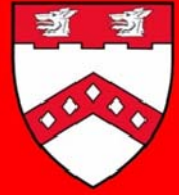


CCEE NEWS

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Barlaz Named New Department Head

Zia Lecture Draws Hundreds

2010 Study Abroad in Australia



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Message from the New Department Head



It is my pleasure to introduce myself as the new Department Head and to welcome you to our newsletter. Our goal is to communicate

with our alumni, the engineering community and others interested in the department on a more regular basis. I am honored to have been selected as the Department's 10th head. I have inherited a great Department and have a solid foundation on which to lead the department to even greater achievements.

I completed my B.S. in Chemical Engineering at the University of Michigan in 1978, and my M.S. and PhD degrees in Civil and Environmental Engineering at the University of Wisconsin in 1985 and 1988, respectively. I have been a faculty member in the department since starting my academic career in 1989. My research interests are in the general area of solid waste management, and I specialize in chemical and biological processes in landfills and in the

application of life-cycle analysis to the evaluation of waste management alternatives.

This promises to be an exciting year as we have a number of ongoing initiatives. In addition to the newsletter, a group of faculty is working on an improved website, and we hope that you will check it frequently for news about the department and the accomplishments of our students and faculty.

I am pleased to welcome Dr. **Tarek Aziz** as our newest faculty member. Tarek completed his PhD in our department in 2009 as was hired as a teaching faculty member to focus on undergraduate education and student programs. Please join me in welcoming Tarek. In addition, we are currently searching for a second person to focus on undergraduate education. We have initiated searches for multiple faculty members across all areas of the department, and I look forward to telling you about new hires as we get into the Spring of 2011.

While growth is generally a good thing, it creates its own set of challenges. We have essentially

outgrown Mann Hall and anxiously await the approval and construction of our new building, EB-V, on the Centennial Campus, but it is going to take time. Until then, we will likely occupy some satellite spaces in buildings adjacent to Mann Hall.

Finally, it is with some sadness that I announce that Dr. **David Johnston**, Edward I. Weisiger Distinguished Professor in Construction Engineering and Management, plans to retire in December, 2010. David has served the department with a tremendous sense of loyalty and dedication for 33 years, and his presence and insights will be sorely missed. A reception to honor David is in the planning stages and will be held in Mann Hall in January at a date to be announced. Please join me in congratulating David on a wonderful career.

Welcome to the Civil, Construction, and Environmental Engineering Department, and thank you for your interest and support.

Morton A. Barlaz
Professor & Head

About the Cover: The second annual CCEE study abroad program was held in Australia during the summer of 2010 (see story on page 9) with stops in Sydney, Adelaide, and Brisbane. *(Cover photograph by Chris Frey)*

The **Sydney Harbour Bridge**, a steel through arch bridge across Sydney Harbour, carries rail, vehicular, bicycle and pedestrian traffic between the Sydney central business district and the North Shore. It is a double-hinged, riveted steel arch bridge with a reinforced concrete deck and reinforced concrete pylons. The bridge, which opened in 1932, was designed and built by Dorman Long and Co Ltd, Middlesbrough Teesside and Cleveland Bridge, Darlington, County Durham. Until 1967, it was the city's tallest structure and is one of the world's widest long-span bridges, with an arch span of 503 meters (1650 ft).



Welcome to the Department of Civil, Construction, and Environmental Engineering. Our threefold mission is to educate students at the undergraduate and graduate levels, to develop and disseminate new knowledge through our research programs, and to provide extension and public service. We strive for excellence in each of our mutually supportive missions. Through this and future newsletters, we hope to provide details on who we are, what we do, and how we impact society through our work.

We have **42** faculty members with expertise in all aspects of Civil Engineering including **Construction Engineering and Management, Computing and Systems, Geotechnical Engineering, Structural Engineering and Mechanics, Transportation Systems and Materials, and Water Resources, Environmental, and Coastal Engineering**. In addition to our faculty, we are home to extension specialists and **20** staff members that include both administrative support as well as technical support in our laboratories.

The Department offers three accredited BS degrees at the undergraduate level including **Civil Engineering, Environmental Engineering, and Construction Engineering and Management**. We are proud of the quality education that we offer at the undergraduate level including opportunities to get involved in undergraduate research. We are also proud of the opportunities for professional activities through the following student groups:

- **American Society of Civil Engineers**
- **Chi Epsilon – the Civil Engineering Honor Society**
- **Institute of Transportation Engineers**
- **Associated General Contractors**
- **National Association of Home Builders**
- **Air & Waste Management Association**
- **American Concrete Institute**

With 922 undergraduates, we are among the largest undergraduate programs in the U.S. Nonetheless, we treat each student as an individual.

At the graduate level we offer the traditional Master's and Ph.D. degrees with the opportunity to specialize in a wide range of topics in civil, construction, and environmental engineering. This Fall we are offering newly approved Master's programs in environmental engineering. We are also a leader in distance education — students can take a few courses for professional development or even earn a Master of Civil or Environmental Engineering degree without ever setting foot on

campus. We typically offer between **10** and **15** graduate courses per semester through the Engineering Online program. This Fall, we had a record graduate student enrollment of **344**, including **97** at the Ph.D. level, **168** in the on-campus Master's program and an additional **79** working on a Master's degree through the distance education program. Many others enroll in our online programs, not to earn a degree, but for professional enrichment.

We have a rich history with approximately 9000 loyal and accomplished alumni, many of whom continue to serve the department and university in a variety of roles. Our leading support group is the Advisory Board which includes both alumni and other leaders in our field who come together to advise and support the department. Just recently, we initiated a departmental fellows program for alumni wishing to increase their involvement.

We are pleased that our students and our faculty have won many prestigious awards. In addition, a number of our faculty members are active as editors and associate editors for leading scholarly journals, are involved in the organization of national and international technical conferences, and are involved in accreditation and professional licensure activities. Most important, the research that we perform today has both immediate impact and long term benefits, serving as the foundation for safe and sustainable infrastructure in the future. We hope that, when reading the stories about the students, faculty and staff in this and future newsletters, you feel that same sense of pride, dedication, and accomplishment that we do.

By the Numbers:

- ◆ **12th Best Undergraduate Environmental Engineering**
- ◆ **13th Best Undergraduate Civil Engineering**

Source: U.S. News and World Report



Zia Lecture on Hoover Dam Bypass Draws Hundreds to NC State



Paul Zia (center) and his granddaughter talk with David Goodyear

More than 400 alumni, students, and friends packed a convention hall at North Carolina State University to hear the chief engineer behind the new Hoover Dam Bypass Bridge describe the planning, design and construction of this spectacular project. The address by **David Goodyear**, senior vice president of T.Y. Lin International, was the main event for the 2010 **Paul Zia Distinguished Lecture Series in Civil Engineering and Construction**, an annual event featuring prominent engineers in the field. Earlier in the day, more than 200 engineers attended lectures and workshops led by Goodyear and William Dowd, the project director for the bypass and executive vice president of HDR Engineering, Inc.

Planning for the bridge has been going on for more than a decade with construction beginning in late January 2005. The bridge connects Nevada and Arizona just downstream from the Hoover Dam, which was dedicated in 1935 by President Franklin Delano Roosevelt. The idea behind the bypass construction is to improve safety, security and traffic capacity on U.S. 93, which currently crosses over the dam itself and will be rerouted to the new bridge.

The 2,000-foot bridge over the Colorado River boasts a concrete arch span of 1,060 feet, the longest in the United States and the fourth-longest in the world. The new bridge was dedicated on October 14, 2010 and will be open to the public in November.



*The Paul Zia Distinguished Lecture Series was established in 2002 to honor the accomplishments and contributions of **Dr. Paul Zia** to the civil engineering profession, particularly in the concrete and structural engineering fields. Dr. Zia, Distinguished University Professor Emeritus of Civil Engineering at NC State University, is a member of the National Academy of Engineering and a former head of the Department of Civil, Construction, and Environmental Engineering at NC State. He is recognized as one of the world's foremost authorities on concrete structures. In 2006 the American Concrete Institute (ACI) honored Dr. Zia for his lifetime achievements. He is the recipient of numerous awards, including the Lamme Medal from the American Society for Engineering Education, the Alexander Quarles Holladay Medal for Excellence, the Alcoa Foundation Distinguished Engineering Research Award, the ASEE Centennial medallion, and the Distinguished Alumnus Award from the University of Florida. Dr. Zia joined the NC State faculty in 1961.*

Zia Lecture Series Committee members include alumni and partners Mike Creed (McKim & Creed), Don Kline (retired Kimley-Horn) and Valoree Eikinas (Mulkey Engineering).



New Faculty Appointments & Promotions



Billy L. Edge joined the Department in July 2009 as Professor of Civil Engineering and Head of the Coastal Engineering Program at the UNC Coastal Studies Institute. He received his B.S. ('64) and M.S. ('66) from Virginia Polytechnic Institute and his PhD from Georgia Institute of Technology ('69). His research interests are in sustainable engineering practices in the coastal environment, coastal engineering, dredging technology, coastal zone management, hydraulic engineering and modeling of coastal processes.



Tarek Aziz received his PhD in Civil Engineering from NC State in 2010 and joined the department as a Teaching Assistant Professor. His research interests lie in the experimentation and modeling of environmental fluid mechanics systems. His most recent research involved investigating the measurement and removal of fat, oil, and grease (FOG) from waste streams.



This Fall, we are pleased to announce the addition of **Mr. James A. Rispoli** as a Professor of Practice in the Faculty of the **Center for Nuclear Power Plant Structures, Equipment, and Piping**. Previously, he was Assistant Secretary of Energy for Environmental Management and, before that, Director of the Department of Energy's Office of Engineering and Construction Management. He is currently President and CEO of Project Time & Cost.



Mike Leming, Associate Professor, accepted the position of Director of Undergraduate Programs and Coordinator of Advising on July 1, 2010. This position, formerly held by **David Parish**, became available due to Parish's promotion to Assistant Dean in the College of Engineering. Leming's research interests are in the area of construction materials and concrete.



Tasnim Hassan was promoted to the rank of Professor effective August 16, 2010. His PhD in Engineering Mechanics from the University of Texas, Austin was awarded in 1993. He has been with the Department since January 1994, first as a post-doctoral research fellow with the Center for Nuclear Power Plant Structures, Equipment and Piping for a year, then as a tenure-track faculty member. His teaching and research focus on strength of materials and failure mechanisms of structures.



Joel Ducoste was promoted to the rank of Professor effective August 16, 2010. He received his PhD degree in Civil and Environmental Engineering from the University of Illinois, Urbana-Champaign in 1996. He joined the Department in 1998, and his research interests are in the operation and design of chemical mixing, flocculation, sedimentation, and chemical and UV disinfection processes in drinking water treatment.



Mervyn Kowalsky was promoted to the rank of Professor effective August 16, 2009. He received his PhD in structural engineering from the University of California, San Diego in 1997. He joined the department in 1998, and his research interests include earthquake engineering design and analysis, behavior of reinforced and prestressed concrete structures, and development of alternative performance-based seismic design procedures.



David W. Parish accepted the position of Assistant Dean of academic affairs for the College of Engineering. His appointment follows his 2-year position as Interim Assistant Dean of Undergraduate Affairs. He chaired the University and the Engineering Course and Curriculum Committees and led the initiative to change the undergraduate curriculum to meet the new general education program requirements.



David W. Johnston, PE, PhD to Retire after 33 Years in the Department



David West Johnston was born in Greensboro, North Carolina in 1944. He received his degrees at North Carolina State University: a BS in Civil Engineering Construction Option in 1966, MS in Civil Engineering in 1968, and PhD in Civil Engineering in 1972. Following seven years of industry experience in the Connecticut/New York area, he joined the North Carolina State University faculty in 1977 where he has served in the Department of Civil, Construction, and Environmental Engineering. From 1997 until 2007 he was Associate Head and Director of Graduate Programs. In 2008, he was named Edward I. Weisiger Distinguished Professor in Construction Engineering and Management. He became a Fellow of the American Society of Civil Engineers in 1983, a Fellow of the American Concrete Institute in 1983, and was member and chair of several committees in these organizations. His research areas include construction engineering, construction management, bridge management systems, and structural engineering. He has authored about 100 papers and reports and made about 50 presentations at conferences and meetings. His awards include the ACI Construction Practice Award in 1994, the ACI Delmar Bloem Award in 2003, and the North Carolina State University Outstanding Teaching Award in 2010. He is an evaluator for the ABET Engineering Accreditation Commission and chaired the Construction Engineering Exam Module Subcommittee for the National Council of Examiners for Engineering and Surveying. During his career he became licensed as a Professional Engineer in North Carolina, New York and Connecticut. He is planning to retire in December 2010 after 33 years of dedicated service.

Honors and Awards

- ♦ **Billy Edge** (Professor & Program Manager for Coastal Processes and Engineering at the UNC Coastal Studies Institute) was among 32 inaugural inductees to the ASCE Academy of Coastal Port & Navigation Engineers (ACOPNE).
- ♦ **Francis L. de los Reyes** (Associate Professor) received the 2010 Outstanding Alumni Award from the Iowa State University Alumni Association. He was selected as one of the TEDIndia 2009 Fellows. He also received the 2010 Earthwise Award from NCSU's Office of Sustainability.
- ♦ **Jie Yu** (Assistant Professor) received a Career Award from the National Science Foundation (NSF) for the project "Multi-scale Interactions of Waves, Currents and Morphology with Applications to Rip Currents."
- ♦ **Sankar Arumugam** (Assistant Professor) received a CAREER Award from the National Science Foundation (NSF) for the project, "Climate Informed Uncertainty Analyses for Integrated Water Resources Sustainability."
- ♦ **Sami Rizkalla** (Distinguished Professor and Director of the Constructed Facilities Laboratory), was elected Fellow, Precast/ Pre-stressed Concrete Institute (PCI), at their annual convention held in San Antonio, TX, September 2009. He also received the American Concrete Institute (ACI) Foundation - Concrete Research Council Robert E. Philleo Award at its Fall 2009 meeting in Chicago and the ACI Concrete Research Council Arthur J. Boase Award at its 2010 spring meeting in Chicago.
- ♦ **John Baugh** (Professor) was named Director of the North Carolina Japan Center at NCSU.



Honors and Awards (cont'd)

- ♦ **John Stone** (Professor) was appointed Honorary Professor of Engineering by Jose Ochoa-Iturbe, Dean of Engineering, Universidad Catolica Andres Bello, Caracas, Venezuela.
- ♦ **H. Christopher Frey** (Professor) was selected by the National Academy of Sciences to a 3-year term on the Board of Environmental Studies and Toxicology (BEST).
- ♦ **Ranji Ranjithan** (Professor) was awarded the Best Research Paper of 2009 at the World Environmental & Water Resources Congress, Providence, RI, May 2010. Co-author of the paper, **Emily Zechman**, a NCSU graduate, is currently an Assistant Professor at Texas A&M University, College Station.
- ♦ **David W. Johnston** (Edward I. Weisiger Distinguished Professor in Construction Engineering) received the 2009-10 Outstanding Teaching Award from the Office of the Provost. As an award recipient, he was also inducted into the Academy of Outstanding Teachers.
- ♦ **Richard Kim** (Professor) and his students received several research awards. **Ms. Maryam Sakhaeifar**, (PhD student), received the 2010-11 Association of Asphalt Paving Technology (AAPT) Ward K. Parr Scholarship. **Mr. Javon Adams** (PhD student), received a National Science Foundation Ford Fellowship. Dr. Kim received the AAPT's Walter J. Emmons Best Paper Award for the third time.
- ♦ Professor **Roy H. Borden** and graduate students **Michael Valiquette** and **Brent Robinson** were awarded the 2010 Best Paper Award at the 89th Annual Meeting of the Transportation Research Board (TRB), Soil Mechanics Section.
- ♦ **Roberto Nunez** (Lecturer & Senior Construction Extension Specialist) received the American Concrete Institute (ACI) Certification Award in recognition of his notable contributions to the advancement of ACI certification.
- ♦ **Robert C. Borden** (Professor) received the 2010 Brown and Caldwell Lifetime Achievement Award for contributions as a leader, innovator and teacher in groundwater remediation.
- ♦ **Jeremy Kress**, a graduate student working with Dr. **Matt Evans**, won the 8th Annual Deep Foundation Institute (DFI) Student Paper Competition. As part of the award, DFI is providing Jeremy with travel support to attend the annual DFI conference in Hollywood, CA to present his work.
- ♦ **Brandon Graver**, an MS student working with Dr. **H. Christopher Frey**, received the first-place Masters-level platform paper award at the 2010 Annual Meeting of the Air & Waste Management Association.
- ♦ **Morton Barlaz** (Professor & Head) will present the prestigious 2010 Kappe Lecture at several locations nationally. The Kappe Lecture of the American Academy of Environmental Engineers (AAEE) is a series whose goal is to share the knowledge of today's practitioners with tomorrow's engineers. The series is named after Stanley E. Kappe, P.E., DEE, an environmental engineer who worked for more than 55 years in his field.

Kimley-Horn and Associates (KHA) is sponsoring a Consulting Experience "KHAmpetition" in which teams of up to five students will compete for scholarship awards during November 5 to 7. Dr. **John Stone** is the faculty organizer for this event. He reports that many student teams have already signed up to participate.



NCSU American Concrete Institute (ACI) Student Chapter Activities

The NCSU American Concrete Institute (ACI) Student Chapter celebrated its four year anniversary under the leadership of **Bruce Clark**, a Senior in the Construction Engineering and Management (CEM) program at NCSU, and with guidance from **Roberto Nunez**, PE, a Lecturer and Senior Extension Specialist in the Department. With approximately 50 members, the NCSU-ACI Chapter is one of the strongest and most active in the nation. During Fall 2009, 15 NCSU students traveled to New Orleans to participate in ACI's Fall Convention. Four teams prepared concrete cube specimens and two teams were internally selected to represent NCSU at the concrete cube competitions in New Orleans. NCSU teams placed third among 30 national and international teams in this competition. In spring 2010, 12 NCSU students traveled to Chicago, to participate in ACI's Spring Convention. NCSU teams participated in

competitive events to produce pervious concrete and a lightweight concrete bowling ball. In Fall 2010, 20 students traveled to Pittsburgh to participate in the ACI Fall Convention and compete to design and construct a very efficient, ductile, lightweight concrete frame structure.

Chapter Members have participated in two yearly "Concrete Construction" competitions in which student teams investigate a real construction problem, and produce an engineered response measured by concrete industry practitioners. Several members of the Chapter have obtained certification as ACI Grade 1 Concrete Technicians through a University-based certification program in close cooperation with the North Carolina Department of Transportation (NCDOT) and the Carolinas ACI Chapter.

2011 Carolinas Conference to be Hosted by NCSU ASCE Chapter

Civil engineering students from colleges and universities in the Carolina region of the American Society of Civil Engineers (ASCE) student chapters will descend on N.C. State University April 14-16, 2011 for the annual 3-day ASCE Carolinas Conference. The annual conference is competition-based, with a day focused on the concrete canoe competition and a day centered on the steel bridge competition and the paper competition. In addition, the host school will create other competitions. The rules for each of these competitions are created by the national ASCE Competition Committee and at the end of the weekend an overall conference winner will be announced.



In hosting such an event, there are many sponsorship opportunities for corporations and firms to make this conference a success. In addition, many generous volunteers are needed from operations to event management to judging. If you or your organization is interested in volunteering for this event, please contact **Ms. Lora Bremer**, Director of Development, at **919-513-0983** or **lora_bremer@ncsu.edu**.



"No Worries" on CCEE Study Abroad Trip to Australia



The second annual CCEE study abroad venture to Adelaide and Brisbane, Australia during July and August of 2010 proved to be a huge success. Twenty-two CCEE juniors and seniors joined Director **Joe Hummer**, and Co-Directors **Rudi Seracino** (CCEE) and **Daniel Findley** (ITRE) for the 5-week trip.

The students took a course in traffic engineering from Dr. Hummer and a course on concrete structure design from Dr. Seracino, with Mr. Findley assisting during both courses. The group began its tour in Sydney before settling into Adelaide University for the concrete course and subsequently moving to the Queensland University of Technology for the traffic course.

In all, the students spent five weeks in Australia which proved to be a terrific place to conduct a study abroad program in civil engineering. Besides seeing some of the great engineering wonders of the world such as the Harbor Bridge and Opera House in Sydney, the students toured advanced labs in structures and highway safety and enjoyed trips on multiple travel modes such as bus ways, light rail, and ferries. The harbors, parks, and public spaces were excellent examples from which we could learn. Of course, the clean and exciting cities, exotic wildlife, stunning scenery, and the amazingly friendly people of Australia also made this a trip of a lifetime.

The CCEE Department is planning additional study abroad trips. In 2011, we will head to South Africa for a look at the engineering challenges faced by a developing country. In 2012 we plan to travel to the NC State campus in Prague, Czech Republic, and 2013 may see a return to China, the site of our inaugural study abroad in 2009. With civil engineering becoming more of a global endeavor in each passing year, the study abroad program provides our students with a wonderful opportunity.

Undergraduate Student Awards

In an effort to recognize the many outstanding undergraduate students in the CCEE Department, over 142 students were awarded scholarships for the 2009-10 academic year. We cannot list all of these students in this newsletter; here are the Senior Awards for 2009 and 2010.

2009 Senior Awards

- ♦ **Lina K. Lawrence**, Scholarly Achievement
- ♦ **Matthew J. Poisel**, Leadership
- ♦ **Nicholas A. Schultz**, Citizenship
- ♦ **Brittany Boudreaux**, CCEE Faculty Senior Scholarship

2010 Senior Awards

- ♦ **Brittany Boudreaux**, Scholarly Achievement
- ♦ **Maggie Hennesse**, Leadership
- ♦ **Troy Gilmore**, Citizenship
- ♦ **Mackenzie A. McBride**, CCEE Faculty Senior Scholarship



Centers, Institutes and Laboratories

The Department has or is affiliated with several substantial Centers, Institutes, and Laboratories that conduct leading edge activities in education, research, and extension.

Constructed Facilities Laboratory



The **Constructed Facilities Laboratory (CFL)**, established in 1996 as the result of a joint investment by the National Science Foundation (NSF) and the State of North Carolina is directed by Dr. **Sami Rizkalla**. The CFL has a dedicated 20,000 ft² building on Centennial Campus with student and faculty offices, state-of-the-art laboratories, and equipment. The CFL is unique in that it is able to test structures under a wide variety of physical and environmental conditions. The lab allows full-scale shake testing for earthquakes, and at temperatures from -60 to 180 degrees Fahrenheit.

It is one of only a few places in the U.S. accredited to perform testing for the International Code Council. New materials must be tested at an accredited site before they can receive approval. CFL is moving toward a new era of predicting structural failures before they happen by expanding into the use of prognostic monitoring. Such monitoring can help discover hidden damage and predict a structure's remaining service life. The CFL houses the National Science Foundation supported Industry-University Cooperative Research Center on Repair of Buildings and Bridges with Composites (RB₂C).



Center for Nuclear Power Plant Structures, Equipment and Piping



Since its founding in 1991, the **Center for Nuclear Power Plant Structures, Equipment, and Piping** has become a premier university-based research and professional organization in the areas of structures, equipment, and piping in nuclear power plants and related facilities. Directed by Dr. **Vernon Matzen**, the center develops sophisticated engineering tools that can result in substantial savings and increase safety over the lifetime of existing plants or facilities or in the design of new ones. The Center offers a wide range of short courses and other training opportunities which are given by Center faculty and outside professionals with specialized expertise in the design and construction of nuclear facilities.

Center for Transportation and the Environment



The **Center for Transportation and the Environment**, established in 1991 within ITRE, conducts innovative programs of research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment. CTE, directed by **Downey Brill**, is an activity of the University Transportation Centers Program, supported by the United States Department of Transportation and recognized as a national university transportation center of excellence. Numerous research projects have been initiated or completed through partnerships with the NC Department of Transportation and sponsorships with the National Cooperative Highway Research Program (NCHRP). CTE has maintained its strong emphasis on technology transfer through training programs, conferences, and teleconferences. For example, CTE is the lead organizer for the ongoing International Conference on Ecology and Transportation series.



Institute for Transportation Research and Education



The **Institute for Transportation Research and Education (ITRE)**, chartered by the North Carolina General Assembly in 1977, is recognized for its pursuit of practical, value-added solutions to the research and training challenges of transportation agencies at all levels of government, in North Carolina, throughout the country, and internationally. Dr. **Nagui Rouphail** is the current ITRE director. The main program areas for ITRE are:

- ◆ **Center for Transportation and the Environment (CTE)**
- ◆ **Visual Analytics, Modeling, and Simulation (VAMS)**
- ◆ **Public Transportation Group**
- ◆ **Next Generation Air Transportation (NGAT)**
- ◆ **Highway Systems**
- ◆ **Pupil Transportation Group**



Computer Training Facility



Traffic Signal Lab

Department Hiring New Faculty and an Extension Specialist

The Department has several tenure-track faculty searches underway:

- ◆ **General Search:** Applicants sought in the thrust areas of intelligent infrastructure, energy and the environment, and sustainable and resilient built and natural systems. These areas support the strategic vision of the College of Engineering. Appointments are expected at the rank of Assistant Professor. Exceptionally qualified candidates may be considered at higher ranks.
- ◆ **Construction Engineering and Management:** Applicants with analytical, computational and/or experimental expertise and experience consistent with construction engineering and management are encouraged to apply. The successful applicant will be considered for appointment depending on rank either as Edward I. Weisiger Distinguished Professor (Professor), time-limited title of Edward I. Weisiger Distinguished Scholar (Associate Professor), or time-limited title of Edward I. Weisiger Distinguished Fellow (Assistant Professor).
- ◆ **Structures and Mechanics:** Candidates are sought with interests in experimental, theoretical, and/or computational research spanning multiple scales. This position is open at all ranks (assistant, associate, and full professor).

The Department has two non-tenured positions available:

- ◆ **Construction Extension Specialist:** The successful applicant is expected to independently develop funding opportunities and engage the construction industry through extension, and to share in the teaching mission of the undergraduate and graduate programs in Construction Engineering and Management.
- ◆ **Teaching Faculty in Structures and Mechanics:** The successful applicant is expected to teach undergraduate classes, assist with undergraduate laboratories, and engage undergraduate students through advising on research projects and coordinating student organizations.

Applications must be submitted via jobs.ncsu.edu, where more details on these positions and specific instructions for submission are available. For full consideration, complete applications should be submitted as soon as possible.



The Department of Civil, Construction, and Environmental Engineering has many facilities that support undergraduate education and graduate research, and that illustrate the breadth of achievements of the faculty, students, and staff of the department. Here, we highlight the capabilities and contributions of our numerous facilities that cut across disciplinary areas within the department, and that support interdisciplinary inquiries with colleagues across the university and beyond. For those of you who are alumni, some of these descriptions may bring back fond memories of your days in surveying class, but also illustrate how we are continually adapting to new technologies to offer our students state-of-practice instruction in methods, equipment, and software.

The laboratories provide students with opportunities to work in teams, design and conduct experiments, interpret data, and apply insights from measurements and simulations to practical engineering problems. Laboratories are also the springboard for students to write professional quality reports, use modern tools, and link theory from the classroom to real-world contemporary issues. Graduates of our undergraduate programs in Civil, Construction Engineering and Management, and Environmental Engineering obtain a wide range of hands-on experience from these laboratories.

Our research laboratories support cutting-edge research and involve both undergraduate and graduate students. These laboratories include high performance computing and its application to complex simulations, quantification of environmental contaminants, improved design of structures and materials, interactions between structures and soils, and coastal hazard identification and management.

Computer Resources Support Students and Faculty

The College of Engineering at NCSU maintains a state-of-the art computing environment known as project Eos, a large-scale distributed system that consists of hundreds of computers running software for Microsoft Windows, Sun Solaris, and Red Hat Linux. Initiated in 1990, Eos is now part of an expanded project called Unity that serves all of NCSU.

While undergraduates are expected to have their own laptops, computers in public labs, including a large one in Mann Hall, provide industry-standard applications that may not be licensed for or run effectively on student-owned computers. The Mann Hall facility includes two laboratories, which are specially configured areas with 42-inch plasma monitors where students and faculty can meet to work on projects. Remote access to Eos is available through the Virtual Computing Lab (VCL). Additional facilities include a specialized, computer-equipped classroom for instruction (see page 17), and wireless access, which is available throughout Mann Hall. Numerous state-of-the-art software tools are available to students via Eos, including compilers, geographic information systems (GIS), mathematical packages, analysis tools, optimization software, computer aided engineering and project planning tools, and many others.

At the initiative of faculty within the department, specialized facilities have been developed to meet high performance computing needs. Such facilities include two Opteron clusters, of which the newest has 88 cores (processors) with a computational performance of approximately 450 gigaflops. The cluster is used by CCEE's **Department of Homeland Security Center of Excellence** to simulate the effects of storm-surge on critical civil infrastructure systems, and for other projects, such as assessment of advanced energy systems.



Computer Lab in Mann Hall 306



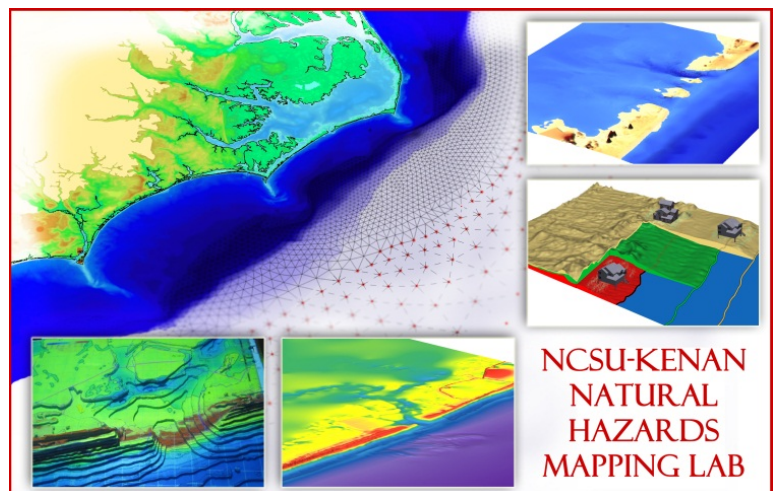
Structural Engineering and Mechanics Laboratory

Both experimental and computational facilities are available for structures and mechanics research. These include laboratories for cement and concrete, structures, structural models, and computing. The cement and concrete laboratory has a broad range of equipment for conducting standard tests to determine properties of cementitious materials. The structures laboratory has 3,000 square feet of tie-down floor space and 2,500 square feet of space for materials testing. A specimen fabrication shop is located nearby. The lab is supported with equipment such as a 2,000-kip closed-loop programmable compression machine with high pressure-temperature testing capability and several other testing machines. The structural models laboratory includes the following: testing tables with reaction frames and actuators; a shaking table; and strain, displacement, and acceleration measurement instrumentation.



Quantifying the Ever-Changing Coastline

The NCSU-Kenan Natural Hazards Mapping Lab, under the direction of Dr. **Margery Overton**, focuses on research that generates knowledge about coastal processes (including landform change), coastal hazard identification and response strategies to improve the resilience of the coastal environment. The laboratory has the hardware and software support to utilize state of the art GIS-based techniques, geospatial tools and numerical models to better understand, visualize, model and develop solutions to coastal problems. Currently, the NCSU-Kenan Natural Hazards Mapping Laboratory has projects focused on the effects of extreme events, sea level rise, beach nourishment, and beach and dune erosion on coastal landforms.





Measuring Vehicle Emissions in the Real-World



Based primarily on funding from sponsored research projects, Dr. **H. Christopher Frey** and colleagues Dr. **Nagui M. Rouphail** and Dr. **William Rasdorf** have assembled a suite of portable instruments that have been employed in over 20 projects since 1999 for measuring the activity, energy use, and emissions of a wide variety of vehicles. Measured vehicles include cars, trucks, school buses, construction equipment, and railroad locomotives. The instruments include portable emissions measurement systems (PEMS) that monitor pollutants in vehicle exhaust, engine sensors, engine electronic control unit data-loggers, geographic positioning systems, and weather sensors. Data obtained with these instruments has been used, for example, to assess the effect of traffic control and congestion on highway vehicle energy use and emissions, to compare emissions for B20 biodiesel versus petroleum diesel, and to assess real-world duty cycles for dump trucks, cement mixers, construction equipment, and locomotives and their implications for emissions. With support from the National Science Foundation, these instruments are used in CE 476/576 Air Pollution Control and CE 479/579 Air Quality to introduce students to principles of field study design, data collection, and data analysis.

Team Work and Fluid Flow in the Hydraulics Laboratory

Students who take CE 381 learn first-hand in the Hydraulics Laboratory (located in Mann Hall 108) about fluid viscosity, hydrostatics, and the conservation of mass, momentum and energy for both pipe flow and flow in open channels. Students from all three undergraduate degree programs (Civil Engineering, Construction Engineering and Management, and Environmental Engineering) take CE 381. Recent acquisitions using student-supported educational technology funds have included equipment for investigating jet impingement and Reynolds number in fluids as well as a new lab-scale flume for exploration of uniform flow, hydraulic jumps, and flow controls. The lab enables small groups of students to work in teams. We are investigating the inclusion of computational modeling so that students will be able to: (1) validate models versus experimental measurements; and (2) explore the effect of design changes in simple systems on fluid dynamics.





Road to Better Pavements

The Bituminous Materials Testing Laboratory is designed to evaluate various types of asphalt binders and mixtures from a simple routine test, such as mix design, to sophisticated performance tests. Test results from this laboratory are used by the asphalt industry and state and federal highway agencies to predict the performance of asphalt materials and to develop new materials. This laboratory is supervised by Drs. **Paul Khosla**, **Akhtar Tayebali**, and **Richard Kim**, and used for both research and undergraduate/graduate teaching.



Construction Engineering Laboratory

The Construction Engineering Laboratory was established in 2007 by Dr. **David Johnston** to meet the specialized experimental needs of the Construction Engineering and Management program. It is located in Mann Hall 100. The lab is used for both courses and research. A new one credit course, CE 468 Construction Engineering Laboratory, has been added to the B.S. Construction and Engineering Management (CEM) curriculum. It allows students to experience various tests and evaluations done in the field by contractors to provide safety and monitor progress during the construction process. A graduate version of the course, CE 568, is also available. Development of the lab was made possible by funding from the university Educational Technology Fund and by matching gifts from the North Carolina Licensing Board for General Contractors.



Surveying Laboratory: Modern Approach to a Civil Tradition



The surveying laboratory, which supports the undergraduate surveying course, CE 301, provides students with hands-on field experience. The centerpieces of the lab are eight Nikon DTM 310 electronic total stations, with tripods, prisms, and all other necessary accessories. The total stations have capabilities to transfer data to PCs, store data, and perform a wide variety of survey calculations. Students working with the lab equipment in the field are issued two-way radios to ease communication and to make their work more efficient. Based on data measured in the field, students learn methods for analysis and presentation of surveying and positioning data, including error analysis.



Teaching and Research in the Geotechnical Laboratories

The geotechnical engineering program has two laboratory locations. The undergraduate engineering laboratory in Mann Hall supports educational experiences in CE 342, Engineering Behavior of Soils and Foundations. Students use equipment for measuring hydraulic conductivity, consolidation, shear strength, and physical properties to quantify soil properties and soil behavior. The Geotechnical Research Laboratory (GRL), located at the **Constructed Facilities Laboratory** on Centennial Campus, is mainly used for graduate level research. The GRL has two testing chambers that, in combination, provide a unique testing environment for large-scale model and prototype-scale testing. The lab has a strong floor; a reconfigurable test frame with up to a 20-foot vertical clearance; static and dynamic actuators; and a data acquisition and control system. Adjacent to the GRL's large scale testing facility is the small-scale Geotechnical Materials Laboratory (GML) that includes equipment for soil characterization, such as computer-controlled systems for the measurement of strength and hydraulic properties.



The Many Inquiries in the Environmental Engineering Laboratories

The environmental engineering teaching laboratory offers undergraduate environmental engineering students the opportunity for hands-on experiences with spectrophotometers, jar testers, gas chromatographs, microscopes, and other equipment commonly used for the characterization of water and air quality. Environmental engineering research facilities include over 5000 sq. ft. of laboratory space and equipment for research on water and wastewater treatment, contaminant transport and site remediation, refuse decomposition, anaerobic environmental microbiology, analytical chemistry, and applied molecular microbial ecology. Specialized equipment permits the study of: (1) carbon cycling and greenhouse gas emissions from landfills; (2) treatment processes for the removal of emerging contaminants such as pharmaceuticals, endocrine disrupting chemicals, and perfluorinated compounds from drinking water and wastewater; (3) microorganisms responsible for nutrient removal from wastewater; (4) mechanisms causing buildup of fats, oil, and grease in sewer lines; and (5) innovative groundwater remediation strategies.



M.S. student samples a microbial consortium capable of degrading chlorinated solvents in groundwater.



Improving Traffic Flow in the Transportation Systems Laboratory

The Transportation Systems Laboratory in Mann Hall 424 supports undergraduate class work and research. Hardware includes computers, a large plotter, and other items that support field work as well as courses. Students collect field data, use existing data, develop models, evaluate system-wide or site-specific transportation options, prepare written recommendations, and present briefings. They usually work in teams of two to four students. Students have used the lab for problems such as regional network modeling and evaluation, environmental impact analysis, and traffic operations and signal timing.



Students in a class in Mann Hall 415, a computerized classroom.

Computerized Classroom Enables Student Design Projects

Progress Energy sponsors the Computer Class Room in Mann Hall 415. It is dedicated to undergraduate and graduate classes that utilize specialized professional software in CCEE disciplines. Hardware includes 21 computers and projection equipment. During lectures students may refer to instructor notes and work on computer-based exercises. During design courses, two to four students work in teams, collect and analyze data, evaluate alternatives, prepare a written report, and present their findings to panels of professional engineers. Recent projects include an airport design for a North Carolina county, steel building design for the City of Raleigh, and a traffic impact study for a proposed parking deck at NC State.

Undergraduate Research Experiences in the Laboratories

CCEE faculty mentor many undergraduate students who are conducting independent research outside of the classroom. The undergraduate research experiences span a wide variety of applications across the department. A few examples include:

- **Doug Schweizer** is working with Dr. **Tasnim Hassan** on an innovative seismic performance enhancement technique for steel building beam-column connections.
- Under the supervision of Dr. **Detlef Knappe**, **Ross Varin** is evaluating the removal of trace pharmaceuticals from drinking water using powdered activated carbon.
- Dr. **Matt Evans** is mentoring **Chris Markham** on simulation of cemented sands and **Christine Nguyen** on soil-structure interaction and moonquakes.
- **Jamie Lee Potter** is working with Dr. **Robert C. Borden** on development of soluble soy-based products for anaerobic bioremediation.
- **Christopher Michael Robison** is evaluating the performance of asphalt mixtures with Dr. **Richard Kim**.
- **Spencer Pierce** is assessing the performance, emissions, and cost of low emissions power plants under the guidance of Dr. **H. Christopher Frey**.
- Dr. **Joel Ducoste** is working with **Amanda Sain** on evaluation of ultraviolet-based methods for drinking water disinfection, **Domenic Libera** on methods for removing fats, oils, and grease from sewer collection systems, and **Micah Jasper** on Lagrangian modeling of microbial disinfection in ultraviolet reactors.

From these experiences, undergraduate students learn first-hand about inductive scientific inquiry and the translation of scientific knowledge to practical engineering applications. Many of these students work in interdisciplinary teams with graduate students, and thus gain insight regarding possible future graduate study in addition to professional practice.



Firm of the Month: Connecting the Department to Industry

The idea for the firm of the month was suggested by the CCEE Departmental Advisory Board. The firm of the month program is our way of thanking and promoting our corporate partners while at the same time educating our students. This program provides participating firms with name recognition for recruiting and business opportunities. The program demonstrates to students ways that they can use their degrees after graduation and provides information on employment opportunities.

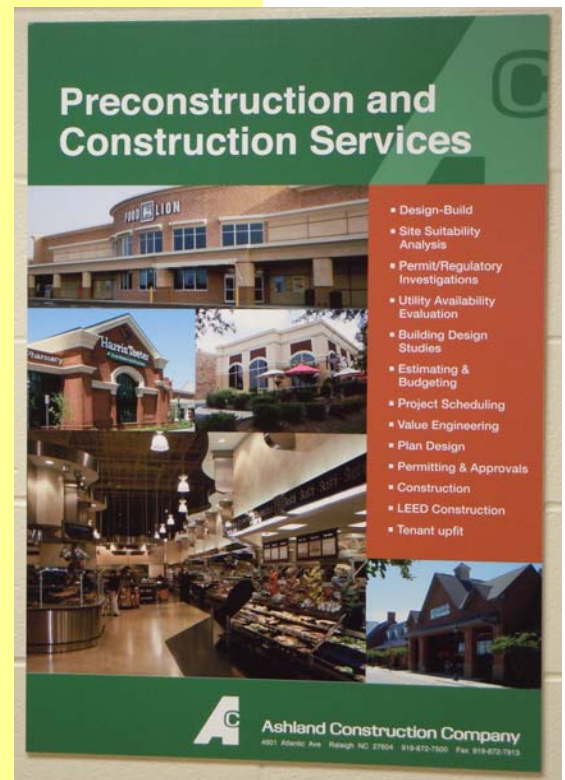
Promotional information regarding the firm of the month is featured in hallways in Mann Hall, walls in the main lobby and display cases in the lobby. Detailed information about the corporation is displayed on a continuously running loop on the large flat screen monitor in the lobby. The firm also has the opportunity to conduct information sessions with students and student groups.

Since the inception of the firm of the month in September 2009, participants have included **Kimley-Horn, McDonald-York, Northrup Grumman, Fluor, Withers & Ravenel, Stewart Engineering, RK&K, Shelco, and Ashland Construction Company.**

The firm of the month supplies approximately 20 color posters of worksites, projects, and other information such as banners, blueprints, models or items to be put in display cases.

Anyone interested in arranging for their firm to participate in Firm of the Month may contact:

Ms. Lora Bremer, Director of Development
919-513-0983 or lora_bremer@ncsu.edu



Alumni Presentation



Peter M. Lehrer (BSCE '63) will speak as part of the **NCSU Entrepreneurs Lecture Series (ELS)** on **October 25 at 4:00 pm** at the **McKimmon Center**. Mr. Lehrer is an internationally recognized leader in managing large-scale complex construction projects. He co-founded **Lehrer McGovern**, one of the largest construction management firms in the country with a staff of 2000 professionals responsible for billions of dollars of work annually. The ELS is designed to showcase outstanding innovation and entrepreneurship among NC State alumni and partners, and is free and open to the public.



Promoting the Department to the Transportation World

The Transportation Research Board (TRB) Annual Meeting, held in Washington, DC each January, is the largest gathering of transportation professionals and academics in the world. Traditionally, top universities hold receptions during the meeting for students, faculty, alumni and friends to attract top notch students and faculty to our programs, reinforce and create new networks, meet new potential sponsors, and increase the visibility of the school in general and its transportation programs in particular. In recognition of these many benefits, the Depart-

ment and the Institute for Transportation Research and Education (ITRE) sponsored NCSU's first TRB annual meeting receptions from 2007 to 2009. More than 125 guests attended including several company presidents and vice-presidents, senior officials from the US, and North Carolina Department of Transportation and a number of international academics and professionals. Due to the recent economic downturn, we were not able to hold a reception in January 2010. However, many of our University competitors continue to

hold their events. Thus, the Department and ITRE are seeking financial support to resume this highly visible and beneficial event, and have instituted a tiered donor recognition program.

Anyone Interested in participating in this donor program should contact:

- ♦ **Ms. Lora Bremer**
lora_bremer@ncsu.edu or
- ♦ **Ms. Christie Vann (ITRE)**
cdvann@ncsu.edu

Department Advisory Board

Mike Gwyn, who chairs the department's Advisory Board, summarizes three main roles of the board:



Mike Gwyn

- ♦ "First, we offer counsel to the Department leadership, faculty and students." This counsel can be in response to a request or as a Board generated initiative.
- ♦ "Second, we provide general assistance to the Department," such as: development activities; assisting student organizations with planning of major events; and providing industry resources for other faculty and department initiatives and needs.
- ♦ Third, and perhaps more importantly, we are advocates for the Department." Internally, the Advisory Board promotes the needs of the Department with the University and the College of Engineering. Outside the University, "we provide a resource to the Department and to the College of Engineering to interface with stake holders and decision makers, peer groups, accreditation organizations, prospective students and the community in general."

As an example of alumni engagement with the department, Mr. **Tom Church** serves on the Advisory Board and, in addition to contributing financially, has contributed both time and leadership. Mr. Church has had the pleasure of reconnecting with many alumni friends and of "recruiting them for the department." He has also learned first-hand the financial needs of the department and in response has established an undesigned fund for flexible use at the discretion of the department head.

**Board members
"are passionate
about
their role and the
Department"**

According to Gwyn, Board members "are passionate about their role and the Department." The Board looks forward to broadening engagement with the department through ongoing and new initiatives, such as the newly formed Departmental Fellows program.



Stay in Touch!

Our alumni and friends play a vital role in shaping our future. Private financial support provides the margin of excellence that distinguishes great universities from good ones. Annual gifts to the department are unrestricted and focus on critical areas such as

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scholarships, endowed professorships, and graduate fellowships.

We are here to work with you and explore how you can make an impact on the department and the future of our students. The Alumni Association offers a life-long extension of your time at NC State University and strives to grow with your changing needs long after you leave the University. Stay connected and let us know what is happening in your life.

Share Your News

Keeping your contact information current enables us to keep you up to date on events in the department and elsewhere!

Have a professional or personal update? We would like to hear from you! Please send us your latest news (e.g., career accomplishments, awards, recognitions, marriage, births, retirement) so we may share your news in future issues. Send the following information and/or news stories to: **lora_bremer@ncsu.edu**

Name, Mailing & Email Address
Company Name & Address
Work & Cell Phone Numbers
Degree & Class Year
Announcements

CCEE News is published by the Department of Civil, Construction, and Environmental Engineering to share information among faculty, staff, students, alumni, and friends of the Department.. This issue was produced by **Chris Frey**, Editor and **Bonnie Diaz**, Managing Editor, Department of Civil, Construction, & Environmental Engineering, NC State University, Campus Box 7908, Raleigh, NC 27695-7908. Additional contributors to this issue were: **Morton Barlaz**, **John Baugh**, **Lora Bremer**, **Downey Brill**, **Joel Ducoste**, **Mo Gabr**, **Joe Hummer**, **David Johnston**, **Richard Kim**, **Detlef Knappe**, **Vernon Matzen**, **Jim Nau**, **Roberto Nunez**, **Margery Overton**, **William Rasdorf**, **Sami Rizkalla**, **Nagui Roupail**, and **John Stone**.

For questions or comments, please contact **Chris Frey** (frey@ncsu.edu) or **Bonnie Diaz** (bdiaz@ncsu.edu)