



TRANSPORTATION PROGRAMS AT THE UNIVERSITY OF SOUTHERN CALIFORNIA



USC

UNIVERSITY
OF SOUTHERN
CALIFORNIA

METRANS

METRANS

The mission of METRANS is to solve metropolitan transportation problems through interdisciplinary research, education, and outreach.

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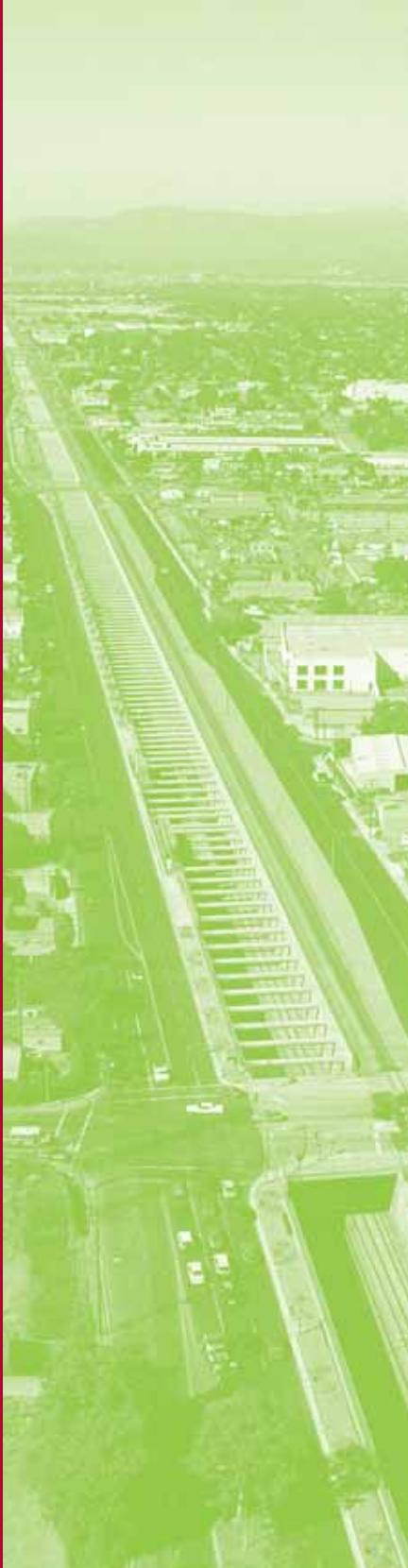
TRANSPORTATION

It is difficult to exaggerate the importance of transportation in modern society. The economy, and in fact our quality of life, depend upon a well-functioning transportation system. Transportation connects people to jobs, family, healthcare, entertainment, and the goods needed for everyday life. Transportation makes possible networks of trade that deliver continuing breakthroughs in technology, ever-cheaper consumer goods, and a growing economy.

One measure of the significance of transportation is the resources we devote to it. The transportation sector accounts for 11 percent of U.S. GDP, and transportation's share of household expenditures—19 percent—is second only to that of housing. In August 2005 the omnibus transportation bill (SAFETEA-LU) was signed into law, authorizing \$286 billion in federal funding for transportation through 2009.

Transportation creates both enormous benefits and enormous costs. Urban congestion problems exist the world over, from the streets of Los Angeles to the subways in Hong Kong. In the metropolitan areas of the southern and western U.S. that experienced rapid growth in the 1970s and 1980s, travel demand has far outstripped the construction of new transportation infrastructure. In the U.S., nearly nine out of 10 trips are made in private cars. Many planners and policymakers see public transit as the solution to congestion and environmental problems, yet transit has not been successful in attracting people from their cars, despite increased investments. Demand for new highways, transit lines, airports, and freight centers continues to grow, but public consensus on what to build, where to build it, and how to pay for it is increasingly difficult to achieve.

With the dominance of the automobile comes a long list of environmental and social concerns, e.g. air pollution, job access for inner city youth, traffic safety, city livability, and public health. Some problems are localized, for example walk access to local shops and services, while others are global, such as world transport energy demand.



The challenge in transportation is to address the many problems our mobile society has created while protecting the benefits it provides. Solving these problems will require both interdisciplinary research and a new generation of practitioners and decision-makers.

TRANSPORTATION RESEARCH AT USC

The University of Southern California has a growing reputation for its interdisciplinary research in transportation. METRANS, the National Center for Metropolitan Transportation Research, serves as the focus of the university's transportation research activities. Faculty researchers come from the School of Policy, Planning, and Development and the USC Viterbi School of Engineering, as well as from the departments of economics and geography and the USC Marshall School of Business. Established in 1998, METRANS is a federally designated University Transportation Center. The center is a joint partnership of USC and California State University, Long Beach. It is funded primarily by grants from the U.S. Department of Transportation and the California Department of Transportation. The mission of METRANS is to solve metropolitan transportation problems through interdisciplinary research, education, and outreach.

The Los Angeles region is the ideal laboratory for studying metropolitan transportation. Southern California is home to nearly two-thirds of the state's population, and in gross domestic product is equivalent to the 12th largest economy in the world. The Los Angeles region is also one of the most congested metropolitan areas in the U.S. and the only one in the "extreme non-attainment" category for ozone. The region is a center for international trade: the Los Angeles/Long Beach port complex is the largest container port in the U.S.; seaports trade in 2004 was \$240 billion. Los Angeles International Airport (LAX) is the nation's third-largest air cargo center. As a center of both international trade and immigration, the Los Angeles region is home to both substantial wealth and substantial poverty, has a higher average population density than does New York City, and has one of the largest transit systems and transit-dependent populations in the country.

"The Los Angeles region is the ideal laboratory for studying metropolitan transportation."



TRANSPORTATION RESEARCH AT USC INCLUDES THE FOLLOWING AREAS:

- Commercial goods movement and international trade. Increases in international trade have had large impacts on metropolitan areas such as Los Angeles. Research topics include more efficient movement of goods, increasing productivity of port and port-related activities, developing models for freight movements within metropolitan areas, estimating economic impacts of international trade, and evaluating goods movement regulatory policies.
- Mobility of urban populations. Dense urban centers are dependent upon efficient public transportation. USC conducts research on the effectiveness and productivity of public transportation, innovative forms of transit service, designing transit-oriented neighborhoods and corridors, and methods for addressing mobility needs of dependent populations.
- Highway infrastructure. Metropolitan areas are characterized by massive investments in transportation infrastructure. USC's research focuses on improving the durability and efficiency of transportation infrastructure, on monitoring infrastructure for structural damage, and on developing pricing and financing options for infrastructure investments.
- Safety, security, and vulnerability. People spend about one hour of every day traveling by foot, bicycle, car, or train. There is great potential for accidents between cars and trains, or between pedestrians and cars in dense metropolitan areas. Research topics include safety of light rail transit lines, work zone safety, and truck accident analysis.
- Intelligent transportation systems. The use of control, communication, and sensor technologies as well as intelligence to make existing transportation facilities more efficient is one of the most promising approaches to freeing current transportation systems from congestion, underuse capacity, and high operating costs.



STUDYING TRANSPORTATION AT USC

USC offers several degree programs that allow students to focus on transportation during their course of study. The following programs are offered by the School of Policy, Planning, and Development (SPPD) or the USC Viterbi School of Engineering.

MASTER OF PLANNING

The Master of Planning (MPL) program prepares individuals to be leaders in implementing positive community change and to help shape quality of life for people in the built environment. The MPL, typically a two-year program, trains graduates to lead the search for solutions to urban planning problems at many different scales—from a city block or neighborhood to a metropolis or entire region.

<http://www.usc.edu/sppd/mpl/>

MASTER OF PUBLIC ADMINISTRATION

The Master of Public Administration (MPA) program provides academic training to individuals interested in managing services and programs to shape the future of our communities and improve the quality of life for residents. Graduates run harbors, airports, and public transportation networks; manage environmental protection systems, community centers, schools, and universities; and serve as leaders in healthcare, urban revitalization, and welfare reform.

<http://www.usc.edu/sppd/mpa/>

MASTER OF PUBLIC POLICY

Through analysis, management, leadership, and advocacy, policymakers help provide the public mandates and strategies for work that improves life for residents in all communities. The MPP program brings together leaders from business, government, and the nonprofit sector to solve public policy problems. The program integrates public policy formulation, analysis, evaluation, and management.

<http://www.usc.edu/sppd/mpp/>

“I chose to focus on transportation because movement is essential in any community. It’s a fundamental need, right up there with food and shelter, and it affects so many aspects of daily life. I like knowing that my work will have an impact on people long into the future, and I appreciate my mentors at USC who helped make this work possible.”



STEPHANIE (TESSE) ROBERTS
MASTER OF PLANNING,
Certificate in Transportation Systems,
2000

Senior Civil Engineer and
Transportation Planner
PARSONS BRINCKERHOFF





MASTER OF SCIENCE, CIVIL ENGINEERING CONSTRUCTION ENGINEERING AND MANAGEMENT

The Master of Science in Civil Engineering with a designation in construction engineering and management prepares individuals to be leaders in the construction industry, including construction management, engineering development and planning, and engineering consulting. Graduates hold positions with public agencies, general contractors, real estate developers, subcontractors, construction management firms, and architectural firms.

http://www.usc.edu/dept/civil_eng/dept/graduate/coneng_c.htm

MASTER OF SCIENCE, CIVIL ENGINEERING TRANSPORTATION ENGINEERING

The Master of Science in Civil Engineering with a transportation engineering designation focuses on the planning, design, construction, management, performance, and improvement of transportation systems. These systems consist of facilities, guide ways, vehicle fleets, control mechanisms, new technologies, and policies that combine to permit the efficient movement of people and freight across several modes. Graduates hold positions with public agencies and transit operators, transportation engineering consulting firms, transportation planning consultants, intelligent transportation systems integrators, applied technology firms, freight companies, and supply chain and logistics management firms.

http://www.usc.edu/dept/civil_eng/dept/graduate/trpeng_c.htm

DOCTOR OF PHILOSOPHY INDUSTRIAL AND SYSTEMS ENGINEERING

The Ph.D. in Industrial and Systems Engineering (ISE) prepares students for positions as leaders on university faculties and as industry researchers and research managers focusing on the role of technology in production, service delivery, and organizations. Epstein ISE doctoral graduates are focused, intellectually fit, and blend the latest quantitative tools with a systems view of problems and a



special facility for reasoning. Interdisciplinary students interested in transportation systems and problems may combine the MSCE degree in transportation engineering with a Ph.D. in ISE, generally in operations research.

<http://www.usc.edu/dept/ise/academics/graduatedesc.html>

DOCTOR OF PHILOSOPHY ELECTRICAL ENGINEERING

The Ph.D. in Electrical Engineering is focused on intelligent transportation systems (ITS) in which the use of advanced technologies and automation coupled with advanced optimization techniques and software tools offer a strong potential for freeing the current transportation system from congestion and inefficiency. The focal center of ITS research is the Center for Advanced Transportation Technologies (<http://www.usc.edu/dept/catt>) and involves three major areas: surface, marine, and air transportation. Students are trained in systems theory, which has applications in almost every area of science, with surface, air, and marine transportation as an application area.

<http://ee.usc.edu/>

DOCTOR OF PHILOSOPHY AEROSPACE ENGINEERING MECHANICAL ENGINEERING

Like the Ph.D. in Electrical Engineering, the Ph.D. degrees in the Department of Aerospace and Mechanical Engineering are focused on intelligent transportation systems (ITS). Students are trained in structures, dynamics, aerodynamics, flows, combustion, and fuel technologies—topics that will have a tremendous impact on transportation systems of the future.

<http://ame-www.usc.edu/>

“USC offers a unique opportunity to learn and conduct research at a highly ranked program that has direct access to a nationally recognized transportation center—METRANS. The MPA program enabled me to view the bigger picture of the transportation field, the challenges and benefits of cross-sectoral governance, and how to build a solid foundation for public management. The program prepared me to take a leadership role in my organization and to help identify and resolve the transportation problems of tomorrow.”



KEN A. HUSTING
MASTER OF PUBLIC ADMINISTRATION,
Graduate Certificate of
Public Management, 2005

Senior Transportation Engineer
CITY OF LOS ANGELES DEPARTMENT
OF TRANSPORTATION





**DOCTOR OF PHILOSOPHY
POLICY, PLANNING, AND DEVELOPMENT**

Through critical discourse and inquiry, fieldwork and theoretical training, university faculty and Ph.D. students trained at the School of Policy, Planning, and Development examine issues of governance and contribute to place-based solutions to problems, including those of transportation, that face communities everywhere in the world.

<http://www.usc.edu/sppd/programs/doctoral/ppd/>

GRADUATE CERTIFICATE IN TRANSPORTATION SYSTEMS

The Certificate in Transportation Systems combines elements of transportation engineering with transportation policy, planning, and program management. This program benefits students intending to pursue careers as developers of transportation technologies or as implementers of technologies within governmental agencies. Students may complete this program as a stand-alone program or in conjunction with another graduate degree at USC.

http://www.usc.edu/sppd/programs/certificate/transportation_systems.html

ELECTIVE COURSES ACROSS DISCIPLINES

Students may pursue a concentration in transportation within most of the degree programs listed above. These concentrations typically comprise three to four elective courses. The interdisciplinary nature of transportation specializations at USC allows students to take elective classes outside of their degree program. For example, MSCE-Transportation Engineering students usually take PPD 633 and PPD 634, while many MPL students take CE 579 and CE 589. Graduate-level courses in and relating to transportation are offered regularly at USC. They include:



TRANSPORTATION SYSTEMS INFRASTRUCTURE, OPERATIONS, MANAGEMENT

- Principles of Transportation Engineering (CE 471)
- Managing and Financing Public Engineering Works (CE 552)
- Risk and Reliability Analysis for Civil Infrastructure Systems (CE 554)
- Design of Transportation Facilities (CE 583)
- Traffic Engineering and Control (CE 585)
- Port Engineering: Planning and Operations (CE 589)
- Managing and Financing Public Engineering Works (CE 552)
- Human Factors in Engineering (ISE 570)
- Facilities Location and Layout (ISE 516)

TRANSPORTATION PLANNING AND POLICY

- Urban Transportation Planning and Management (PPD 633)
- Institutional and Policy Issues in Transportation (PPD 634)
- Transportation and the Environment (PPD 692)
- Coastal Policy and Planning (PPD 694)
- Design of Transportation Facilities (CE 583)
- Port Engineering: Planning and Operations (CE 589)
- Introduction to Transportation Planning Law (CE 579)
- Core Laboratory Workshop: Transportation (PPD 531L)

TRANSPORTATION ENGINEERING AND ANALYSIS

- Principles of Transportation Engineering (CE 471)
- Engineering Economy (ISE 460)
- Network Flows (ISE 532)
- Economic Analysis for Engineering Projects (ISE 561)
- Advanced Concepts in Computer Simulation (ISE 580)
- Concepts for Spatial Thinking (GEOG 581)
- Spatial Analysis and Modeling (GEOG 583)
- GPS/GIS Field Techniques (GEOG 587)
- Linear System Theory (EE585)
- Random Processes in Engineering (EE562a)
- Communication Systems (EE567)
- Systems Architecting (SAE549)

“I am very proud of the years I spent at USC. The outstanding faculty in the Daniel J. Epstein Department of Industrial and Systems Engineering gave me the tools and knowledge I needed to excel in the field of transportation. It’s a field that has room for improvement; the demand for more efficient services is constantly increasing and there is an endless need for creative, innovative solutions.”



LUCA QUADRIFOGLIO
PH.D. IN INDUSTRIAL AND SYSTEMS ENGINEERING,
2005

Postdoctoral Research Associate
USC CENTER FOR RISK AND ECONOMIC
ANALYSIS OF TERRORISM EVENTS



USC TRANSPORTATION FACULTY

USC transportation faculty represent many research fields. Several faculty members are internationally recognized for their research contributions.

TRIDIB BANERJEE

SPPD – Urban Planning
Design and planning of built environment; political economy of urban development; smart growth
tbanerje@usc.edu

MAGED DESSOUKY

Industrial and Systems Engineering
Production and operations management; simulation models; operations research applications to transportation systems
maged@usc.edu

GENEVIEVE GIULIANO

SPPD, Civil Engineering, Geography
Transportation planning and policy; metropolitan spatial structure; travel behavior
giuliano@usc.edu

PETER GORDON

SPPD – Real Estate Development and Urban Economics
Applied urban economics; economic spatial impact modeling and assessment
pgordon@usc.edu

RANDOLPH HALL

Industrial and Systems Engineering
Transportation operations and logistics; maintenance, routing, scheduling, and system design
rwhall@usc.edu

JOHN HEIDEMANN

Information Sciences Institute and Computer Science
Sensor networking; Internet traffic analysis
johnh@usc.edu

PETROS IOANNOU

Electrical Engineering – Systems and Center for Advanced Transportation Technologies
Intelligent transportation systems; surface, marine, and air
ioannou@usc.edu

CLARA IRAZÁBAL

SPPD – Urban Planning
Urban design; comparative urbanism
irazabal@usc.edu

ERIK JOHNSON

Civil Engineering
Structural dynamics and control; structural health monitoring
johnsone@usc.edu

NAJMEDIN MESHKATI

Civil Engineering and Industrial and Systems Engineering
Safety, reliability, and efficiency of large-scale complex systems; risk reduction in civil infrastructure systems
meshkati@usc.edu

JAMES E. MOORE II

Industrial and Systems Engineering and SPPD
Transportation network performance and control; computational land use/transport models; transportation policy analysis
jmoore@usc.edu

DOWELL MYERS

SPPD – Urban Planning
Demographic change; immigration; urban growth
dowell@usc.edu

FERNANDO ORDONEZ

Industrial and Systems Engineering and Computer Science
Convex optimization; algorithms, high performance computing and robust optimization; network design
fordon@usc.edu

CHRISTIAN REDFEARN

SPPD – Real Estate Development and Urban Economics
Urban and regional economics; applied econometrics
redfearn@usc.edu

HARRY RICHARDSON

SPPD and Economics – Urban Economics
Metropolitan spatial structure; urban travel behavior; economic impact modeling
hrichard@usc.edu



THE ROLE OF RESEARCH IN EDUCATION

Transportation research and education are inextricably connected at USC. All graduate courses in transportation are enriched by faculty research, and Ph.D. and master's students have many opportunities to participate in research projects. Research assistant positions are a major source of funding for these graduate students. In 2004-05 more than 70 graduate students were employed as research assistants on METRANS research projects. Additional opportunities are provided in related centers such as the Center for Advanced Transportation Technology, and through other faculty research.

A rich and stimulating research environment is fostered through lectures and seminars, field trips, and conferences. METRANS holds a monthly seminar series that features USC faculty and Ph.D. research, as well as leading researchers and practitioners from throughout the U.S. Graduate students participate in field trips to major local facilities such as the Los Angeles Department of Transportation Automated Traffic Surveillance and Control (ATSAC) Center, the California Department of Transportation District 7 Transportation Management Center (TMC), and the Alameda Corridor. USC graduate students participate in the annual student conference organized by the University of California Transportation Center, and undergraduates participate in the annual symposium sponsored by the California Transportation Foundation.

“When I was a graduate student at USC, I had the opportunity to work with several prominent scholars across multiple fields including mathematics, management science, public policy, and engineering. Together, these scholars have made a lasting impact on my career and especially on my transportation-related teaching and research activities.”



YUEYUE FAN
PH.D. IN CIVIL ENGINEERING, 2003

Assistant Professor in Civil
and Environmental Engineering
UNIVERSITY OF CALIFORNIA AT DAVIS



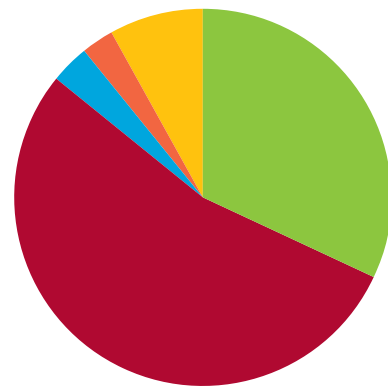


CAREERS IN TRANSPORTATION

Graduates of USC's transportation programs find a wide range of career opportunities available to them. Alumni work for industry, government agencies, and nonprofit organizations. Master's graduates are employed as engineering consultants, regional transportation planners, managers of transportation agencies, or policy advisors to elected officials. Those who join government agencies may work at the federal, state, or local level. Some master's students continue to other advanced degrees, and most Ph.D. graduates obtain university faculty or research positions. The chart below shows where USC graduates obtained their first position after graduation.

EMPLOYMENT OUTCOMES 1998-2005

- GOVERNMENT
- INDUSTRY
- ACADEMIC
- UNIVERSITY TEACHING
- OTHER



ADMISSION

Admission to a degree program at USC is based on an assessment of an applicant's potential for academic and professional achievement. Admission deadlines and requirements vary by program, so applicants should consult the website for the program or programs that are of interest by going to the URLs provided in the program descriptions.



TRANSPORTATION PROGRAMS AT THE UNIVERSITY OF SOUTHERN CALIFORNIA



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