

FALL 2009



THE DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

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USF UNIVERSITY OF
SOUTH FLORIDA



Message from the Chairman

Dear Alumni, Students, and Friends:

I am pleased to tell you of the considerable progress the Department has made in the last several years in spite of hard economic times. The size of the program has grown significantly with the Department graduating around 100 undergraduates a year. The number of faculty members has increased, the curriculum has been modified to better train our students, and the Department's research has expanded to the levels of major research institutions. Let me give you some examples of significant activities in the Department.

The Department's Environmental Engineering program has blossomed. Over the last five years, the Department has added 7 new environmental faculty members. This group is headed by Professor Jim Mihelcic who is a State of Florida 21st Century World Class Scholar. Environmental faculty members are working in the traditional areas of environmental engineering. However, research is growing in the area of sustainability. The Department has also added coursework in this area—Green Engineering for Sustainability, Green Infrastructure for Sustainable Communities, and Sustainable Development Engineering. Professor Mihelcic has also brought to the Department a Peace Core Masters program. Students in this program take graduate courses in the Department and then do their thesis while serving abroad in the Peace Corps.

The Transportation group has also added two new faculty members with a pavement specialist slated to join the Department in Semester II. The Transportation faculty, together with professors from CUTR (Center for Urban Transportation Research), have expanded the graduate course offerings in the Transportation area. The impressive list of graduate courses being offered is larger than that found in most universities in the nation and includes courses on planning, economics, modeling, management, aviation transportation, and pavement design and maintenance to mention a few areas.

The Department has invested considerable efforts and funds in improving its curriculum and laboratories. The Department has just constructed a state-of-the-art concrete laboratory so that courses such as Concrete Construction Materials now have a laboratory component. Also, a major renovation of Geotechnical Engineering Laboratory is underway and the Department is creating a Transportation Computations Lab. With regard to the curriculum, the Civil Engineering program now contains a two course sequence in numerical methods and computer tools and we have just added Engineering Geology as a required course. In addition, the Department now offers an International Capstone Design experience. This year, a group of students will be going to Bolivia to work on some of that country's environmental problems.

We welcome your input on the direction that we should take in the Department. Please send me an email at Carpente@usf.edu.

William Carpenter
Professor and Chairman
Department of Civil & Environmental Engineering
University of South Florida

Featured Faculty Member



ANDRÉS TEJADA-MARTÍNEZ RECENTLY RECEIVED A NATIONAL SCIENCE FOUNDATION (NSF) CAREER AWARD CO-FUNDED BY THE ENGINEERING (FLUID DYNAMICS PROGRAM), GEOSCIENCES, AND CYBER INFRASTRUCTURE DIRECTORATES.

The duration of this award is five years for a total of \$480,000. The research to be performed involves highly resolved numerical simulations of storm-driven, full-depth turbulent mixing in shallow seas in order to understand the impact of these events on coastal benthic (bottom) boundary layers and gas transfer at the air-sea interface. The ultimate goal of this work is to obtain improved representations of benthic boundary layers in large-scale, coarse-grid regional climate models and improved bulk parameterizations of ocean flux uptake of greenhouse gases such as CO₂. Computations will be performed using a parallel code developed by Tejada-Martínez capable of dividing large fluid dynamics problems into smaller ones which are then solved concurrently on multiple processors. Simulations will be conducted on the CIRCE cluster maintained by Research Computing at USF and at supercomputing centers throughout the country. Tejada-Martínez will also work towards integrating this research with an educational program designed to promote environmental fluid mechanics and computational science through graduate and undergraduate courses. Furthermore, a citizen science network will be established to record surface characteristics of foam and flotsam patterns associated with wave-, wind- and tidal-driven turbulent mixing throughout Tampa Bay. This network will increase public awareness of turbulent mixing and its influence on processes such as gas transfer across the air-water interface, mixing of pollutants and harmful algal blooms (red tides).

This past summer Tejada-Martínez also received two Collaborative Research awards from NSF. The first of these was

awarded by the Geosciences Directorate (Physical Oceanography Program) and dovetails his CAREER award.

The simulations of Tejada-Martínez will be guided by field measurements from acoustic Doppler current profilers (ADCPs) mounted at the Rutgers University long-term ecosystem cabled observatory at 15 meters depth (LEO-15) off

New Jersey and at the Navy's R2 tower on mid-shelf off the coast of Georgia. These unique data sets provide an opportunity, when combined with highly resolved numerical simulations to investigate the interaction of several turbulence generating mechanisms in shallow seas. Tejada-Martínez and collaborators will study the interaction between waves and the wind-driven current, the tidally-forced bottom boundary layer, wave breaking and stratification (due to surface cooling or surface heating). Understanding of these interactions will lead to new turbulence parameterizations for inclusion in regional climate models. The new parameterizations are expected to lead to better predictions of vertical mixing on shallow shelves, ultimately leading to improved prediction of cross-shelf flows.

The second Collaborative Research award was made by the NSF Office of Polar Programs (Antarctic Ocean and Atmospheric Sciences Program). Tejada-Martínez will collaborate with Patrick Neale, a scientist at the Smithsonian Environmental Research Institute with the goal of understanding the wave- and wind-driven turbulent mixing dependence of photosynthesis of phytoplank-

ton in the upper surface mixed layer of the Antarctic Ocean. Much attention has been given to this region because increased solar ultraviolet radiation (UV) resulting from the Antarctic ozone hole

The work will involve collaboration with scientists from the Center for Coastal Physical Oceanography at Old Dominion University and from Skidaway Institute of Oceanography.

has reduced primary productivity (phytoplankton) by as much as 15%. Neale and Tejada-Martínez hypothesize that a major impact of the fluid turbulence is to increase the proportion

of surface mixed layer plankton that are exposed to inhibiting UV penetrating the upper few meters. Previous field observations suggest that Antarctic Ocean phytoplankton only slowly recover from the effects of near-surface exposure and turbulent fluid motions will enhance the overall impact of UV on surface mixed layer primary production. The highly resolved numerical simulations of Tejada-Martínez guided by ADCP measurements of surface mixed layer turbulence taken during Neale's 2004 and 2005 cruises to the Ross Sea Polynya in the Antarctic Ocean will allow definition of realistic particle trajectories ultimately used to estimate phytoplankton photosynthesis. Photosynthetic activity was monitored concurrently with Neale's ADCP measurements. This will allow for comparisons between observed and numerically computed photosynthetic activity and a clear understanding of the impact of turbulent mixing on this process. Expected results from this research will also help scientists develop representations of seasonal changes in primary productivity for inclusion in large-scale, full biogeochemical models of the Antarctic Ocean carbon flux.

International Capstone Comes to the Civil and Environmental Department

Undergraduate students in the Civil and Environmental Engineering Department have the option of completing their Capstone course abroad. This new program allows seniors to attain university credit (two three credit hour courses) while working on engineering projects in the developing world. Design and construction projects include water supply, water resources/management, site master planning, site reclamation, solid waste management, and wastewater treatment, school classrooms, and school site master planning to benefit communities. Projects for majors other than Civil and Environmental Engineering, such as biomedical, mechanical, electrical engineering and business, health, communications, education, etc. are also available.

The course involves international travel and work on a construction site, feasibility studies in engineering design and creation of construction plans and specifications. The classes are conducted as if students are working in an engineering design firm. Depending on the specific project, students will learn and experience:

- international "client" & city official meetings
- local construction, materials & techniques
- data gathering & testing
- project scheduling & site coordination
- team building & decision-making
- new ways of thinking
- different language and culture

This project class will inspire students with the vision of lifelong learning, giving, and community service, to serve as a strong foundation for their careers and lives.

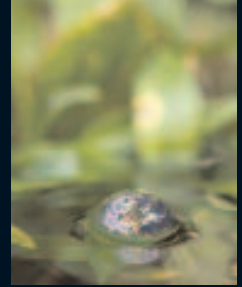
Construction work in underdeveloped areas is typically done in a simple manner with simple tools, making it easy for stu-



dents to use and understand the materials, tools, techniques and stages of construction. The uniqueness of the projects and techniques make an excellent laboratory to further understand implications of design, design documentation, construction productivity, materials and procurement, scheduling and on-site coordination, without overwhelming the students with typical US scale, techniques and schedule rigors. It is a fantastic way to generate discussions and experiences revolving around project management, teambuilding and communications while at the same time learning lessons of appreciating other cultures and flexibility in solving problems. This experience serves as the basis for the design project. Each team of 3 or 4 students is assigned their own design project.

The advisors of the program, Linda Phillips and Dennis Magolan, are Lecturers and Patel Associates at the University of South Florida in the Civil and Environmental Department. Linda has a B.S. and M.S. in Civil Engineering from Michigan Technological University specializing in Construction Management, and over 20 years of practical experience. Linda began her teaching career in 1997 at Virginia Tech and then moved to the University of Minnesota before going to Michigan Tech from 1998 – 2008, teaching classes in Project Management, Professional Practice and Capstone Design. In 2000, at the request of her students, Linda started the International Senior Design (ISD) taking over 160 students to developing world countries to do their Capstone design projects.

For information about program fees visit the website at <http://cee.eng.usf.edu/icd> or contact Dennis or Linda via email: DennisM@usf.edu and Lindap@usf.edu



Environmental and Water Resources Engineering Seminar Series

This semester the graduate students of Environmental and Water Resources were selected to participate in a new seminar series aimed at showcasing the research of talented graduate students. The seminar series included:

Oct 7: Development and Application of an Embodied Energy Model for Individual Water Supply Systems in the Great Lakes Region (Weiwei Mo)

Oct 21: Performance of Lagoon Wastewater Treatment System in Sapecho, Bolivia (Helen Muga); Impact of Shallow Water Oceanic Turbulence on Gas Transfer at the Air-Sea Interface (Cigdem Akan)

Nov 11: The analysis and fate of Endocrine Disrupting Compounds during Soil Aquifer Treatment (Won-Seok Kim); Environmental Biotechnology Seminar (Samuel Dupont)

Nov 18: Infiltration in the Shallow Water Table Environment (Yuliya Lukyanets); Lattice Boltzmann method: 21st century modeling tool for computational fluid dynamics (Shadab Anwar)

Dec 2: Gas-lift anaerobic membrane bioreactor (GI-AnMBR): Preliminary results from a filterability assessment (Ana Prieto); MCE Awareness: An Examination of Mercury, Community, and the Environment (Joniqua Howard)

For more information, contact Dr. Sarina Ergas at Sergas@eng.usf.edu



PEACE CORPS

The Master's International Program in Civil and Environmental Engineering has officially launched and is already the chosen degree program by many environmentally minded graduate students. This new program is overseen by Dr. Jim Mihelcic who founded the very first Master's International program in Civil & Environmental Engineering.

The USF Peace Corps Master's International program in Civil and Environmental Engineering has a strong focus on sustainability and humanitarian engineering. Students are allowed to explore and innovate at the interface of engineering design and technology with people, society, and health. In addition to traditional engineering coursework, students are required to take classes in sustainable development engineering, global health assessment, and research methods in applied anthropology.

Our program differs from other Master's International Engineering Programs.

- 1) knowledge creation is critical to our work, we require completion of a research thesis;
- 2) we require 9 credits of coursework in global health, applied anthropology, and sustainable development engineering;

- 3) students can obtain a Graduate Certificate in Water, Health, Sustainability;
- 4) students without a first degree in engineering can take an International Capstone Design experience set in Bolivia; and,
- 5) we have many faculty with international and sustainability experience that works its way into the classroom and research.

The sustainability revolution is now happening around the world. Our graduate program is about a unique partnership that Dr. Mihelcic formed with the U.S. Peace Corps back in 1997. It is about solving the world's problems by integrating a health and human dimension into engineering and about interacting with the disciplines of public health, applied anthropology, and sustainability. It is about

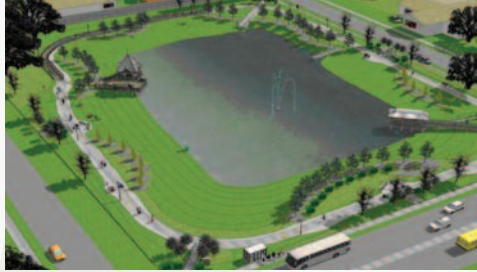
learning how to apply appropriate and sustainable technology and correctly balancing the dynamic between society, economy, and the environment. It is about protecting the environment while serving your neighbors and humankind. And it is about learning the critical role engineering can play in the eradication of global poverty and hunger; improving global health; promoting gender equality; facilitating sustainable development, appropriate technology, and beneficial infrastructure; and promoting change that is environmentally and socially just.

Both Masters in Civil and Environmental Engineering require 30 credits; 24 will be taken on campus (4 classes per semester) and 6 will be research taken associated with Peace Corps training and service. 18 of the 24 credits taken on campus must be in the Civil and Environmental engineering school.

Civil and Environmental Engineering Team Win an EPA P3 Award

TAMPA, Fla. (October 14 2009)

A team of graduate and undergraduate students (Joniqua Howard, Erlande Omisca, Ken Thomas, Trina Halfhide and Daniela Soledade) under the direction of Dr. Maya Trotz, assistant professor of civil and environmental engineering, was one of six university teams nationwide to win an Environmental Protection Agency (EPA) People, Prosperity and Planet (P3) Phase II award competition, which encourages college students to apply technology in innovative ways to tackle global environmental challenges. This P3 Award was judged by the American Association for the Advancement of Science (AAAS) panel with final decisions by the EPA.



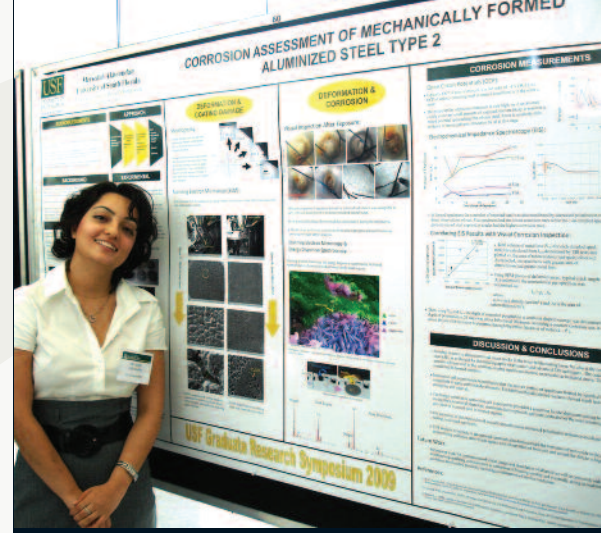
The project started in 2008 under a \$10,000 Phase I grant titled "Water Awareness Research and Education in East Tampa" (WARE-East Tampa, www.ware-easttampa.com) contributes to a storm water beautification project undertaken by the East Tampa Community Revitalization Partnership (ETCRP), transforming three of the community's 31 storm water pond areas into community-friendly green spaces. The collaborative effort between Young Middle Magnet for Math and Science, Lockhart Elementary, King's Kids, USF departments of Civil and Environmental Engineering and USF School of Architecture and Community Design, USF Engineers for a Sustainable World www.eswusf.com and the Health Environment and Social Services Committee of the ETCRP provides learning opportunities for students in K3-8 schools as well as community members.

Dr. Trotz says, "Given USF's commitment to community engagement, this project has opened many new opportunities for my own research and I have submitted much larger proposals that build on the existing collaborations. Our USF students spent Friday afternoons with a class at Young in spring 2009, participated in many community events like the East Tampa Community Survival Day and arranged field trips for the kids. I think the community support has been very encouraging, especially after they see presentations of the project which feature the students. This year we have expanded to other schools and are working with community members on curriculum development and on the design of an educational kiosk that will be built by the end of this year."

Two ponds have been completed. The close proximity of the ponds to local schools provides a natural fit for building curriculum around the ponds. The field site locations provide students the opportunity to learn about science and engineering as well as provide a service to community.

According to graduate student Joniqua Howard, "The P3 EXPO held on the National Mall in Washington D.C. was inspiring. We saw so many great projects, met many students from around the country, and got a chance to discuss our project with Dr. Lisa Jackson, the EPA Administrator. It was our first time at the EXPO and we plan to return to showcase our project in 2010. We plan to organize it so that the kids whom we work with get a chance to experience it, as it's really about them."

The \$75,000 award is given to the best student designs, providing an opportunity to further the designs, implement them in the field and move them to the marketplace. The competition is focused on benefiting people, promoting prosperity, and protecting the planet through innovative designs to address challenges to sustainability in both the developed and developing world.



Doctoral Candidate Wins Award at the Graduate Student Research Symposium

Mersedeh Akhoondan was one of six students who received recognition at the Graduate Student Research Symposium on October 8, 2009. Her research was on "Corrosion Performance of Mechanically Formed Aluminized Steel." Over 110 students presented their research to faculty and peers.

Transportation Graduate Student Receives Award

Dr. Yu Zhang's student Nagesh Nayak, has been awarded the Graduate Research Award from the Federal Aviation Administration of the U.S. Department of Transportation and administered by the Airport Cooperative Research Program (ACRP) of the Transportation Research Board/National Academies. Nagesh's research was on "Estimation and Comparison of the Impact of Single Airport Delay to the National Airspace System using Multivariate Simultaneous Models." This is a national competition and the committee received hundreds of proposals from different universities. The Graduate Research Award Program on Public-Sector Aviation Issues awards up to 10 highly qualified applicants a stipend of \$10,000 each for successful completion of a research paper on a subject chosen by the candidate within the framework of the program's purpose.

New Faculty

Sarina Ergas, P.E., Ph.D.
Associate Professor of Civil and Environmental Engineering



Dr. Ergas received a Ph.D. and an M.S. from the University of California – Davis in 1993 and 1990, respectively. She teaches environmental engineering, Capstone Design and biological processes. Prior to joining the faculty at USF, Dr. Ergas was a faculty member at the University of Massachusetts– Amherst for 15 years. Dr. Ergas' research interests include environmental biotechnology - bioremediation, biological air pollution control, membrane bioreactor systems, nutrient removal and water scarcity.

Dennis Magolan
Lecturer in Civil Engineering



Mr. Magolan earned an M.S. in civil engineering from Michigan Technological University in 1984. He teaches International capstone design and ethics in professional engineering. His research interests include engineering education and international service learning.

James Mihelcic, Ph.D.
Professor of Civil and Environmental Engineering
State of Florida 21st Century World Class Scholar



Dr. Mihelcic received a Ph.D. and M.S. in civil engineering from Carnegie Mellon University in 1988 and 1985, respectively. He teaches sustainable development and environmental engineering, sustainable development engineering and environmental engineering, and directs the Peace Corps Master's International program in civil and environmental engineering. Prior to joining the faculty at USF he was a professor at Michigan Technological University and co-directed

their Sustainable Futures Institute. He is the past president of the Association of Environmental Engineering & Science Professors (AEESP), a member of the U.S. EPA Science Advisory Board for Environmental Engineering, and is a Board Certified Environmental Engineer Member with the American Academy of Environmental Engineers. Dr. Mihelcic's research interests include green engineering, sustainable development, reform of engineering education and global issues of water, sanitation, and built environment.

Linda Phillips
Lecturer in Civil Engineering



Ms. Phillips earned an M.S. in civil engineering from Michigan Technological University in 1984. She teaches International capstone design, and professionalism and ethics in engineering. Her research interests include sustainable development of water, sanitation, construction, engineering education and international service learning.

Abdul Pinjari, Ph.D.
Assistant Professor of Civil Engineering



Dr. Pinjari received a Ph.D. in Civil Engineering Transportation Systems from the University of Texas - Austin in 2008, and an M.S. in Civil Engineering Transportation Systems from USF in 2004. He teaches transportation planning, travel demand modeling, discrete choice modeling, transportation engineering, and transportation data collection and analysis. Prior to joining the faculty of USF, he served as a research project manager at the Center for Transportation Research of the University of Texas - Austin while pursuing his doctoral studies. Dr. Pinjari's research interests include travel demand modeling and forecasting, multimodal transportation planning and policy analysis, econometric modeling of travel behavior, land-use and transporta-

tion interactions, sustainability issues in transportation, revealed preference and stated preference travel data collection, and transportation safety.

Qiong (Jane) Zhang, Ph.D.
Assistant Professor of Civil and Environmental Engineering



Dr. Zhang received a Ph.D. in environmental engineering from Michigan Technological University in 2001 and an M.S. in environmental engineering from Tsinghua University, P.R. China, in 1995. She teaches physical and chemical principles in environmental engineering, and sustainability science and engineering. Prior to joining the faculty of USF, she was operations manager of the Sustainable Futures Institute at Michigan Technological University. Dr. Zhang's research interests include green engineering and sustainability, life cycle assessment, water-energy nexus, environmental fate and transport modeling, and water supply and treatment.

Yu Zhang, Ph.D.
Assistant Professor of Civil and Environmental Engineering



Dr. Zhang received a Ph.D. and an M.S. in civil and environmental engineering from University of California – Berkeley in 2008 and 2003, respectively. She teaches transportation network analysis, air transportation, graduate transportation seminar and transportation engineering. Prior to joining the faculty of USF, she worked as a research assistant at the National Center of Excellence for Aviation Operations Research (NEXTOR) for five years and the California Partners for Advanced Transit and Highways (PATH) Dr. Zhang's research interests include air transportation, transportation network modeling and operations, transportation economics and planning, freight transportation and transportation sustainability.

News Round Up

AUGUST 2009:

- The USF College of Engineering was recently awarded a Department of Education Graduate Assistance in Areas of National Need (GAANN) grant, which will support a group of six to eight Ph.D. students to pursue research and education at the Water, Materials, Energy, Human Nexus with faculty from the departments of Civil and Environmental, Chemical Engineering and Mechanical Engineering.
 - The project management team includes faculty engineering members Maya Trotz, Delcie Durham and James Mihelcic, whose research and educational activities support the USF vision for sustaining healthy communities.
- Dr. Andrés Tejada-Martínez, assistant professor in the Department of Civil and Environmental Engineering in the College of Engineering, received a \$480,000 National Science Foundation CAREER award for his proposal titled Parameterizations of Langmuir Turbulence in Shallow Water.
 - This multidisciplinary grant is being co-funded by the Engineering, Geosciences and Cyber Infrastructure Directorates.
- The University of South Florida team placed fourth nationally among all schools in the competition and the same University of South Florida team won the Best Overall Report of all the teams in the Florida Prestressed Concrete Association's Big Beam competition for Zone 6.
 - Rajan Sen was the faculty advisor and students included James Barnes, Renee Garwood, William Lindecamp, Allen Overby, Jerome Panacci, Chak-Yin Szeto, and Matthew Trowbridge.

APRIL 2009:

- A team of USF students and their faculty advisor recently received a competitive Phase II Grant from the U.S. Environmental Protection Agency. The \$75,000 award was part of the EPA's prestigious People, Prosperity, and Planet (P3) Competition. The USF team was one of six selected nationally to receive the annual award.
 - The P3 Award Competition was held at the EPA's Annual National Sustainable Design Expo on the National Mall in Washington, D.C., April 18-20. The USF project is titled "Water Awareness, Research and Education in East Tampa: A Pilot Collaboration Involving USF, Young Magnet Middle School and the East Tampa Community."
 - Led by USF Assistant Professor of Civil & Environmental Engineering Maya Trotz, the team consists of Joniqua Howard, Erlande Omisca and Ken Thomas who are doctoral environmental engineering students; Daniela Soledade, an undergraduate student majoring in civil and environmental engineering; and other members of the USF Chapter of Engineers for a Sustainable World (ESW). Additional faculty who will assist in the implementation of the project are: Fenda Akiwumi (geography), Trent Green (architecture), and Amy L. Stuart (public health and engineering).
- After placing 3rd in a national ASCE competition, Civil & Environmental Engineering students Hong Ting (Sam) Chiu, Michael Gerdjikian, Angela Krause, and Kyle Yeasting won first place at a poster session in the Engineering/Physical Science/Mathematics category here at USF.
- The USF "Steel Bridge Team" with the student chapter of ASCE placed 3rd locally and traveled to the national competition for the first time.

MARCH 2009:

- Wayne Echelberger, Ph.D., P.E., Professor Emeritus of Civil and Environmental Engineering (Department Chairman, 1989-96) at the University of South Florida, was honored as Engineer of the Year by the Tampa Chapter of the Florida Engineering Society the Tampa Bay Engineers Week Banquet 2009.
- Dr. Amy L. Stuart, Assistant Professor of Environmental and Occupational Health (College of Public Health) and Civil and Environmental Engineering (College of Engineering) has received a National Science Foundation CAREER Award for her project "Multi-scale interactions of air pollution, urban growth, and equity – integrated research methods and informal science teaching". This is a 5-year nationally competitive award.
- Dr. Abdul Pinjari, new transportation faculty in the Department of Civil Engineering, has been selected to receive the 2008 Wootan Award for outstanding Ph.D. dissertation in policy and planning in Transportation. The award is given by the Council of University Transportation Centers (CUTC) for the best dissertation among U.S. universities in the area of policy and planning in Transportation studies.
- Civil & Environmental Engineering students Adrienne Accardi and Mersedeh Akhoondan won prizes at the NACE International Corrosion 2009 Conference. They each took home 2nd place for their poster entries. Also submitting student posters were Margareth Dugarte ("Accounting for Temperature Effects in Electrochemical Measurements of Steel in Concrete") and Kingsley Lau (Determination of Undercoating Corrosion of Epoxy Coated Rebar by Electrochemical Noise Technique").