GRADUATE EDUCATION IN
TRANSPORTATION

IOWA STATE UNIVERSITY
Students interested in transportation-related graduate studies will find stellar resources at Iowa State University (ISU):

- nationally renowned faculty
- a university-based transportation research and education center
- state-of-the-art laboratories, computing facilities, and communications networks
- flexible degree programs
- unique transportation conferences and seminars
- working partnerships with local, state, and federal transportation agencies and private industry

Facilities and resources

Center for Transportation Research and Education (CTRE)

CTRE is ISU’s focal point for transportation research, education, and public service. The center has a full-time staff of 25 and supports as many as 100 undergraduate and graduate students in several disciplines. CTRE has three divisions:

- Advanced Transportation Technology specializes in intelligent transportation systems (ITS), especially as they are applied in commercial vehicle operations.
- Transportation Planning and Information Systems manages a state-of-the-art laboratory for geographic information systems (GIS) applications in transportation.
- Outreach manages, among other programs, the Federal Highway Administration-sponsored Local Technical Assistance Program for Iowa.

A fourth division, Infrastructure Development and Design, will be added soon.

www.ctre.iastate.edu/

Iowa Department of Transportation (DOT)

Originally located on the ISU campus, the Iowa DOT maintains a synergistic working relationship with the university. The department provides programmatic support for the Center for Transportation Research and Education, and CTRE conducts significant research and development work for the Iowa DOT, providing assistance in developing new initiatives, gathering information, and providing technical advice. This unique arrangement provides an excellent learning community for students. The Iowa DOT has also entered into an umbrella research agreement with ISU that streamlines the contractual process for new research projects. The Iowa DOT manages an excellent transportation library and keeps copies of many specialty publications, which ISU students and staff may access.

www.state.ia.us/government/dot/index.html

Faculty

ISU has more than 35 faculty members whose principal research activities focus on some aspect of transportation. Many of these faculty have transportation-related specialties within civil and construction engineering (CCE) in the College of Engineering, community and regional planning in the College of Design, or transportation and logistics (T&L) in the College of Business—the largest business college-based transportation program in the Midwest.

Dr. Robert E. Abendroth, Associate Professor of CCE; Ph.D., 1983, Wisconsin
Dr. Fouad S. Fanous, Professor of CCE; Ph.D., 1982, Iowa State
Dr. Lowell F. Greimann, Professor of CCE, Chair of the Department; Ph.D., 1968, Colorado
Dr. F. Wayne Klaiber, Professor of CCE, Distinguished Professor in Engineering; Ph.D., 1968, Purdue
Dr. Max L. Porter, Professor of CCE; Ph.D., 1974, Iowa State
Dr. Terry J. Wipf, Professor of CCE, Manager of Bridge Engineering Center; Ph.D., 1983, Nebraska–Lincoln

Bridges and transportation structures
- epoxy-coated strands in composite precast prestressed concrete panels
- traffic management strategies for merge areas in construction zones
- quality-based performance rating of contractors (National Cooperative Highway Research Program)
- recruiting women and minorities in public sector engineering positions
- motor carrier scheduling and driver fatigue
- effects of real-time 3-D graphics in driving simulation
- field testing integral abutments
- rural interstate safety and traveler information system
- Des Moines community outreach partner project
- improved computer program for river valley rating curves
- performance-based specifications for portland cement concrete embankment quality
- loading and unloading practices related to lumping
- advanced technology maintenance vehicle benchmarking for Iowa DOT construction offices
Materials Analysis Research Laboratory (MARL)
MARL conducts materials analysis, primarily focusing on materials for concrete pavements. Much of its modern equipment, including a low-vacuum scanning electron microscope, was purchased with funding from ISU and the Iowa DOT. www.marl.iastate.edu

Bridge Engineering Center
Researchers at the center study the design, behavior, repair, and rehabilitation of highway and railroad bridges. They work closely with the Iowa DOT and national transportation agencies and offer short courses and seminars on bridge inspection and rehabilitation for engineering professionals.

Structural engineering laboratory
The structures laboratory in the Department of Civil and Construction Engineering typifies ISU’s advanced facilities for transportation-related research. Consisting of five rooms, the lab includes an 80-by-50-foot main testing area. The 80-by-25-foot tie-down floor has a load capacity in excess of one million pounds. The lab is equipped with a 20-ton overhead crane. Electronic and computer equipment is available for controlling experiments and data logging. A remote facility contains 6,900 square feet of additional test space.

Asphalt research and teaching laboratory
A 1998 match gift from the Asphalt Paving Association of Iowa has equipped the Department of Civil and Construction Engineering’s asphalt research lab with new equipment to conduct research using Superpave, the state-of-the-industry process for designing and analyzing performance-based asphalt mixtures. This new equipment, in conjunction with more conventional asphalt testing tools, gives the laboratory a significant capability to undertake basic research into asphalt binders and mixtures.

Geographic information systems for transportation (GIS-T) laboratory
The GIS-T lab, located in the Center for Transportation Research and Education, represents a significant resource in terms of computer and peripheral hardware and software, including Intergraph work stations, color plotters, a Novell network, and a wide variety of state-of-the-art software: relational databases, programming software, CADD and travel demand modeling programs, and several desktop and full-function GIS programs.
- counting aircraft operations at non-tower airports
- application of genetic algorithms to determine optimal driver/vehicle performance
- maximizing use of roadway weather information systems
- preventing cracking at diaphragm/plate girder connections in steel bridges
- virtual prototyping of driver display designs
- traffic control policies for pavement edge drop-off in construction zones
- impact of air service on economic development
- mix time's relationship to portland cement concrete consistency and consolidation
- human in the loop helicopter simulation
- multimodal investment analysis
- maturity measurements to make decisions regarding pavement strength
- evaluation of thin bonded overlays
- statewide pavement management system
- computer-aided parametric planning
- vibrator performance's relationship to concrete consolidation
- electronic data interchange use in motor carrier industry
- transportation asset management
Geotechnical engineering laboratory
The Department of Civil and Construction Engineering's geotechnical research facilities at ISU include equipment for index tests and engineering classification of soils and aggregates as well as permeability, strength, and stress-strain characterization. The lab has both low stress and conventional triaxial test equipment, large scale and standard direct shear testers, and consolidometers. In addition to both standard size rigid and flexible wall permeameters, the facility includes a large scale permeameter.

Hydraulics laboratory
The Department of Civil and Construction Engineering maintains a hydraulics and water resources laboratory. The lab has a 30-by-2-foot Plexiglas tilting flume for experimental work on hydraulics issues related to transportation. Scale models of transportation related structures can be tested to determine their hydraulic performance before the full-scale structure is built.

Surveying facilities
The Department of Civil and Construction Engineering operates a photogrammetry laboratory with analogue, analytical, and digital photogrammetric equipment; a geodesy laboratory with diverse kinds of geodetic surveying equipment and models for advanced geodetic surveying instructions; and a surveying laboratory, with access to several monuments in central campus and in the civil engineering outdoors instruction field for curve setting and topographic map exercises.

Synthetic environments laboratory
ISU's "C2" is one of the world's most advanced computer virtual reality rooms, enabling researchers to study a wide variety of subjects using computer-simulated environments. C2 can be used to create artificial driving environments, thus allowing researchers to test the response of humans to vehicle and roadway design and to vehicle features without placing subjects in physical peril.

www.icemt.iastate.edu/about/otherLabs/index.html

Parks Library
The university library offers a comfortable, friendly environment with more than four million holdings, including an extensive collection of periodicals, government publications, reference materials, and audiovisual resources. The library has a large collection of transportation publications and essential transportation and engineering literature search engines. www.lib.iastate.edu/

Highway construction
Dr. Mark O. Federle, Associate Professor of CCE; Ph.D., 1990, Michigan
Dr. Charles T. Jahrens, Assistant Professor of CCE; Ph.D., 1987, Purdue
Dr. Edward J. Jaselskis, Associate Professor of CCE; Ph.D., 1988, Texas
Dr. James E. Rowings, Jr., Associate Professor of CCE; Ph.D., 1982, Purdue
Dr. Gary Smith, Associate Professor of CCE; Ph.D., 1986, Purdue

Highway hydraulics and hydrology
Dr. T. Al Austin, Professor of CCE, University Professor; Ph.D., 1971, Texas Tech
Dr. Ruochuan Gu, Assistant Professor of CCE; Ph.D., 1991, Minnesota
Dr. Larry L. Northup, Professor of CCE; Ph.D., 1967, Iowa State

Dynamics and controls
Dr. James Bernard, Professor of Mechanical Engineering, Director of the Center for Emerging Manufacturing Technology; Ph.D., 1971, Michigan
Dr. Julie Dickerson, Assistant Professor of Electrical Engineering; Ph.D., 1993, Southern California
Dr. Hung Anh Pham, Assistant Professor of Mechanical Engineering; Ph.D. 1996, California–Berkeley
- TQM in design and construction of transportation facilities
- Impact of bridge deck cracking on durability
- Developing controls and sensing systems for autonomous vehicles
- State DOT management techniques for materials and construction acceptance (National Cooperative Highway Research Program)
- Field data collection and reporting for construction projects
- Developing thin maintenance surface for Iowa's roadways
- Cold-in-place asphalt recycling
- Highways construction benchmark data
- GIS at the Iowa Department of Transportation
- Real-time microwave asphalt pavement quality sensor
- Orientation angles of an aerial camera using GPS to an accuracy of 20 seconds of arc
- Distance sharing of intellectual resources among transportation stakeholders
- Soft photogrammetry for highway engineering
- Design of grade stabilization structures
- GPS for photogrammetry
- Using waste truck tires as drainage culverts
- Highway applications for plastic pipes
Engineering Teaching and Research Complex (ETRC)

The largest capital project ever undertaken by ISU, the ETRC broke ground in September 1997. The completion of Phase 1 (Howe Hall) in year 2000 will allow the Department of Civil and Construction Engineering to expand its classroom and laboratory space significantly. [www.eng.iastate.edu/etrc/](http://www.eng.iastate.edu/etrc/)

Computer and communications facilities

In 1998 ISU was ranked as one of the nation’s 20 “most wired” campuses, with approximately 10,000 computer workstations and 130 student labs. ISU’s versatile, high-speed computing network supports computing services for instruction and research and access to off-campus sites, including those offering supercomputers. Network connections are available in all classrooms and student residence hall rooms. The university has satellite uplink and downlink facilities, as well as several distance-learning classrooms. [www.cc.iastate.edu/](http://www.cc.iastate.edu/)

Degree programs

**Interdisciplinary M.S. degree in transportation**

ISU’s master of science degree in transportation is one of only a few truly interdisciplinary transportation degrees nationwide. It includes three core fields: transportation engineering, community and regional planning, and transportation and logistics. Students develop a cohesive curriculum from the three core fields and related fields such as economics, political science, industrial engineering, sociology, and other disciplines. Students in this major have gone on to positions with state and federal departments of transportation, transportation consultants, and regional and metropolitan agencies. [www.ctre.iastate.edu/msdegree.htm](http://www.ctre.iastate.edu/msdegree.htm)

**M.S. and Ph.D. degrees in civil engineering with specialty in transportation**

The degree involves planning, design, maintenance, and operation of highway facilities. Students choose an emphasis in materials, structures, construction, hydraulics, or transportation engineering. Graduates with master’s degrees have gone on to work as city engineers and transportation engineers for metropolitan planning offices. Others work for transportation consultants, state and federal departments of transportation, and transportation research organizations. Ph.D. graduates have gone on to careers in academia and as full-time researchers in institutes and laboratories. [www.cce.iastate.edu/grad/](http://www.cce.iastate.edu/grad/)

Community and regional planning

- **Dr. Timothy O. Borich**, Associate Professor of CRP; Ph.D., 1992, Iowa State
- **Dr. Elisabeth Infield Hamin**, Assistant Professor of CRP; Ph.D., 1997, Pennsylvania
- **Dr. Riad G. Mahayni**, Professor of CRP, Chair of the Department; Ph.D., 1972, Washington
- **Mr. David Plazak**, Adjunct Assistant Professor of CRP, Transportation Policy Analyst at the Center for Transportation Research and Education; M.S., 1979, Iowa

Agricultural economics

- **Dr. C. Phillip Baumel**, Distinguished Professor of Agriculture; Ph.D., 1961, Iowa State

Transportation and logistics (T&L)

- **Dr. Benjamin J. Allen**, Professor of T&L, Distinguished Professor in Business, Professor of Economics, Dean of the College of Business; Ph.D., 1974, Illinois
- **Dr. Michael R. Crum**, Professor of T&L, Chair of the Department of Logistics, Operations, and Management Information Systems; D.B.A., 1983, Indiana
- Improving cooperation between U.S. and European bridge engineers and researchers
- Managing highway access
- Integrating travel models and GIS
- Bridge strengthening and rehabilitation
- Bridges for low-volume roads
- Seismic retrofit methods for reinforced concrete bridge columns
- Speed humps evaluation
- Performance-based standards for potential size and weight truck regulation
- Institutional issues involved in deploying ITS for commercial vehicle services
- Upper Mississippi River/Illinois Waterway navigation study
- Evaluation of I-75 Mainline Automated Clearance System (MACS)
- Intercity bus terminal study for Des Moines International Airport
- Deploying ITS in Des Moines metropolitan area
- Field operational test of international electronic border crossing system
- Electronic purchase of motor carrier credentials
- Automated mileage and state line crossing system for apportioning fuel taxes and registrations
- GIS traffic planning tools
- Weigh-in-motion technology
M.B.A. degree with emphasis in transportation
The College of Business offers full-time and weekend programs toward a master's degree in business administration, and students may choose an informal emphasis (12 credit hours of advanced electives) in transportation and logistics. The program emphasizes a team approach to core classes provided by the departments of accounting, economics, finance, management, marketing, statistics, and transportation and logistics. [www.public.iastate.edu/~isubuscoll/grad/grad.html](http://www.public.iastate.edu/~isubuscoll/grad/grad.html)

M.C.R.P. degree with concentration in land use and transportation planning
The Department of Community and Regional Planning offers a master's degree with a concentration in land use and transportation planning. Acceptance of a thesis or professional report is required. [www.public.iastate.edu/~design/crp/crp.html](http://www.public.iastate.edu/~design/crp/crp.html)

### Financial assistance
Teaching and research assistantships in a variety of areas are available to qualified students. Research assistants can generally select projects that complement or enhance their degree programs or that provide a springboard for their own thesis research. ISU’s graduate assistants in transportation have been highly successful in competing for other programs of support. In 1996–97, for example, three ISU students received prestigious Dwight David Eisenhower Fellowships (approximately 15 fellowships were awarded nationally) to complete master’s and/or doctoral work in transportation. Whenever possible, graduate assistants are given financial assistance to attend regional and national events. In 1998, 15 ISU students were supported to attend the annual meeting of the Transportation Research Board. [www.cce.iastate.edu/grad/](http://www.cce.iastate.edu/grad/)

### Additional resources
**Transportation Scholars program**
The Transportation Scholars program provides an enhanced educational experience for students accepted into the program. Scholars are required to work on research projects and take a weekly seminar course to broaden their perspective of transportation. Seminars feature speakers with national and international reputations. Scholars also participate in an annual conference involving only student presenters. The best paper is awarded a cash prize. [www.ctre.iastate.edu/Education/scholar_prog.htm](http://www.ctre.iastate.edu/Education/scholar_prog.htm)

**Dr. Thomas Goldsby**, Assistant Professor of T&L; Ph.D., 1998, Michigan State

**Dr. Richard F. Poist**, Professor of T&L; Ph.D., 1972, Pennsylvania State

**Dr. Yoshinori Suzuki**, Assistant Professor of T&L; Ph.D., 1998, Pennsylvania State

**Dr. C. K. Walter**, Associate Professor of T&L; Ph.D., 1972, Ohio State

**Other project managers**

**Mr. Jerry Amenson**, Manager of Materials Analysis Research Laboratory; A.A., 1968

**Dr. Ali Kamyab**, Transportation Research Scientist at the Center for Transportation Research and Education (CTRE); Ph.D., 1995, Iowa State

**Mr. Bill McCall**, Associate Director of Advanced Transportation Technologies at CTRE; B.S., 1962, Iowa State

**Mr. Tom McDonald**, Safety Circuit Rider at CTRE; B.S., 1964, Iowa State

**Dr. Scott M. Schlorholtz**, Associate Scientist in Materials Analysis Research Laboratory, Adjunct Assistant Professor of CCE; Ph.D., 1990, Iowa State

**Mr. Omar Smadi**, Pavement Management Specialist at CTRE; Ph.D. candidate; M.S., 1993, Iowa State

**Mr. Duane E. Smith**, Associate Director of Outreach at CTRE; M.S., 1980, Iowa State

**Mr. Doug Wood**, Manager of Structural Engineering Laboratory; M.S., 1990, Iowa State
evaluation of Oregon “Green Light” automated commercial vehicle operations
employment data for transportation planning
accident loss reduction factors
intersection collision diagram software
relationship of cognitive skills losses to driving performance
voice control of secondary systems
glass fiber composite dowel bars for highway pavement
concentrated loads on composite steel deck slabs
aluminum girder highway bridges
direct testing of coarse aggregate for Portland cement concrete pavements
microcracking and chemical deterioration in concrete pavements
GIS-based accident location and analysis system
integrated transportation management systems database
transit bus safety: decreasing agency liability
expanding the shrinking employment pool for county engineers
timber railway bridges
Midwest ITS/CVO mainstreaming
freight transportation modeling
automated vehicle identification and classification
critical VMA in asphalt paving mixtures
Biennial transportation conference
The Center for Transportation Research and Education at ISU, together with the Iowa Department of Transportation, sponsors a biennial regional transportation research conference. The event provides Midwesterners a convenient opportunity to attend a broad research conference of the caliber of the Transportation Research Board and attracts presenters from around the country. Students whose papers are accepted have the opportunity to present their research to a large and varied audience and have their papers published in a formal proceedings.  www.ctre.iastate.edu/pubs/crossroads/index.htm

Transportation Student Association
ISU's Transportation Student Association (TSA) is a student-founded and operated organization that provides members with practical information on transportation topics. TSA is multidisciplinary and encompasses students from engineering, planning, and transportation and logistics. It serves as the parent organization for the student chapters of the Intelligent Transportation Society of America (ITS/A) and the Institute for Transportation Engineers (ITE).  www.public.iastate.edu/~stu_org/TranSA/

Campus
Iowa State University is a research and teaching university of national stature with a student body of 25,000. As the nation’s first land-grant institution, it fulfills its mission by educating students, completing leading-edge research, and delivering services to the public. The university covers 1,000 parklike acres in Ames, a central-Iowa community of 50,000 located 30 miles north of the state capital, Des Moines. With its carefully planned campus, including a variety of trees and plantings, pristine lake, bell tower, and nationally renowned sculpture, ISU has been ranked as one of the 25 most aesthetically pleasing campuses in the country.  www.iastate.edu/  www.ames.ia.us/

Contact information
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Dr. Lowell F. Greimann  . Chair, Department of Civil and Construction Engineering . 515-294-5586 . 515-294-8216 (fax) greimann@iastate.edu www.cce.iastate.edu/

Dr. Riad G. Mahayni  . Chair, Department of Community and Regional Planning . 515-294-8958 . 515-294-4015 (fax) mahayni@iastate.edu www.public.iastate.edu/~design/crp/crp.html

Dr. Michael R. Crum  . Chair, Department of Logistics, Operations, and Management Information Systems . 515-294-8105 515-294-6060 (fax) mcrum@iastate.edu www.public.iastate.edu/~isubuscoll/undergrad/Majors/trlog.html