems Analysis-1	Nie	MW 2-3.50
CIVENV 473-0, Choice Modeling in Engineering	Stathopoulos	MW 10-11.50
CIV_ENV474: Data Analytics for Urban Systems	Chen	Th 9:00-11:50
COMP-SCI: Social Network Analysis 3:30-6:20 Th	Contractor	3:30-6:20 Th
CIVENV 517-3, Seminar in Transportation Engineering	Chen	Th 3:30-5
Electives: EECS/Stats/IEMS/Applied Math/Economics or others depending on advisor's approval		