TRANSPORTATION SYSTEMS (PHD)

Civil and Urban Engineering Department (https://engineering.nyu.edu/academics/departments/civil-and-urban-engineering/)

NYSED: 08812 **HEGIS:** 0908.00 **CIP:** 14.0804

Program Description

The PhD in Transportation Systems is a research-oriented degree intended for those whose goal is a career in basic transportation research and/or teaching at the Institute level or in private research organizations.

Program Requirements

Students pursuing the PhD in Transportation Systems generally specialize in one of the following subject areas:

- Transportation planning
- Traffic engineering
- Intelligent transportation systems
- Transportation safety

Other focus areas are possible and can be developed with the help of faculty advisers. All subject areas, of course, must be relevant to the degree sought and have a faculty member willing and able to guide the student's research.

Admissions

To apply for admission to any Tandon graduate program, please contact the Office of Graduate Admissions (https://engineering.nyu.edu/admissions/graduate/).

Admission Criteria

Admission to the PhD in Transportation Systems requires an MS in Transportation Systems or equivalent, with a GPA of 3.5 or better (on a 4.0 scale).

All applicants are required to submit GRE scores for consideration. Foreign applicants must take the TOEFL examination and submit the results for consideration.

The "equivalent" of the MS degree can be achieved in several ways. The candidate may have an MS degree with a different title that covers substantially the same material. More generally, applicants must demonstrate that they have the equivalent of all undergraduate and master's level course work in order to pursue doctoral level work in the major area. Further, "equivalence" is evaluated based on the totality of the student's undergraduate and graduate record, not course-by-course.

Program Requirements

The PhD requires the completion of 75 credits, comprised of the following:

Course	Title	Credits
Major Area Courses		
Select graduate courses in consultation with your academic adviser. [1]		33
First Minor Area Courses		
Select graduate courses in consultation with your academic adviser.		9
Second Minor Area Courses		
Select graduate courses in consultation with your academic adviser.		9
Qualifying Exam		
RE-GY 9990	PHD QUALIFYING EXAM [2]	0
Dissertation		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering (repeated, for credit) [3]	24
Total Credits		**75**

1. Courses cannot be selected from the School of Professional Studies for any requirement in the PhD program.
2. Students must pass the qualifying exam (QE) within 2 years of beginning the PhD program. The QE is the prerequisite to the dissertation.
3. After passing the QE, students will enroll in at least 3 credits of dissertation every fall and spring semester until graduation. The PhD requires a total of 24 credits of dissertation.

Additional Information and Requirements

Doctoral Committees

Upon admission, every PhD student is assigned an academic adviser, who is selected by the PhD committee. Any member of the civil engineering faculty can be an academic adviser to a graduate student. In cases where a student is supported on a research contract, the principal investigator of the contract would normally be appointed as the academic adviser for the student. Where a student has a particular research interest and is working with a particular faculty member, the student may request that the faculty member be appointed as academic adviser. In rare cases where a PhD student enters the program without a prior selection of a major area of study, the initial academic adviser will be the Graduate Coordinator of the transportation program.

In fulfilling their academic requirements, PhD candidates will deal with two advisory committees:

Academic Advisory Committee

The student's academic adviser works out a program of courses to fulfill major and minor requirements for the PhD. The Academic Advisory Committee generally will comprise the academic adviser and one faculty member for each minor area of study. The Academic Advisory Committee guides the PhD student's work through the successful completion of a qualifying examination. A letter signed by the academic adviser and approved by the department head is placed in the student's file, indicating the composition of the Academic Advisory Committee.

Dissertation Committee

The Dissertation Committee is formed immediately after the student passes the qualifying examination. It comprises a major adviser, a dissertation adviser and a minor adviser for each minor the student has pursued. Additional faculty members may also be on the Dissertation Committee. The Dissertation Committee may be the same as the Academic Advisory Committee, or may be different. The Dissertation Committee guides the student's course and research work after the student has passed the qualifying examination. The Dissertation Committee must be formally assigned and approved by the department head and filed with the Office of Graduate Academics. The major adviser must be a full-time faculty member of the Department of Civil and Urban Engineering. The major and dissertation adviser may be the same individual. Students should complete the *Request for Appointment*

or Reconstitution of Guidance Committee form found on the Graduate Academics website (https://engineering.nyu.edu/academics/graduate/graduate-student-forms/) to start the process of gathering a Dissertation Committee.

Doctoral Degree Requirements

To earn a PhD in Transportation Systems, the following requirements must be met:

- Completion of 51 credits of graduate work (not including the PhD dissertation) in relevant major and minor areas of study beyond the bachelor's degree, with an average grade of B or better (cumulative average of 3.0 or better).
- Completion and successful defense of a 24-credit dissertation related to the major area of study. Dissertations must consist of original research that meaningfully advances the state-of-art in the subject area of the research and should result in the publication of at least one paper in a strictly peer-reviewed technical journal related to the subject. A grade of B or better must be achieved for the dissertation.
- Completion of two minor areas of study, each consisting of between 9 and 12 credits of graduate work.
- Residency requirements for the PhD in Transportation Systems include the 24-credit dissertation. The dissertation advisor has to approve all transferred credits from other institutions.

In satisfying the 51-credit course requirement, the student must satisfy all requirements for the major and minor areas selected, or their equivalent.

In satisfying these basic PhD requirements, students must also satisfy one of the two following conditions:

- Completion of 39 credits of approved graduate course work, not including individual guided studies (readings, projects, theses, etc.) beyond the bachelor's degree, with a cumulative average of 3.5 or better.
- Completion of 21 credits of related graduate course work beyond the master's degree, with a cumulative average of 3.5 or better.

Satisfying condition 2 requires that the department accept the student's MS degree *in toto* without regard to its specific content. This requires a recommendation from the department's Graduate Committee and the approval of the department head.

Qualifying Examination

The PhD qualifying examination is designed to (1) assess student's fundamental knowledge about their sub-discipline of Transportation Systems, and (2) evaluate the student's ability to conduct PhD-level research, including the ability to approach open-ended questions, reason through complex problems, synthesize and analyze information, and articulate it to others. Students must inform their graduate adviser of the semester that they intend to take the exam. Any student who has been accepted into the PhD program is eligible to take the exam.

The exam consists of two parts: written and oral.

Part 1 - In-person Open-book Written Exam

The written exam is to be administered each year in May after the end of the spring semester (the specific date will be determined each year by the graduate adviser). Three subjects will be chosen by the student out of a set of four predetermined subjects. The predetermined subjects must correspond to courses offered at NYU Tandon that year. Predetermined subjects, questions, grading rubrics, and solutions will be decided and reviewed by each sub-discipline. Each subject exam will consist of multiple questions that can be completed over the course of an hour, for a total of a three-hour exam. Students will be proctored by a faculty member and will not be allowed to use internet-connected devices.

A passing grade of 70% is required in each subject. For any subject that a 70% or above is not achieved, the student must petition the graduate adviser for a second opportunity to take the subject exam (this does not guarantee permission), which should be administered within 3-months. The student will only be required to retake subjects that they did not receive a grade of 70% or above during an exam.

Part 2 - Structured Oral Exam

The oral exam is to be administered within three months of the student passing the written exam. After passing this exam, the student becomes a PhD Candidate.

The oral exam consists of a presentation of a research proposal to the PhD qualifying exam committee. The student will be provided a research topic one week prior to the oral exam, and will be asked to spend that time developing a research proposal that they will present to the committee. The research topic will be within the student's proposed field, but not directly related to their chosen research topic. The exam topic will be formulated by the PhD qualifying exam committee chair, and must be approved by all other members of the exam committee before it is provided to the student.

The oral qualifying exam committee will consist of no less than three committee members, with at least two members belonging to the CUE department. The exam committee will be determined by the exam committee chair (typically the student's PhD adviser).

The oral exam will consist of a 20-minute presentation of the student's proposal, during which they will approach the following questions:

- What is known about the research topic? Students should be able to identify at least three key publications on the topic and describe key findings -- these should be a mix of seminal works and significant recent breakthroughs. Students should be able to explain/replicate methods, experiments, mathematical proofs, and/or assumptions made in those key publications.
- What are research gaps related to the topic?
- What research question and objectives could be implemented to address the identified knowledge gaps? Students are expected to clearly state their research question(s) and hypotheses)
- What experimental methods could be implemented to answer the research question(s)?
- What are the expected outcomes of the research and why?

After the student's presentation, each committee member will be allotted up to 20 minutes to ask targeted questions based on the proposed research, or fundamental understanding related to the topics presented. Students will have access to a chalkboard or white board to write out or illustrate concepts.

The following categories provide a structured evaluation of the results to the PhD Qualifying Examination Committee:

- Pass: the student's performance in written and oral parts of the qualifying examination were satisfactory.
- Conditional pass/retake: the student's performance in the oral part of the qualifying examination was not satisfactory. The student will

be asked to take the oral exam again, or perform a set of conditions before being granted a passing grade. The committee will define the time frame for completion of the conditions or retake of the examination. A third attempt is rarely permitted only with written approval of the department Chair.

- Fail: the student's performance in the written and/or oral parts were not satisfactory. When a student fails the PhD qualifying exam, there is no option to retake the exam.

The qualifying exam may be taken home with permission from the program director.

Dissertation Proposal

Following passage of the qualifying examination and the appointment of a Dissertation Committee, the PhD candidate must submit a written Dissertation Proposal, outlining the subject of the proposed research. This proposal should be between 15 and 20 pages long and should address the following specific items:

- Description of the topic
- Literature review sufficient to insure that the work contemplated is original
- Research methodologies to be used
- Data and/or laboratory needs and their availability to the student
- Anticipated outcomes

The Dissertation Proposal must be submitted after one semester of registering full time for dissertation credits, or before 9 credits of dissertation credit are completed.

The Dissertation Proposal is orally presented and defended before the Dissertation Committee and other interested departmental faculty. The date of the oral defense and copies of the draft Dissertation Proposal must be made available to department faculty at least two weeks (14 calendar days) before the defense.

When the Dissertation Proposal is formally accepted, the Dissertation Adviser enters a letter into the student's graduate file, indicating this acceptance, with a copy of the proposal. While the Dissertation Committee has reasonable flexibility to modify the proposal during the research, any significant change in focus area or methodology requires that an amended Dissertation Proposal be written and formally accepted following the same procedure noted herein.

Dissertation Defense

The culmination of the student's PhD work is the oral presentation and defense of the final draft dissertation. A defense is generally scheduled after the Dissertation Committee has reviewed the draft dissertation and determined that it is complete and of sufficient quality to be presented and defended. By this time, it is also required that a paper based on the dissertation has been submitted to a peer-reviewed journal for publication, details to be worked out with the dissertation adviser.

The defense is organized and scheduled by the Dissertation Committee. All Institute faculty members are invited to observe and ask questions at all NYU Tandon dissertation defenses. Therefore, the date of the defense must be announced Institute-wide at least one month before the event, and copies of the draft dissertation must be available to any faculty member requesting one in a timely fashion and in no case less than two weeks before the defense. The defense of the final draft of the student's dissertation must take place in-person at the Brooklyn campus.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
TR-GY 6333	Transportation & Traffic Concepts, Characteristics & Studies (major area course)	3
TR-GY 6343	Traffic Operations & Control (major area course)	3
TR-GY 7013	Urban Transportation & Logistics Systems (major area course)	3
	Credits	**9**
2nd Semester/Term		
TR-GY 6013	Fundamental Concepts in Transportation (major area course)	3
TR-GY 6053	Transportation Economics and Finance Fundamentals (major area course)	3
1st Minor Area Course		3
	Credits	**9**
3rd Semester/Term		
1st Minor Area Course		3
1st Minor Area Course		3
2nd Minor Area Course		3
	Credits	**9**
4th Semester/Term		
TR-GY 6113	Forecasting Urban Travel Demand (major area course)	3
2nd Minor Area Course		3
2nd Minor Area Course		3
RE-GY 9990	PHD QUALIFYING EXAM	0
	Credits	**9**
5th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
Major Area Course		3
	Credits	**6**
6th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
Major Area Course		3
	Credits	**6**
7th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
Major Area Course		3
	Credits	**6**
8th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
Major Area Course		3
	Credits	**6**
9th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
Major Area Course		3
	Credits	**6**
10th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
	Credits	**3**
11th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
	Credits	**3**

12th Semester/Term		
TR-GY 999X	PHD Dissertation in Transportation Planning & Engineering	3
	Credits	**3**
	Total Credits	**75**

Learning Outcomes

Upon successful completion of the program, graduates will:

1. Develop a strong and deep fundamental knowledge about the profession of transportation planning and engineering.
2. Develop the knowledge and skills to perform independent fundamental research in transportation planning and engineering.
3. Produce fundamental research that meaningfully advances the state-of-the-art of the profession of transportation planning and engineering.

Policies

Program Policies

Transfer Credit Policy

Transfer credits for PhD students can be awarded course by course. Alternatively, an MS degree from another institution may be accepted for transfer in toto, as a blanket 30 credits. The latter requires a recommendation from the department's Graduate Committee and the approval of the department head. Transfer credits are awarded generally at the time of admission and must be approved by the academic adviser, the transportation graduate coordinator, and the department head.

NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

Tandon Policies

Additional academic policies can be found on the Tandon academic policy page (https://bulletins.nyu.edu/graduate/engineering/academic-policies/).