

NORTHWESTERN UNIVERSITY MASTERS OF SCIENCE PROGRAM IN TRANSPORTATION SYSTEMS ANALYSIS AND PLANNING (2026-2027)

Track		1 st Quarter/Fall	2 nd Quarter/Winter	3 rd 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 (CIV_ENV 480-1 ¹)	Choice Modeling in Engineering (CIV_ENV 377)
			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 313²) • Mathematical Programming (IEMS 450-1²)	• Mathematical Programming (450-2)	
	Track 2: Data Science for Transportation	• Intermediate statistics (IEMS 401) • Stochastic models and simulation (IEMS 315) • Uncertainty analysis (CIV_ENV 306) • Statistical Methods for Data Mining (IEMS 304)	• Statistical Learning (IEMS 402) • Data Science for Urban Systems (CIV_ENV 374)	• Statistical Learning (IEMS 402) • Social Network Analysis (COMP-SCI 341)
	Track 3: Transportation Economics and Policy	• Microeconomics (Econ 310) • Transportation Economics and Public Policy (ECON 355) • Supply-Chain Modeling and Analysis (IEMS 381³) • Intro to Econometrics (ECON 480)	• Urban Politics (POLI_SCI 321-0-20) • Climate and Energy - Law and Policy (CIV_ENV 309)	

Overall structure	For MS Students: - The program requires 12 course units, attendance in the Seminar series, and a writing requirement (see Appendix A). For the electives, we encourage students to take courses in areas of their professional interest (Appendix B). For PhD Students: - 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. We encourage students to take advanced courses to build research skills (see Appendix B for examples). - PhD students must take the “Seminar in Responsible Conduct for Research” in year 1. Each student is assigned a 1st year academic advisor to ensure they have mentoring throughout. Then by the time of candidacy, PhD students need to select a research advisor for the rest of their dissertation work (this may or may not be the same person as the 1st year advisor).
MS Writing requirement	Please see Appendix A 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 The students are recommended to take one of the two courses that cover optimization. While both courses cover optimization, IEMS 313 is more suitable for those who do not have a strong background in this area. IEMS 313 is offered every quarter	

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

Fall Quarter		
Course (bold=required courses)	Instructor	Time Schedule
CIV_ENV 376, Intro. to Transportation Engineering	Nie	TTh 2:00-3:50
CIV_ENV 471, Transp. Systems Planning and Management	Stathopoulos	MW 2-3:50 F (Lab) 2-3:50
CIV CIV_ENV ENV 517-1, Seminar in Transportation Engineering (zero credit)	Chen	Th 3:30-5 (NUTC)
<i>Additional courses (select 2)</i>		
IEMS 313-0 - Foundations of Optimization	Morton, Jiang	MWF 11:00AM - 11:50AM
Econ 355, Transportation Economics and Public Policy	Savage	MWF 11-12:20
IEMS 450-1: Mathematical Programming	Nohadani	MW 12:30-1:50
IEMS 401: Intermediate Statistics	Apley	MW 11-12:20
IEMS 381: Supply-Chain Modeling and Analysis (prereq. IEMS 313)	Watson	TTH 12:30-1:50 (Lab: F 2:00, 3:00)
CIV_ENV 368: Sustainability: Issues & actions, near & far	Gray	T: 3:30-6:20
CIV_ENV 306, Uncertainty Analysis	Chen	MWF 12:00-12:50, T 12:30-1:20
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
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.	Lewis	MWF 12- 12:50 PM
Other electives: In EECS, Statistics, IEMS, Applied Math, Math, Economics. For example, Econ 309, 310, 326. IEMS 415, 464.		

Winter Quarter		
Course (bold=required courses)	Instructor	Time Schedule
CIV_ENV 480-1, Travel Demand Modeling I (required)	Stathopoulos	MoWe 1:00PM - 2:50PM
CIV_ENV 483, Infrastructure Systems Analysis (required)	Durango-Cohen	TTh 9:30-10:50 (Lab: F 10:00-10:50)
CIV_ENV 471-1Transportations Systems Analysis I	Omer Verbas (ANL)	TBD (possible Tu 3:00PM - 5:50PM)
CIV_ENV 517-1, Seminar in Transportation Engineering (zero credit)	Chen	Th 3:30-5
<i>Additional courses (select 1)</i>		
IEMS 313-0 - Foundations of Optimization	Morton, Jiang	MoWeFr 11:00AM - 11:50AM Lab Mo 2:00PM - 2:50PM
Data Science for Urban Systems (CIV_ENV 374)	Chen	MW 10:00-10:50 (Lab: F 11:00-11:50)
CIV_ENV 309-0: Climate and Energy - Law & Policy	Harley	F 4:00-6:50
COMP_SCI 374-0 - Causal Graphical Models	Zach Wood-Doughty	TuTh 9:30AM - 10:50AM
COMP_SCI 349-0 - Machine Learning	Zach Wood-Doughty	TuTh 3:30PM - 4:50PM
SOCIOL 438-0 - Computational Content Analysis Collapsible section	Oscar Stuhler	Tu 9:30AM - 12:20PM
Elective: Introduction to Stochastic Simulation (IEMS 435), others in EECS/Stats/IEMS/Applied Math/Economics		

Spring Quarter		
Course (bold=required courses)	Instructor	Time Schedule
CIV_ENV 473-0 Choice Modeling in Engineering	Stathopoulos	MW 10-11.50
CIV_ENV 474: Data Analytics for Urban Systems	Chen	Th 9:00-11:50
CIV_ENV 517-3, Seminar in Transportation Engineering (zero credit)	Chen	Th 3:30-5
<i>Additional courses (select 1)</i>		
CIV_ENV 499 Independent research credits		
IEMS 305: Foundations of Modern Machine Learning (prereq: A prior course in statistics at the level of IEMS 304)	Shi	TTH 9:30-10:50 Shi
IEMS 350: Humans, AI, and Decision-making	Contractor	T 5:00-7:50 Contractor
COMP-SCI 341: Social Network Analysis	Contractor	Fr 12:00PM - 12:50PM Fr 3:00PM - 3:50PM
Electives: EECS/Stats/IEMS/Applied Math/Economics or others depending on advisor's approval		

Graduate Student FAQ

PhD students:

- **Q.** If a PhD student wants to take 5 credit courses in a quarter, can they? Is there some cost?
 - **A:** Students who wish to register for more than four units in a quarter are required to complete a [course overload petition form](#). The petition should include: 1) the academic rationale for the overload; 2) the course subject, catalog number, and class number; and 3) signatures from the student's adviser and director of graduate studies. Students should email the completed form to gradservices@northwestern.edu
- **Q:** When should the overload petition be submitted?
 - **A:** Ideally before the quarter begins or during registration week to avoid enrollment delays.
- **Q:** Can PhD students take courses outside their department?
 - **A:** Yes, with adviser approval and if the course aligns with research or training goals.
- **Q.** How does a PhD students register for independent research credit **499**?
 - **A:** First, discuss with a selected adviser about the timing and content/scope for the research credit. This ensures that project scope and deliverables are agreed upon, and that an advisor is willing to supervise you for the quarter. The 499-credit can be a way to get research exposure and get to know the PIs in the transportation program. It's recommended to take the 499 credit in winter or spring quarter, since it builds on training acquired earlier in the program.
 - Complete the [Independent Study Agreement Form](#) and submit it to your adviser for approval.
 - Obtain the permission number from Logan Hart and then register in CAESAR.
 - CEE499 is a graded 1-unit course.
- **Q.** PhD students do not need to do the CEE-508 paper requirement to get their MS degree approved, correct?
 - **A by Logan:** To my understanding, that's correct, since their PhD will be ending in a thesis anyway

MS students

- **Q.** If an MS student wants to take >4 credits in a quarter? If they take up to 5 credits is there an extra cost?
 - **A:** MS students incur additional tuition if enrollment exceeds 4 units in a term. For TGS, anything above 4 units counts as a course overload and requires the process above
- **Q.** how does an MS students register for **499 (Independent Study)**
 - **A:** 499 courses require a permission number from the department or instructor.
 - Enrollment requires a form outlining:
 - Project title and description
 - Learning objectives
 - Deliverables (e.g., report, presentation)
 - Faculty adviser signature
 - Submit to your instructor/advisor for approval before registration in CEASAR.

- **Q.** How many credits of 499 can MS students count towards their degree?
 - **A:** MS students can count **two instances of 499** courses towards their course requirements. Each instance counts as one of the 12 required courses, regardless of credit load. These 499 courses must be taken in different quarters.
- **Q.** Can I do a 'thesis option' for my MS degree in transportation.
 - **A:** Yes, in this case you would take the 12 courses, and then take an additional quarter to complete a CEE-508 credit (which would be your thesis) + CEE-512 to maintain full-time status
- **Q.** MS cannot fall below 3 credits per quarter if they want to stay in full-time status, correct?
 - **A:** Correct, only 3 or 4 units is considered full-time.
 - Master's students who have the program's approval to study on a part-time basis may meet the minimum coursework requirement by registering in one or two course units per quarter.
 - International students must obtain approval from OISS as well so they can be part-time but maintain their visa.
- **Q:** Can MS students take courses outside their program?
 - **A:** Yes, but they should confirm with their adviser that the course counts toward degree requirements.

Additional Notes

- **International Students:** Must maintain full-time status unless approved for part-time by OISS.