Undergraduate Minor in Transportation and Logistics

- An interdisciplinary program available to all Northwestern undergraduates from any undergraduate school.

- Administered by Northwestern’s renowned Transportation Center – one of the country’s most prestigious academic and research centers dedicated to the study of transportation and logistics.

Students pursuing the Transportation and Logistics Minor will have . . .

- access to numerous **transportation and logistics-related courses** available in a variety of schools and departments across campus taught by faculty who are recognized experts in their fields.

- personalized academic **advising** by senior faculty

- opportunities for involvement in exciting transportation **research** projects

- access to highly specialized **career counseling** and numerous **job opportunities** with top companies

- membership in the NU **Transportation Club** - and involvement in all of its activities including field trips, executive luncheons, speaker events and social activities

- opportunities to attend **research seminars** and presentations at the Transportation Center

- **interaction** with fellow **undergraduates** interested in transportation and logistics, and the Transportation Center’s **faculty, graduate students and alumni/alumnae**
The Transportation and Logistics Minor

*Interdisciplinary Cross-School accredited Minor available to all Northwestern Undergraduates*

Passenger and freight transportation represents nearly a fifth of the United States Gross Domestic Product and influences every aspect of our lives: where we live, where we work and the goods we purchase. The study of transportation and logistics is inherently interdisciplinary, reaching across disciplines, schools and departments.

Northwestern offers relevant courses through the Department of Civil and Environmental Engineering and the Department of Industrial Engineering and Management Science in the McCormick School of Engineering and Applied Sciences, and the Department of Economics and other social science departments in the Weinberg College of Arts and Sciences.

The Minor offers undergraduate students the opportunity to obtain a more rounded education in transportation and logistics compared with that offered within their selected major program of study. The curriculum equips students with a broad understanding of the economics, engineering and operations of transportation and logistics systems and the role of public policy.

The Minor is administered by the **Transportation Center**, an interdisciplinary research center founded in 1954. The Center has been recognized for decades as a leader in graduate education, and now extends this expertise to undergraduates. The Center has affiliated faculty from many of the participating departments.

For more information on the Transportation Center, go to our web site at:

http://transportation.northwestern.edu
Degree Requirements

Students are required to complete **seven** of the courses listed below (at a grade of C- or better), of which:

- **one** is a required course (Trans 310 -- a seminar course taken in the senior year)

- at least **three** must be from the list of core courses, or which two must be from Departments other than that in which they are majoring.

- the remainder may be additional core courses or from the list of approved elective courses. Courses offered by Northwestern University that are not listed here will be considered for credit towards the Minor if the course is appropriate to the student's program of study.

**At least two courses of the core or elective courses must be outside the school in which the student is registered.**

- Students in the McCormick School of Engineering and Applied Science may double count a maximum of two courses from their major program toward the Minor.

- However, students registered in other schools are not allowed to "double count" courses which are part of their major, but can count courses that form “related courses,” or “distribution” requirements.

- The McCormick School of Engineering and Applied Science has approved TRANS 310 as acceptable for the “social science/humanities” requirement. In addition, TRANS 310 and other WCAS courses taken as part of the Minor will be considered as “thematically related” for purposes of the “social science/humanities” requirement.

In preparation for taking the minor, students should have taken courses in:

- calculus
- probability and statistics.
Curriculum

In the listing of courses the following abbreviations identify the school and department.

**WCAS - Weinberg College of Arts and Sciences**
- BUS_INST  Business Institutions
- ECON  Economics
- ENVR_SCI  Environmental Sciences
- GEOG  Geography
- HISTORY  History
- POLI_SCI  Political Science
- SOCIOL  Sociology

**KSM - Kellogg School of Management**
- KELLG_FE  Financial Econ. Certificate

**MEAS - McCormick School of Engineering and Applied Science**
- CIV_ENV  Civil and Environmental Engineering
- IEMS  Industrial Engineering and Management Science

**Interschool Program**
- TRANS  Transportation Program

**Required Course**

TRANS 310  Seminar in Transportation and Logistics.

*Students will obtain one credit based on formal enrollment in the Spring Quarter of their senior year. However, class activities occur during the entire senior year. You must have taken at least five of the courses for the Minor by the time you formally enroll for the spring quarter.*

This capstone course is the culmination of the Minor. It will bring together the knowledge gained from other courses in the Minor and in their Major. Unlike the technical courses offered as part of the Minor, this course is designed to emphasize the relation of theory to the real world, and to recognize the interdisciplinary nature of the degree. There are three components to TRANS 310. Evaluation will be based on two extended papers and on class participation.

1. Seminar Attendance

During the senior year, students should attend 27 hours of approved lectures, seminars and other related activities. This would be equivalent to the time in lectures in a regular course. There will be group seminars about five times each quarter for an hour each time. Some of these sessions will comprise of a discussion of a contemporary issue. Students will read materials beforehand and be prepared to lead the discussion. Other session will comprise presentation of students’ work on their two required papers.

In addition to the group seminars, students can also count towards the 27 hours any of the following: seminars in the various Transportation Center seminar series, other
Transportation Center special lectures and events, and other public lectures or conferences outside of Northwestern with the permission of the instructor.

2. Case Study Paper (due first week of Winter Quarter)

A descriptive case study of a particular transportation or logistics firm or industry, or of a public policy debate. The objective is for students to read and investigate the existing literature on a subject, and to organize and report on what they have learned in the form of a six-page paper. For this paper, there is no need for any original data analysis, but students will need to use analytical skills in interpreting and organizing the existing literature. Students are expected to look at multiple sources. The subject matter can be anything in the field of transportation and logistics. The deadline for submission of this paper is the end of the first week of Winter Quarter.

3. Research Paper (due in May)

An extended, analytical, paper that evaluates a specific public policy initiative or a business issue. While purely theoretical work is welcomed, it is likely that most papers will be empirical. TRANS 310 is not an honors program, so this is not a paper where you have to collect and analyze a large data set. However, this paper will usually involve some data collection and statistical or econometric analysis (fortunately, transportation and logistics does have many easily accessible databases for the student to use). It is possible that this paper may be an analytical extension of the literature-review paper submitted earlier in the year, but this need not be the case. The paper will typically be about ten pages, exclusive of any tables and/or data appendices.

Students typically agree on the topic with the instructor of TRANS 310 in January and work on their papers during Winter and Spring Quarters. The deadline for submission is the eighth week of Spring Quarter.

In addition to the written paper, students will have the chance to make a brief presentation of their work to the faculty and other students. Typically, this occurs during WCAS Reading Period at the end of Spring Quarter.
Core Courses

Students must select at least three core courses, of which at least two are from Departments other than that in which they are majoring. No substitutions will be allowed for the core courses.

CIV_ENV 304 Civil and Environmental Engineering Systems Analysis
CIV_ENV 371 Introduction to Transportation Planning and Analysis
CIV_ENV-376 Transportation System Operations

ECON 310-1 Microeconomics
ECON 355 Transportation Economics and Public Policy (Econ 310-1 and ECON 281 or equivalent are prerequisites)

Either IEMS 310 Operations Research (for those wishing to take only one course in industrial engineering)

or IEMS-313 Foundations of Optimization (for IEMS Majors and those wishing to take additional IEMS courses, GEN_ENG 205-1 or MATH 240, and COMP_SCI 111 are prerequisites)

IEMS 381 Supply Chain Modeling and Analysis (IEMS 313 prerequisite)
IEMS 383 Service Operations Management (IEMS 313 prerequisite)

Elective Courses

The remainder of the program must be selected from additional core courses and the following list of approved elective courses. Courses offered by Northwestern University that are not listed here will be considered for credit towards the minor if the course is appropriate to the student’s program of study. Approval for substitutions will be made by the Transportation Center’s Program Committee based on a written submission made by the student.

Either CIV_ENV 205 Economics and Finance for Engineers (was IEMS 326)

or BUS_INST 304 Corporate Finance

or ECON 360-1 Foundations of Corporate Finance Theory

or KELLG_FE 310 Principles of Finance

CIV_ENV 330 Engineering Project Management
CIV_ENV 368 Sustainability: The City
CIV_ENV 387 Design of Sustainable Urban Developments

ECON 309 Public Finance
ECON 337 Economics of State and Local Governments
ECON 349 Industrial Economics
ECON 350 Monopoly, Competition and Public Policy
ECON 354 Issues in Urban and Regional Economics
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON 361</td>
<td>International Trade</td>
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<tr>
<td>ECON 371</td>
<td>Economics of Energy</td>
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<tr>
<td>ECON 372</td>
<td>Environmental Economics</td>
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<tr>
<td><strong>or</strong> ECON 370</td>
<td>Environmental and Resource Economics</td>
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<tr>
<td>ECON 373</td>
<td>Natural Resource Economics</td>
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<tr>
<td><strong>or</strong> ECON 370</td>
<td>Environmental and Resource Economics</td>
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<tr>
<td>ECON 381-1,2</td>
<td>Econometrics</td>
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<tr>
<td>GEOG 312</td>
<td>Geography of Chicago and its Region</td>
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<td>GEOG 341</td>
<td>Principles of Cartography</td>
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<td>GEOG 343</td>
<td>Geographic Information Systems</td>
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<tr>
<td><strong>or equivalent, such as</strong></td>
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<tr>
<td>ENVR_SCI 390-21</td>
<td>Geographic Information Systems Level 1</td>
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<td>HISTORY 322-2</td>
<td>Development of the Modern American City, 1870 - Present</td>
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<tr>
<td>IEMS 315</td>
<td>Stochastic Models</td>
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<td>IEMS 317</td>
<td>Discrete-Event Systems Simulation</td>
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<td>IEMS 365</td>
<td>Analytics for Social Good</td>
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<td>IEMS 382</td>
<td>Production Planning and Scheduling</td>
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<tr>
<td>POLI_SCI 321</td>
<td>Urban Politics (was POLI_SCI 221)</td>
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<tr>
<td>POLI_SCI 322</td>
<td>Ideas and Institutions in Urban Politics</td>
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<tr>
<td>POLI_SCI 329</td>
<td>U.S. Environmental Politics</td>
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<tr>
<td>SOCIOL 301</td>
<td>The City: Urbanization and Urbanism</td>
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<td><strong>Either</strong> SOCIOL 312</td>
<td>Social Change and the Environment</td>
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<td><strong>or</strong> SOCIOL 336</td>
<td>Climate Change, Policy, and Society</td>
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- **Graduate Level Courses**  *Qualified advanced students may take the following courses upon petition to the instructor and the Director of the Transportation and Logistics Program*

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CIV_ENV 471-1,2</td>
<td>Transportation Systems Analysis</td>
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<tr>
<td>CIV_ENV 472-1,2</td>
<td>Transportation Systems Operations and Control</td>
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<tr>
<td>CIV_ENV 473</td>
<td>Survey Methods, Data and Analysis</td>
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<tr>
<td>CIV_ENV 480-1,2</td>
<td>Travel Demand Analysis and Forecasting</td>
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<tr>
<td>CIV_ENV 482</td>
<td>Evaluation and Decision making for Infrastructure Systems</td>
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<td>CIV_ENV 484</td>
<td>Advanced Theories of Traffic Flow</td>
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<tr>
<td>IEMS 481</td>
<td>Logistics</td>
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<tr>
<td>IEMS 482</td>
<td>Operations</td>
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- **Independent Study**  *Students may count up to one credit of approved independent study in transportation and logistics towards the minor. The student may register in either TRANS 399, or a 399 in the department appropriate for the supervising faculty member.*
For More Information

- For academic advising, and to declare a Minor see the Program Director:

  Professor Ian Savage  
  Department of Economics  
  Room 3371  
  2211 Campus Drive  
  847-491-8241  
  ipsavage@northwestern.edu

- Contact an Associate Program Director in your department. These include:

  Civil & Environmental Engineering:  
  Professor Pablo Durango-Cohen (847-491-4008, pdc@northwestern.edu)

  Industrial Engineering and Management Science:  
  Professor Karen Smilowitz  
  (847-491-4693, ksmilowitz@northwestern.edu)