Graduate Tracks

TRANSPORTATION ENGINEERING

Transportation engineering considers the planning, design, management, and operations required to provide safe, convenient, and cost effective movement of people and goods. The graduate program in Transportation Engineering offers courses and research opportunities for students wishing to pursue a career in transportation engineering, transportation systems, or quantitative transportation planning. Much of the program's strength comes from an interdisciplinary network of faculty and students. In addition to the core transportation group in civil, environmental and geodetic engineering, interactions in coursework and research are found with city and regional planning, geography, statistics, electrical and computer engineering, aviation, and industrial and systems engineering.

Courses focus on methods and applications in demand modeling and forecasting, network modeling, urban transportation planning, transit planning and operations, traffic flow theory, real-time traffic management, infrastructure management, data collection and processing, traffic engineering, and facility design. Example courses can be found below in Tables A and B. MS students will typically take 6+ credits from Table A, 6+ credits from Table B, and 3+ credits from the list of Math courses. PhD students will typically take 12+ credits from Table A and 8+ credits from Table B. In conjunction with faculty advisors, students also select additional courses to fill out a cohesive graduate program.

Research

Examples of current research projects include:

- The use of automated sensing in transit performance monitoring, service planning, and operations control
- Traffic monitoring from conventional detectors and emerging sensors
- Advanced traffic flow theory development from high-resolution empirical data sets
- Measurement and modeling of urban passenger travel criteria pollutant and greenhouse gas emissions
- Transportation infrastructure inspection, deterioration modeling, and maintenance
- Airport design and air transportation systems
- Measurement and modeling of traveler satisfaction and mode choice from mobile phone data and GPS

Facilities

Resources include physical facilities and datasets spanning multiple areas of surface transportation. Several examples follow and many of these resources are unique to OSU.

- The OSU Campus Transit Lab (CTL) http://transitlab.osu.edu/campus-transit-lab/ is based on a transit network of more than 30 route-miles served by a fleet of around 40 buses, where extensive data on passenger demand and vehicle activity are collected via automatic sensors and field surveys.
- A probe vehicle instrumented with DGPS and inertial navigation sensors for positioning and a total of 7 radar and LIDAR sensors to classify and monitor ambient vehicles on the roadway.
- Extensive complementary databases, including 10 years of individual vehicle actuation data from 70 loop detector stations on the Columbus Freeway system, and multi-year archives of automatic vehicle location (AVL) data from various public and private fleets.
- Access to The Ohio State University Airport and Center for Aviation Studies, supporting aviation systems and facilities design research (http://aviation.osu.edu, http://osuairport.org).
- State-of-the-art computing facilities.

Faculty

André Carrel, PhD, University of California at Berkeley (data analytics for Smart City applications, travel demand management, transit operations, freight and logistics systems), Email: carrel.20@osu.edu.

Benjamin A. Coifman, PhD, University of California at Berkeley (Intelligent Transportation Systems, traffic flow theory, traffic monitoring), Email: coifman.1@osu.edu.

Frank M. Croft, PhD, P.E., Clemson University (traffic engineering, highway location and design), Email: croft.3@osu.edu.

Mark R. McCord, PhD, Massachusetts Institute of Technology (transportation planning under uncertainty, applications of remotely sensed data), Email: mccord.2@osu.edu.

Rabi G. Mishalani, PhD, Massachusetts Institute of Technology (system analysis, transit planning and operations, real-time transportation network management, infrastructure monitoring and maintenance), Email: mishalani.1@osu.edu.

Seth B. Young, PhD, University of California at Berkeley (airport planning and design, aviation systems), Email: young.1460@osu.edu.

Funding

Funding is available to support graduate education through Graduate Research Assistantships (GRAs), University and Department Fellowships, and other mechanisms. Applications for admission to the program and for financial aid are made to the Civil Engineering graduate program. Admission decisions are made by the department's admissions committee, and financial aid decisions are made collectively by the transportation faculty. Both admission and financial aid decisions are based on the overall quality of the applicant and a clearly articulated interest in transportation.

Interdisciplinary Programs

The transportation systems and engineering group actively supports interdisciplinary studies where collaborative opportunities exist with many departments across campus. Current examples include:

- The Dual Master's Degree in Urban Transportation Planning discussed at the end of this document.
- Several students pursue a minor or second degree in statistics or Electrical and Computer Engineering.

COURSE OFFERINGS:

TABLE A	Title	Credits
CIVILEN 7730	Transportation Demand Modeling	4
CIVILEN 7740	Urban Transportation Network Analysis	4
CIVILEN 7760	Transportation Management Systems	3
CIVILEN 7770	Infrastructure Systems Analysis	3
TABLE B		
CIVILEN 5001	Introduction to Geographic Information Systems	4
CIVILEN 5300	Airport Planning, Design, and Development	3
CIVILEN 5700	Urban Transportation Demand Forecasting	3
CIVILEN 5720	Transportation Engineering Data Collection Studies	3
CIVILEN 5730	Highway Location and Design	3
CIVILEN 5740	Design and Operation of Road Traffic Facilities	3

CIVILEN 5750	Instrumentation, Signals, and Control in Transportation Applications	3
CIVILEN 5760	Network Metrics and Control in Transportation Systems	3
CIVILEN 5770	Urban Public Transportation	3
CRPLAN 6810	Non-motorized Transportation Planning	3
GEOG 5300	Geography of Transportation	3
GEOG 5301	Sustainable Transportation	3
ISE 5200	Linear Optimization	3
ISE 6200	Fundamentals of Optimization	3
MATH (MS only)		
STAT 6201	Mathematical Statistics	4
STAT 6301	Probability for Statistical Inference	3
STAT 6450	Applied Regression Analysis (OR ECON 5410 Econometrics I)	4
ECON 5410	Econometrics I (OR STAT 6450 Applied Regression Analysis)	3
MATH 5603	Numerical Linear Algebra	3

Dual Master's Degree in Urban Transportation Planning

The transportation program supports a long-standing dual master's degree in Urban Transportation Planning, administered jointly by the Civil Engineering (CE) and City and Regional Planning (CRP) programs. The CE-CRP Dual Degree program provides an integrated, interdisciplinary curriculum that simultaneously leads to MSCE and MCRP degrees in less time than would be required if each degree were pursued separately. Knowledge of calculus, statistics, and physics, and some familiarity with computer software are required, although some of these requirements could be satisfied concurrently within a student's program of study.

Application to the Dual Degree program should occur after admission to either the Civil Engineering or City and Regional Planning master's program, early in the student's graduate program. With the application, a plan of study should be completed with approval of at least one transportation faculty member in the Civil Engineering program and at least one transportation faculty member in the City and Regional Planning program. The plan of study should include the following CE courses (see Tables A and B above): CE 5700, CE 5720, CE 5770, CE 7730, CE 7740, CE 7790, plus one Math course approved by the CE program advisor. Additional required courses are specified by the CRP program. Successful completion of a comprehensive examination or a thesis is required by each degree program.

Students interested in the Dual Degree program should contact Professor Mark McCord (mccord.2@osu.edu) for further information.

Graduate Applications: To be considered for admission, you must first apply to the University. Applications are available at http://gpadmissions.osu.edu/apply/grad.html. For additional information, contact Mary Leist, leist.48@osu.edu, 614/ 292-2005.