

# CCEE NEWS

**DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING**  
**COLLEGE OF ENGINEERING** NORTH CAROLINA STATE UNIVERSITY | FALL 2013



## RENEWABLE ENERGY

*NEW TECHNOLOGIES MAKE HARVESTING OF RENEWABLE ENERGY FROM  
NC COASTAL WINDS AND WAVES AN ATTRACTIVE OPTION*

**\$4 MILLION IN NEW FUNDED PROJECTS 04**  
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**NC STATE  
UNIVERSITY**



**COLLEGE OF  
ENGINEERING**

## IN THIS ISSUE

**EDITOR** Chris Frey

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### CONTRIBUTORS TO THIS ISSUE

Mort Barlaz, Emily Berglund, Lora Bremer, Joel Ducoste, Mo Gabr, Murthy Guddati, Tasnim Hassan, Ed Jaselskis, David Johnston, Paul Khosla, Brina Montoya, Jim Nau, Irving Nazario, Mohammad Pour-Ghaz, Ranji Ranjithan, John Stone, Billy Williams

### PRODUCTION STAFF

Jennifer Cox, Brent Lancaster, Candice Wallace, Carrie Misenheimer

*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.*



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**ABOUT THE COVER** A MULTI-DISCIPLINARY TEAM INCLUDING CCEE GRADUATE STUDENTS IS DEVELOPING AN OFFSHORE COMPRESSED-AIR-ENERGY-STORAGE SYSTEM.



# LETTER FROM THE DEPARTMENT HEAD MORTON A. BARLAZ



Welcome to the Fall 2013 newsletter. It is a pleasure to update our friends on happenings in the department. As you read this, our fall semester is well

under way. We welcomed about 185 new undergraduates to the department as well as about 80 new graduate students. It is fun to watch the excitement and curiosity on the faces of students entering Mann Hall, especially those for whom NC State is their first experience in the U.S.

I am pleased to welcome Dr. **Casey Dietrich** to our faculty. Casey completed his PhD in Civil Engineering at the University of Notre Dame in 2011 and comes to us from the Institute for Computational Engineering and Sciences at the University of Texas – Austin where he was a Postdoctoral Research Associate. His research focuses on the prediction of storm surge during hurricanes, and he is looking forward to using our coast as his data set. **Matt Poisel** in our Construction Extension group has departed for Atlas Engineering but will teach this fall as we search for his replacement. In addition, we will be searching for new faculty in several areas this year.

We started the semester with a welcome back ice cream social for all of our students, and we thank **FDH Engineering** for their sponsorship. I used the opportunity to meet with new undergraduates and encouraged them to take advantage of the programs that make NC State a great university, including our student organizations and undergraduate research. I also described the undergraduate thesis option.

This newsletter features four research briefs from our faculty, highlighting the Department's contributions to civil infrastructure in drinking water

disinfection, offshore storage of wind and wave energy, enhanced performance of steel building beam connections during seismic events, and the degradation of fiber reinforced polymers used in structural applications. These briefs are great examples of how civil, construction, and environmental engineers are working to improve public welfare and environmental sustainability. In an effort to be more responsive to new opportunities and to better integrate our faculty's expertise, we have formed a cross disciplinary specialty group in Mechanics and Materials for faculty interested in fundamental research on civil engineering materials.

Several of our faculty and students have been recognized with national awards as described on pages 08 and 09. Notably, Weisiger Distinguished Professor Emeritus **David Johnston** received the ASCE Roebling Award in recognition of his outstanding contributions to the advancement of Construction Engineering — a well-deserved recognition for a career devoted to the Construction Engineering discipline.

I have updated the PowerPoint presentation that describes our academic and research programs. We continue to be a leader in research on many aspects of society's infrastructure, working across disciplines at scales ranging from nanoscale to field-scale. Please check out the presentation at [www.ce.ncsu.edu/about](http://www.ce.ncsu.edu/about), and let me know what you think.

As you read this newsletter, I hope that you get a sense of all of the wonderful activities in our teaching, research, and extension programs. As everyone is aware, the economy is not as strong as we would like. The legislature imposed a significant budget cut to the UNC system, and this is impacting the department. I have explained budget reductions that we have experienced in past letters and asked our friends and alumni for help. Many of you have responded, and your contributions are sincerely appreciated. It is time to point out that we are in a paradigm shift with respect to state funding. As a university and as a department, we have been dependent on state support, which is decreasing significantly. Private support must increase to simply continue, not to mention enhance, what we do. Please make a contribution to the department an annual event. Your gifts provide help with the special things that make us excellent, whether it is field trips for undergraduates, allowing graduate students to make a presentation at a national conference, or helping to recruit and retain the best students and faculty in the world. We need your support as we strive for excellence.

Thank you. •

A handwritten signature in black ink, appearing to read 'M. Barlaz', with a long, sweeping horizontal line extending to the right.

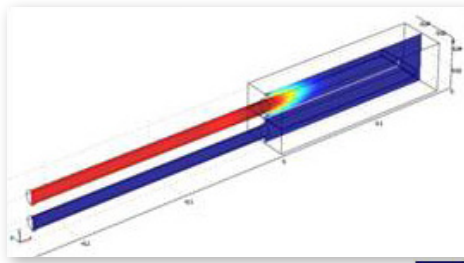
Morton A. Barlaz  
Department Head

## CCEE AT NC STATE SUSTAINABLE INFRASTRUCTURE FOR SOCIETY

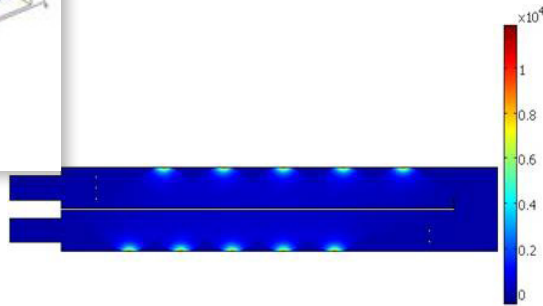
- \$17.5 million** in research expenditures
- 146** ongoing research projects
- 11** winners of CAREER and other NSF young faculty awards
- 47** faculty
- 315** graduate students
- 796** undergraduate students



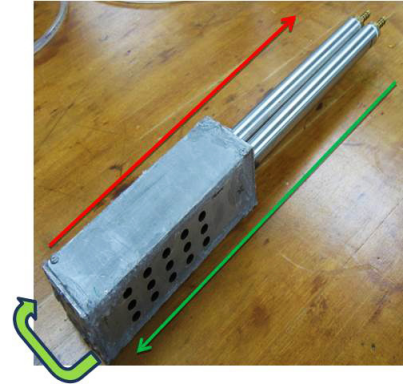
# RESEARCH UPDATES



Numerical simulation of pathogen load at different locations within the reactor.



Numerical simulation of illumination of the water flow path with ultraviolet light.



Small scale experimental drinking water disinfection reactor, showing ports for 15 LED lights on one side.

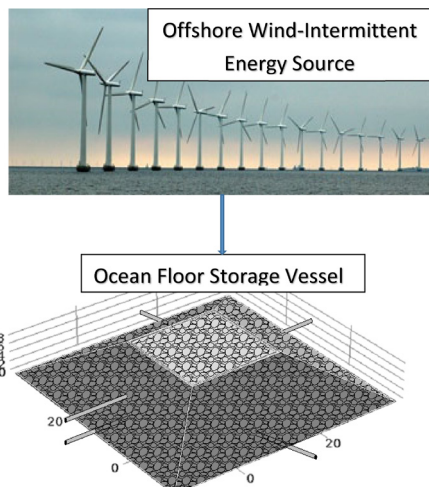
## LIGHT EMITTING DIODE REACTOR FOR DISINFECTION OF DRINKING WATER

Drinking water disinfection has typically been achieved by adding chemicals such as chlorine. However, chemical disinfectants are incapable of inactivating some harmful microorganisms, such as *Cryptosporidium*, and can produce harmful by-products. More recently, ultraviolet light (UV) from mercury-based lamps has become an increasingly popular disinfection alternative because it can kill chlorine-resistant pathogens without producing known

harmful by-products. However, mercury-based lamps can break, leading to harmful mercury release into the drinking water. With funding from the National Science Foundation, graduate students **Richard Jenny**, **Mohammed Safarin** (MENE, 2012) and **Colleen Bowker** (MSENE, 2010), and undergraduate student **David Talbert**, under the leadership of Dr. **Joel Ducoste**, are investigating the feasibility of using light emitting diodes (LEDs) as a source of

ultraviolet light. LED UV light offers the potential for a longer operating life, more design flexibility due to their small size, and avoidance of the health risks from possible mercury exposure. The research includes experimentation and numerical modeling. The research team plans to develop designs with numerous LEDs of varying wavelengths strategically placed for safely achieving high inactivation of pathogenic microorganisms. •

## STORAGE OF OFFSHORE INTERMITTENT RENEWABLE ENERGY



Schematic of an offshore wind farm connected to an ocean floor compressed air energy storage system.

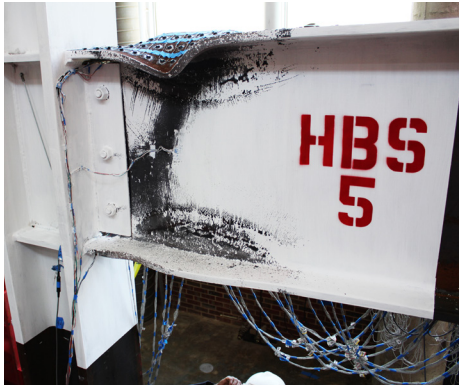
The advent of new technologies and faster computers makes the harvesting of renewable and environmentally friendly energy from NC coastal winds and waves an attractive option. One of the challenging aspects of these intermittent sources is the need for storage of the generated power to enable a more continuous and predictable electricity feed into the grid. A multidisciplinary team led by Dr. **Mo Gabr** with investigators Drs. **Shamim Rahman** and **Joe DeCarolis** from CCEE, Drs. **Paul Ro** and **Andre Mazzoleni** from Mechanical Engineering, and Drs. **Iqbal Husain** and **Emmanuel Agamloh** from Electrical Engineering are working on developing an offshore compressed-air-energy-storage

system with CCEE graduate students **Jin-Fu Xiao** and **Zahra Aghazadeh**. The wave- and wind- generated electrical power will be converted to compressed air, which will be stored at zero pressure differential at the bottom of the ocean. Ocean water hydrostatic pressure will maintain the compressed air until retrieval. Important issues such as anchorage of the storage system, soil-structure interaction and potential geologic hazards such as seafloor slope stability are being investigated for assurance against failure potential and construction feasibility. Funding of this research is provided by the Ocean Energy Engineering Program of the UNC Coastal Studies Institute. •



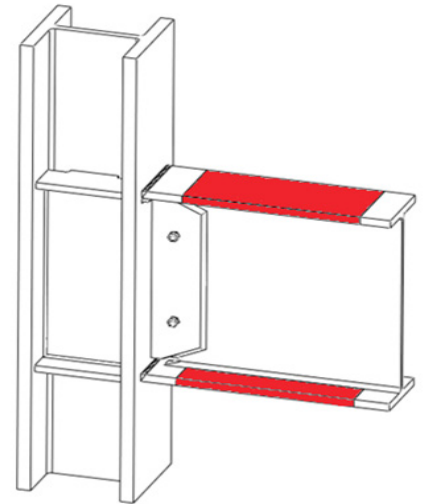
## IMPROVING RESILIENCE OF STEEL BUILDINGS TO EARTHQUAKES

In the aftermath of the 1994 Northridge earthquake in California, many steel buildings experienced undesirable weld cracks, resulting in billions of dollars in damage. An innovative technique for seismic performance enhancement of steel building beam-column connections has been developed and experimentally



Full sized connection between a steel beam and column illustrating desired deformation as a result of the new heat-treated beam section.

validated at NC State by a team led by Dr. **Tasnim Hassan** with CCEE graduate students **Machel Morrison**, **Doug Schweizer** (BSCE, 2011) and **Shahriar Quayyum**. With support from the National Science Foundation, the team has conducted rigorous structural analysis and full scale beam-column connection experiments to develop a novel technique to enhance beam performance involving a heat-treated beam section (HBS). Heat treatment reduces the strength of steel and thus allows large localized deformation to dissipate seismic energy without weld fracture. The technique has been validated in experimental work at the Constructed Facilities Laboratory. The research team is generating test data so that the novel connection can be prequalified by the American Institute of Steel Construction Committee for incorporation into building construction. •



Schematic of a building connection showing locations for the heat-treated beam sections (HBS).

## FIBER REINFORCED POLYMER AGING RESEARCH FOR EFFECTIVE INFRASTRUCTURE APPLICATION



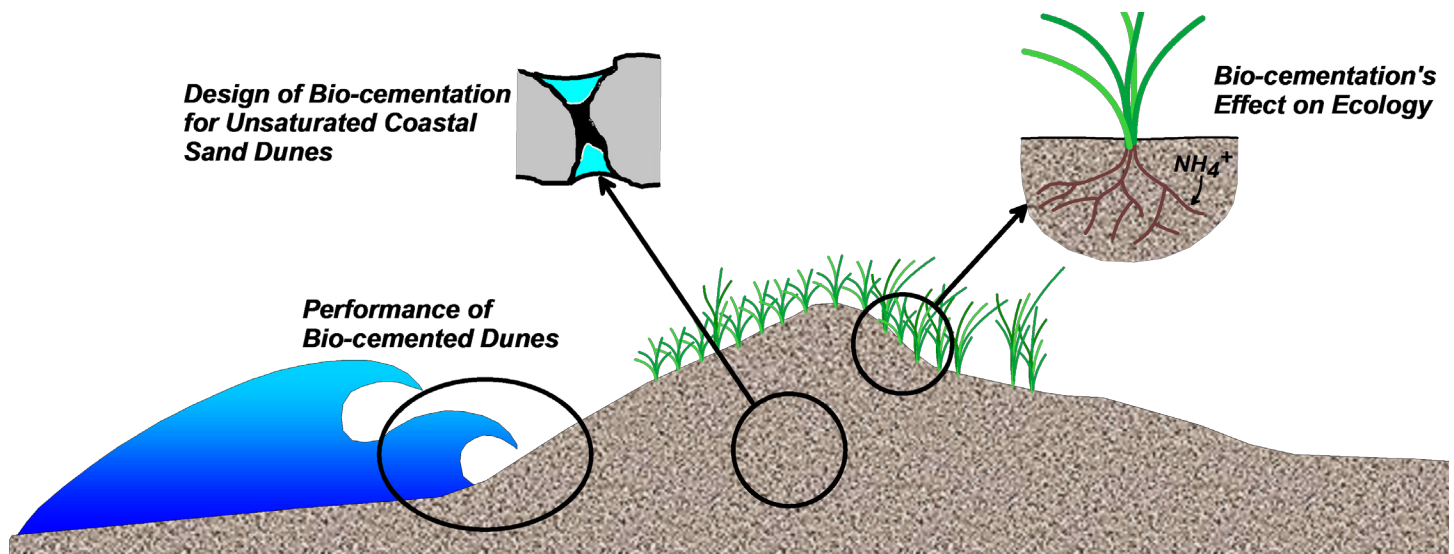
Fiber reinforced polymer (FRP) specimens under sustained loading and simultaneous exposure to moisture and aggressive agents for accelerated aging.

Fiber Reinforced Polymer (FRP) materials are high-strength, lightweight and non-corrosive. They are an alternative to conventional structural materials such as concrete and steel. However, because of comparatively limited research and knowledge about the long-term durability of FRP materials, designs using these materials include a high degree of conservatism. During their service life, FRP materials are subjected to a combination of loading and environmental conditions that may degrade the mechanical properties of these materials.

**Drs. Sami Rizkalla and Mohammad Pour-Ghaz**, in collaboration with researchers at West Virginia University,

are performing research to develop experimentally based predictive models that can be used to assess the rate of degradation of mechanical properties of FRP materials under service life conditions. Test methods are being developed to help researchers and practitioners quantify the degradation of FRP materials in the laboratory and in the field. This research is funded by the National Science Foundation. The research team includes a graduate student, **Bryant Miller** (BSCE 2012, valedictorian) and two undergraduate researchers, **Jonathan Holtvedt** and **Arienna Wilson-Muller**. •

# CCEE FACULTY AND COLLEAGUES GARNER OVER \$4 MILLION IN NEW FUNDED PROJECTS



Concept for bio-cemented coastal sand dunes.

The summer months have been highly productive for 18 departmental faculty who have received new sponsored projects from the National Science Foundation (NSF), North Carolina Department of Transportation (NCDOT), and Lean Construction Institute (LCI), with total funding of over \$4 million. These projects provide resources to support graduate and undergraduate research assistants and to obtain and utilize new state-of-the-art research equipment.

An interdisciplinary team of faculty in CCEE and the Department of Plant and Microbial Biology (PMB) was recently awarded a grant from the NSF **Emerging Frontiers in Research and Innovation** (EFRI) program. The team is led by principal investigator Dr. **Amy Grunden** in PMB, along with CCEE faculty Drs. **Ranji Ranjithan**, **Joel Ducoste**, and **Francis de los Reyes III**, postdoc Dr. **Jim Levis** and PMB faculty Dr. **Heike Sederoff**. The project goal is to develop a sustainable, scalable marine microalgal-based photosynthetic biorefinery (PSBR) for efficient generation of algal oils that are then converted to

transportation fuels. Algal oils are an ideal feedstock for biofuels production, offering high production density and the ability to use marginal water (e.g., municipal wastewater, brackish water)



Developing Transportation Fuel from Marine Microalgae.

and atmospheric carbon dioxide (CO<sub>2</sub>), and to reuse CO<sub>2</sub> in flue gases. The results will ultimately lead to a new design paradigm to develop efficient systems for microalgae-based fuel production, as well as conserve freshwater resources, mitigate eutrophication and reduce greenhouse gas emissions. This research also has

the potential to contribute to economic growth and security for the U.S. by reducing dependence on fossil fuel. •

CCEE Professor Dr. **Tasnim Hassan** is leading an interdisciplinary team of faculty from CCEE, Mechanical and Aerospace Engineering, and Nuclear Engineering to design and develop a novel miniature mechanical testing system. This team is funded by an NSF **Major Research Instrumentation** (MRI) grant. The objective of the research is to develop methods to measure the strength, ductility, fatigue and creep resistance properties of newly developed materials on miniature samples. Systems required for conducting these types of tests on miniature specimens are not commercially available. The results of this work have the potential to reduce the lead time for the design of new materials while also enabling prediction of component reliability with less uncertainty. •

Drs. **Francis de los Reyes** and **Joel Ducoste** have received an NSF grant to develop aerobic granular biomass reactors



for wastewater treatment, which represents an innovative, efficient, compact, and potentially more sustainable method for treating wastewater than conventional technologies. The development of aerobic granules in existing wastewater treatment plants represents a leap in technology with economic and efficiency benefits for the nation's wastewater infrastructure. •

Dr. **Brina Montoya** has recently been awarded a project from the **NSF Broadening Participation Research Initiation Grants in Engineering** (BRIDGE) program to strengthen coastal sand dunes using biologically induced cementation. Naturally occurring soil bacteria can be used to bind the sand grains together, thus increasing the strength and stiffness of the sand dunes. The outcomes of this project have the potential to impact the Outer Banks communities of North Carolina by strengthening the coastal sand dunes that are essential to protecting coastal infrastructure. BRIDGE grants support early-career faculty to integrate effective diversity-enhancing strategies into

their research and education activities. The research goals will be achieved while conducting outreach focusing on engaging young female students in engineering activities and increasing recruitment and retention of female university students. •

Seven faculty received five new projects sponsored by NCDOT. Drs. **Akhtar Tayebali** and **Mohammad Pour-Ghaz** will conduct a study on moisture in warm mix asphalt and its effect on material performance. Dr. **Margery Overton** will continue a long-term study to monitor and evaluate the shoreline response north and south of the Oregon Inlet due to the construction of the terminal groin built to protect Bonner Bridge at the north end of Pea Island. Drs. **Billy Williams** and **Nagui Roupail** will assess benefits, costs, and priorities for the NCDOT's Incident Management Assistance Program (IMAP). Dr. **Paul Khosla** will determine how to incorporate Recycled Asphalt Pavement (RAP) with virgin materials to achieve desired asphalt performance. Dr. **Cassie Hintz** will conduct a study

to determine appropriate pavement emulsion application rates to prolong pavement service life. Drs. **William Rasdorf** and **Mo Gabr** will design and develop a database archival and retrieval system for electronic documentation, management, qualitative analysis, and display of retaining walls which, in turn, will enable improved asset management. Drs. **Rudi Seracino**, **Gregory Lucier**, and **Sami Rizkalla** will assess the suitability of replacing steel pre-stressing strands in cored deck slabs with carbon fiber composite cable (CFCC) strands. In addition, they will investigate using glass fiber reinforced polymer (GFRP) bars as a replacement for conventional mild steel reinforcement in cored deck units. •

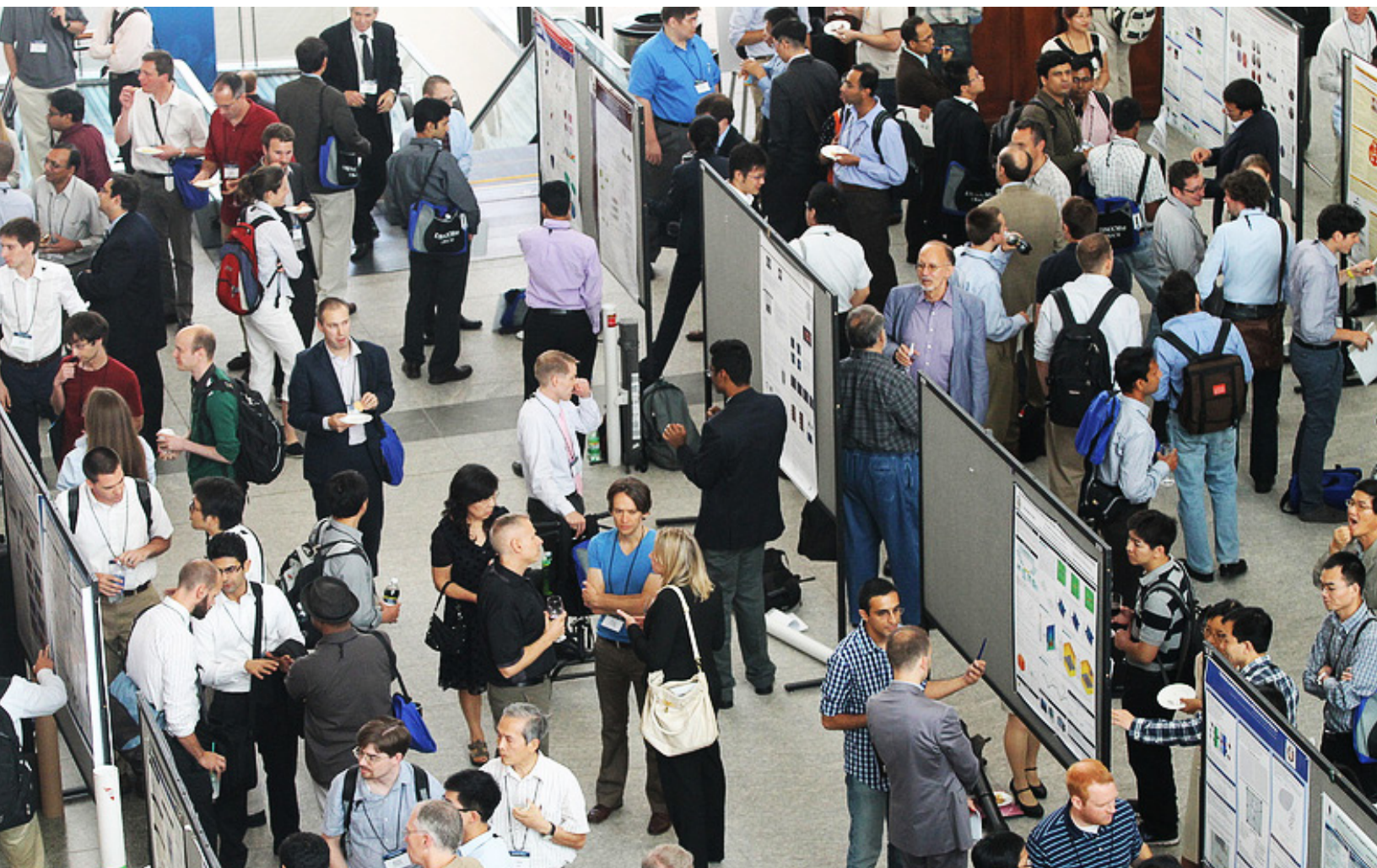
Dr. **Min Liu** received support from the Lean Construction Institute to evaluate methods for optimizing the performance of construction project teams.

The CCEE Department has 146 ongoing research projects with annual expenditures of \$17.5 million. •

## NEXT SHAW LECTURE >> COMPLEX MODELS

Professor **J. Tinsley Oden**, Associate Vice President for Research at the University of Texas-Austin and the Director of the Institute for Computational Engineering and Sciences, will deliver the **Henry M. Shaw** Lecture on Wednesday, November 6, 2013 from 3:30 to 5:00 pm in Mann Hall, Room 216. He will speak on "The Emergence of Predictive Science: Validation of and Uncertainty Quantification in Complex Models of Physical Systems." Dr. Oden is a member of the U.S. National Academy of Engineering. The lecture is open to the public. A reception will follow in the Mann Hall lobby.

The Henry M. Shaw Lecture Series in Civil Engineering was established in 1966 by the faculty and friends of Mr. Henry Marchand Shaw, Sr. The lecture honors the late Mr. Shaw, who was president of the North Carolina Products Corporation, for his contributions to the growth of North Carolina and for his interest in the University's School of Engineering.



Student poster session in action at the Raleigh Convention Center.

## NC STATE CO-HOSTS THE NATIONAL FLAGSHIP CONFERENCE ON COMPUTATIONAL MECHANICS

CCEE faculty member Dr. **Murthy Guddati** and Dr. **John Dolbow** of Duke University co-chaired the biennial 12th US National Congress on Computational Mechanics, held this year at Raleigh's Convention Center on July 22-25. The conference attracted approximately one thousand researchers from academic, industrial and government organizations around the nation and across the world.

The interdisciplinary meeting focused on computational modeling of complex physical systems and included talks on a wide range of topics, including

finite element simulation of civil and mechanical engineering systems, quantum mechanical and molecular modeling of materials, and advanced algorithms for internal structure characterization for engineering and biomedical applications. Computational mechanics is routinely applied to many civil engineering problems, from the prediction of seismic response of large structures, to the simulation of contaminant transport in surface water and groundwater. The conference included 77 mini-symposia, nine plenary

and semi-plenary lectures, four short courses, a plenary panel on careers in computational mechanics, and a poster competition in which 90 students presented their research.

Other members of the NC State organizing committee included Vice Chancellor for Information Technology **Marc Hoit** and Professors **Don Brenner** of Materials Science, **Mohammad Zikry** of Mechanical Engineering, **Pierre Gremaud** of Mathematics, and **Kumar Mahinthakumar** of CCEE. •



# COASTAL ENGINEERING EXPERT CASEY DIETRICH JOINS CCEE FACULTY



Dr. **Casey Dietrich** joined the CCEE department in August 2013 as an assistant professor. Dietrich's research focuses on the development of computational models for wind waves and coastal circulation, and their application to high-resolution simulations of ocean behavior. This fall, Dietrich is teaching the junior-level course on fluid mechanics and hydraulics and in the future will teach courses in coastal engineering.

Before joining the CCEE department, Dietrich worked for three years as a research associate at the Institute for Computational Engineering and Sciences

(ICES) at the University of Texas at Austin. Dietrich received his PhD in civil engineering from the University of Notre Dame in 2011. He received his MS in civil engineering, BS in civil engineering, and BA in journalism, all from the University of Oklahoma.

Dietrich's work addresses coastal processes, ranging from hurricanes to sediment transport, both of which can transform regions, albeit at rates ranging from hours to many years. Dietrich develops models to describe the oceans in deep water and the nearshore and then validates them against the best available measurements and knowledge of natural behavior. These models lead to improved understanding of the natural and built environments. His models have been used for levee design in New Orleans by the U.S. Army Corps of Engineers and for floodplain risk assessment along the Gulf and Atlantic coasts by the Federal Emergency Management Agency. He has also applied his models to forecast coastal flooding during recent storms including

Hurricane Isaac (2012) and oil transport following the BP spill in 2010. He plans to extend his models for civil engineering applications along the North Carolina coastline.

With regard to teaching hydraulics this fall, Dietrich says, "I hope to excite the students to continue learning in this area." He plans to incorporate cooperative learning into his course, where the lecture becomes a discussion as teams of students work examples and experience the material in a supportive setting. According to Dietrich, "They learn the material by doing it."

A factor in his choice to join NC State is that "when I got to know the people in the CCEE department at NC State, I knew it would be a great place for me to collaborate and learn." As Dietrich settles into his new home at NC State, he is also exploring the surrounding area. "I love Mexican food. It was easy to find in Texas, but I'm still learning where to look for it in North Carolina!" •



## OVERTON APPOINTED TO KEY ROLE IN IMPLEMENTATION OF NC STATE'S STRATEGIC PLAN

NC State University Provost Warwick A. Arden has reappointed CCEE's Dr. **Margery Overton** as Special Assistant to the Provost to continue her work on initiatives associated with implementation of NC State's strategic plan - The Pathway to the Future (<http://info.ncsu.edu/strategic-planning/overview/pathway-to-the-future/>). Overton will work with the Office of Academic Strategies and Resource Management under the leadership of Senior Vice Provost Duane Larick. In addition, Overton is a 2013-2014 ELATE Fellow. Executive Leadership in Academic Technology and Engineering, ELATE, is a leadership development program for senior women in science, technology, engineering and mathematics offered by the Drexel University College of Medicine and Drexel University College of Engineering.

# AWARDS



CCEE faculty and students racked up university, national, and international awards and honors in recent months



David Johnston

› Dr. **David Johnston** won the prestigious **Roebling Award** from the **Construction Institute of the American Society of Civil Engineers** for

his outstanding leadership in developing a path for construction engineers to pursue licensure as professional engineers and for continuing leadership in preparation of the construction engineering exam module for the civil engineering Professional Engineers (PE) exam. According to ASCE, the award "recognizes an individual who has made an outstanding contribution to the advancement of construction engineering." Dr. Johnston received his award at the national ASCE Annual Convention on October 11, 2013 in Charlotte, NC.

**Extension and Outreach Award.** He was recognized for his teaching and extensive research and for his work to translate his research into practice.



Sami Rizkalla

› Drs. **Sami Rizkalla, Gregory Lucier, and Paul Zia** won the **ASCE T.Y. Lin best paper award** for the papers, "Development of a rational design methodology for

precast concrete slender spandrel beams: Part 1, experimental results" *PCI Journal*, Spring 2011, and "Development of a rational design methodology for precast concrete slender spandrel beams: Part 2, analysis and design guidelines" *PCI Journal*, Fall 2011. They were commended for an extensive research program undertaken to develop a rational design procedure for precast concrete slender spandrel beams. The award was presented at the Prestressed Concrete Institute Conference in Grapevine, TX on September 24, 2013.



Jim Nau

› Dr. **James Nau** won the **2013 Chi Epsilon Excellence in Teaching Award** for the Cumberland District. He was

nominated by the North Carolina State University Chapter of Chi Epsilon in recognition of his dedication to teaching.

› An inter-institutional team of researchers, including Dr. **Mort Barlaz**, received the **2013 Thomas A. Middlebrooks Award** of ASCE's Geo-Institute for a paper titled "Deer Track Bioreactor Experiment: Field-Scale Evaluation of Municipal Solid Waste Bioreactor Performance," that was published in the June 2012 issue of ASCE's *Journal of Geotechnical and Geoenvironmental Engineering*.

› Dr. **H. Christopher Frey** was recognized as a **Best Reviewer** for the *Journal of the Air & Waste Management Association* and with a certificate of **Excellence in Reviewing** from the journal *Atmospheric Environment*, for providing "candid and insightful comments" and for "outstanding contribution to the quality" of each journal, respectively.



Bob Borden (center) receives Alumni Association award from NC State Chancellor Randy Woodson (left).

› Dr. **Bob Borden** was awarded an **Alumni Association Outstanding**



Susan Dunn working in the lab during her master's research.

› **Susan Dunn** (MS ENE 2011) received the American Water Works Association's **First Place 2013 Academic Achievement Award** for the best Master's

Thesis - "Effects of Powdered Activated



# HONORS

Carbon Base Material and Size on Disinfection By-Product Precursor and Trace Organic Pollutant Removal." Her research was funded by a National Science Foundation Graduate Research Fellowship and the Water Research Foundation. Her academic advisor was Dr. **Detlef Knappe**. She received the award at the AWWA Annual Conference in June in Denver, CO.



Yuanfang Sun

› **Yuanfang Sun** (MS ENE 2012) received the Air & Waste Management Association's **2013 First Place Master's Thesis Award** for her thesis entitled

"Inter-Vehicle and Inter-Run Variability in Real-world Activity, Energy Use and Emissions of Light Duty Gasoline Vehicles." Her research was funded by the National Science Foundation and her academic advisor was Dr. **H. Christopher Frey**. The award was given at the A&WMA Annual Meeting in June in Chicago.

› **Hana Chmielewski** (MSCE student) received a **National Science Foundation Graduate Research Fellowship** to pursue interdisciplinary PhD research with NC State's Civil Engineering Department and Operations Research Graduate Program. Her dissertation research is

entitled "Sustainable and Resilience Civil Infrastructure: An Interdisciplinary Model to Optimize Investment and Policy Planning in Water Utilities" and aims to produce a shared tool to model investment and policy decisions across the engineering, land-use, and mitigation planning disciplines. Chmielewski is working with Dr. **Ranji Ranjithan**.

› **Ingrid Arocho**, a construction engineering student, received the 2013 University Graduate Student Association (UGSA) **Outstanding Teaching Assistant Award**. Ingrid served as the Teaching Assistant for CE 301 Civil Engineering Surveying and Geomatics. The award recognizes exceptional contributions made by Graduate Teaching Assistants to the educational excellence of the University. Arocho is working with Dr. **William Rasdorf**.

› **Ayse Karanci**, a CCEE graduate student, has been selected by the SE Climate Science Center as one of seven NC State University graduate students to serve as **Global Change Fellows** for the 2013-14 academic year. Ayse will be exploring the impacts of sea level rise and vulnerability on coastal landforms. The Global Change Fellowship is a program designed to provide financial, scientific, and professional development support for graduate students who are interested in multidisciplinary research related to climate and global change.

› **P. Graham Pritchard** (BSCE 2011), MS student in Structural Engineering and Mechanics, won the **best master's student paper and presentation award** at the 2013 American Society of Mechanical Engineers' Pressure Vessels and Piping Conference held July 15-18, 2013 in Paris, France.

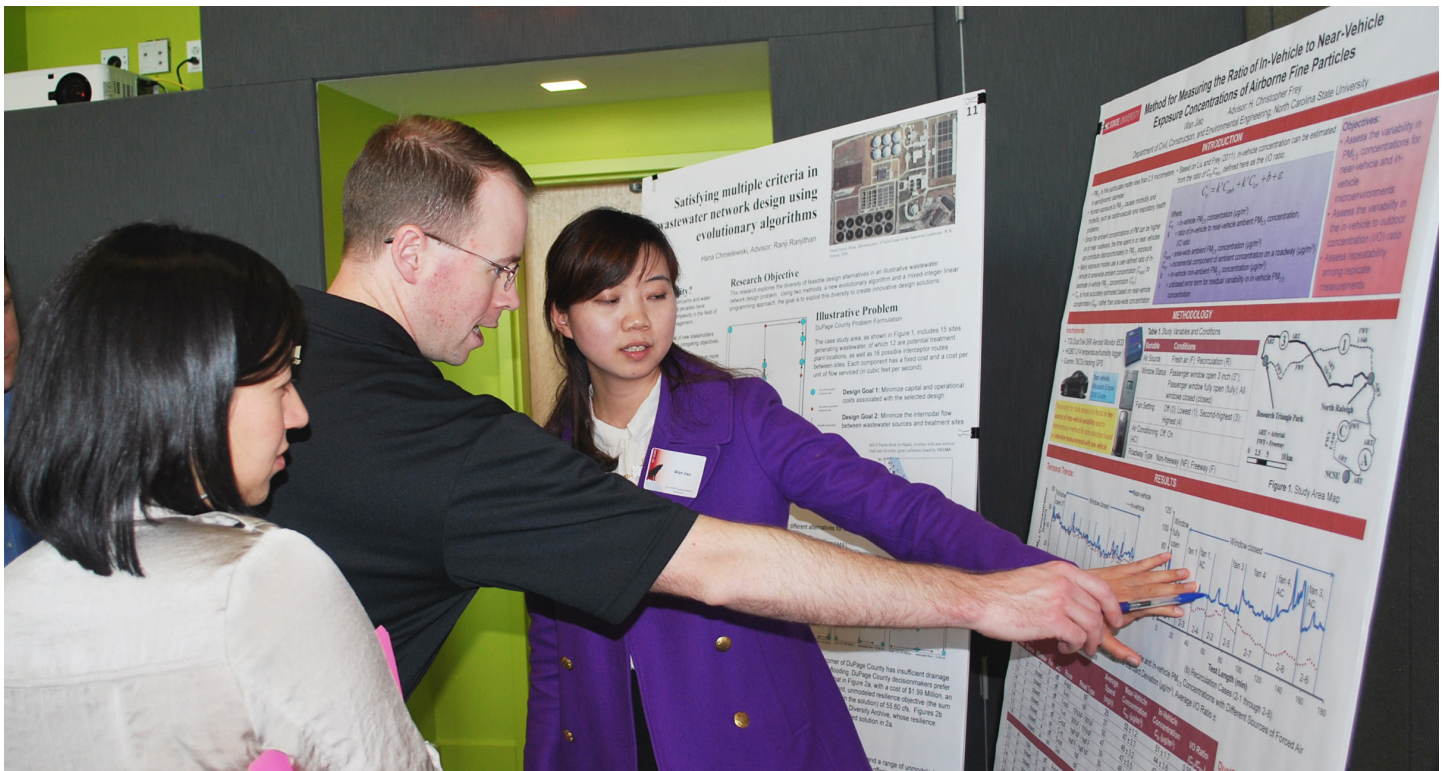
› In June, the NC Section of ASCE awarded the **Scholarship of Distinction** to **Greg Adams**, a CCEE senior and President of the NC State ASCE Student Chapter.



Roberto Nunez

› The American Concrete Institute awarded **First Place** in the **National Concrete Construction Competition** to a winning team of students,

including **Wyatt Starnes**, **Samuel Brewer**, **William Yandle**, and **James Freeman**, from the CE 463 Construction Estimating, Planning, and Control course. The winning team was selected from among 34 entries. **Roberto Nunez** is the ACI-NC State student chapter advisor and CE 463 instructor.



Wan Jiao (right) explains her research to Jon Williams (second from right) during the poster presentation.

## WATER RESOURCES AND ENVIRONMENTAL ENGINEERING SYMPOSIUM FEATURES 50 GRADUATE STUDENT PRESENTATIONS

The Water Resources and Environmental Engineering (WREE) Group held its 12th Annual Spring Symposium on Friday, March 15 at NC State's new Hunt Library. The Symposium featured 50 student poster presentations. Dr. **Nancy Love** of the University of Michigan delivered a keynote talk entitled, "At the Confluence of Nutrients, Pharmaceuticals and Sustainability: Emerging Issues in Wastewater Management." The symposium provides an opportunity for students to gain experience in preparing and delivering presentations and enhances the visibility of the WREE program with the professional community.

The timing of the symposium coincides with the height of recruitment activity for prospective graduate students. Nearly 20 such students visited during the symposium and met with faculty and current students.

Student posters covered a wide range of topics, including air pollutant emissions from vehicles, drinking water treatment, energy systems, fluid mechanics, groundwater remediation, human exposure to atmospheric fine particles, hydroclimatology, life-cycle analysis, microbial risk assessment, solid waste management, wastewater treatment and

water resources. Most of the presenting students are research assistants working with faculty on sponsored research projects. The content presented by each student will be part of their master's thesis or PhD dissertation. Although most of the student presenters were graduate students, undergraduate students also delivered presentations. For example, **Karoline**



Judges for the WREE Spring Symposium.



**Johnson** presented a poster on hybrid electric vehicle energy use and emissions.

The symposium organizing committee, comprised of graduate students, was chaired by **Hana Chmielewski** and included more than a dozen others. Faculty members **Sankar Arumugam**, **Francis de los Reyes**, **Ranji Ranjithan**, and **Emily Berglund** served as advisors.

The symposium was supported by a dozen sponsors. **FDH** was the Gold Sponsor. Silver Sponsors included the **Environmental Research & Education Foundation**, **Hazen and Sawyer**, **Geosyntec Consultants**, and **McKim & Creed**. Bronze Sponsors included **Dewberry**, **AECOM**, **Withers & Ravenel**, and **GHD**. Other sponsors included **HDR**,

the **Research Triangle Chapter of the Society for Risk Analysis**, the **Research Triangle Chapter of the Air & Waste Management Association**, and **Freese and Nichols**.

Two dozen professionals from area companies, government agencies, foundations, and professional societies served as judges for the best poster awards. Judges included **Charles Archer**, **Christian Bailor**, **Andy Bajoczky**, **Tim Baldwin**, **Les Hall**, **Steve Hilderhoff**, **Andrew Lindstrom**, **TJ Lynch**, **Karen Marsh**, **Mark McIntire**, **David Mobley**, **Cameron Patterson**, **Wayne Powell**, **Andrew Shull**, **Stacey Smith**, **Eric Solano**, **David Svendsgaard**, **Jeff Thompson**, **Cheryl Vetter**, **Angela Walsh**,

**Lauren Wellburn**, **Mike Wayts**, **Art Werner**, and **Jon Williams**.

Poster award winners were:

- 1st Prize: **Tate Rogers**, "Power Auger Modification for Pit Latrine Extraction in Developing Countries," advised by Dr. **Bob Borden**
- 2nd Prize: **Maged Al Gharably**, "Multivariate Function-based Energy Assessment During Early Building Design," advised by Drs. **Joe DeCarolis** and **Ranji Ranjithan**
- 3rd Prize: **Jeremy Fireline**, "Mapping Historic Disinfection Byproduct Data with ArcGIS to Identify North Carolina Surface Waters with Potentially High Bromide Concentrations," advised by Dr. **Detlef Knappe**
- Society for Risk Analysis Award: **Gurdas Sandhu**, "Comparison of Energy Use and Emissions from Ultra Low Sulfur Diesel and Biodiesel Blends for In-use Earthmoving Equipment," advised by Dr. **H. Christopher Frey**.



Presenters and attendees.



Judges and attendees gather around a poster.



Nancy Love delivers the keynote presentation.

The 13th Annual WREE Spring Symposium, to be held on March 14, 2014, is in the planning stages. The Department and WREE group are seeking financial and in-kind support to continue this event.

People interested in contributing to the annual WREE Spring Symposium should contact Ms. Lora Bremer at [lora\\_bremer@ncsu.edu](mailto:lora_bremer@ncsu.edu).

# NETWORKING PROGRAM BRINGS WOMEN STUDENTS TO CCEE

The “We are Women in Engineering” (We are WE) Networking Luncheon and Seminar was hosted by CCEE on March 14-15, 2013. A total of 35 local and visiting women participated in the We are WE Program, including 11 undergraduate women invited from other universities via a competitive application process. Visiting students came from Utah State University, University of Pittsburgh, Rensselaer Polytechnic Institute, Dutchess Community College (Poughkeepsie, NY), Ohio Northern University, and the University of Connecticut. Student travel costs were supported through the NC State University Office of Institutional Equity and Diversity, with additional support for the event provided by CCEE, **McKim & Creed**, **FDH**, and the **NC State Engineering Foundation**.

Visiting students toured the NC State campus and attended a luncheon with current CCEE female graduate students and faculty and an invited speaker, Dr. **Nancy Love**. Love is a professor of Civil and Environmental Engineering at the University of Michigan. In her

talk, Love described her path through industry and academics, as she balanced family, illness, and adoption. Visitors attended a CCEE panel discussion by Dr. **Brina Montoya**, Dr. **Cassie Hintz**, and PhD candidate **Stephanie Vereen**. The panelists took questions from the audience about their experience in graduate school, academic careers, undergraduate research, and transitioning from industry to academics. Dr. **Emily Berglund** led a workshop about formulating engineering research questions, and the students attended a presentation to learn about the CCEE’s Water Resources and Environmental Engineering (WREE) Group.

The We are WE Program was held in cooperation with the Annual WREE Spring Symposium (see article page 10).

Participants reported that the event improved their knowledge about NC



Women from NC State and from other schools attended the We are WE Program.

State, understanding of graduate school, and confidence in their academic abilities.

The We are WE Program will be held again in the Spring 2014, in cooperation with the WREE Spring Symposium. Individuals and organizations interested in supporting the We are WE Program can contact the NC State Engineering Foundation through **Lora Bremer** ([lora\\_bremer@ncsu.edu](mailto:lora_bremer@ncsu.edu)). For information about applying to attend the program, please contact Dr. Emily Berglund at [emily\\_berglund@ncsu.edu](mailto:emily_berglund@ncsu.edu). •

## SAVE THE DATE: CONSTRUCTION PROGRAM 60<sup>th</sup> ANNIVERSARY

The CCEE Department is planning to celebrate a milestone event for the Construction Engineering and Management program. The program is marking the 60th anniversary of its modern founding in 1954. The event will be held on **April 3 and 4, 2014** on campus and will include an informal lunch, panel discussion, tours of the campus, dinner and a golf outing. All “CEM” and “CEC” alums as well as CE

alums associated with the construction profession are welcome to attend. Come see faculty whom you may have had for class, Mann Hall, the new Hunt Library, and friends from your class.

We seek volunteers to help the planning team, especially in the areas of fundraising, marketing, corresponding with alumni and developing program booklets for the luncheon and dinner. •

Please let us know if you would like to attend or volunteer by sending an email or note to **Lora Bremer, Senior Director of Development and Alumni Engagement, Department of Civil, Construction, and Environmental Engineering, PO Box 7908, Raleigh, NC 27695-7908**, email: [lfbremer@ncsu.edu](mailto:lfbremer@ncsu.edu). If you have any questions, please call her at (919) 513-0983.

Also, please send Dr. **David Johnston** ([johnston@ncsu.edu](mailto:johnston@ncsu.edu)) any photos along with a caption including approximate date that might be appropriate for a slide show or presentation.





Stephanie Vereen, Megan Jaunich, Rachel Ingham, Nicole King Brown, Dr. Brina Montoya, Dr. Min Liu, and Haritha Malladi attend the sisterhood dinner.

## NC STATE 2013 SISTERHOOD DINNER

CCEE women graduate students and faculty attended the 2013 Sisterhood Dinner February 25, 2013 at the McKimmon Center. The annual event is sponsored by the NC State Council of the Status of Women and the NC State Office for Institutional Equity and Diversity. The Sisterhood Dinner honors, celebrates, and reflects on the achievements made by and on behalf of women. CCEE alumnus **Barbara Mulkey** (BSCE 1977, MSCE 1984) was the keynote speaker. Mulkey is the Founder and Chairman of the Board of Mulkey Engineers & Consultants, and she currently serves on the Board of Trustees for NC State University. Mulkey's keynote speech discussed transformational women, past, present, and future. Throughout her light-hearted

and thoughtful speech, she used anecdotes from her life to discuss topics such as work-life balance, leadership, ambition, and even fashion. She also outlined how women have impacted the workplace and all that women have achieved. Chancellor Randy Woodson gave the opening remarks for the evening, and the audience was serenaded by the female acapella group, Ladies in Red. The evening ended with the 2013 NC State Equity for Women Awards.

In attendance at the Sisterhood Dinner were CCEE graduate students **Nicole**



Barbara Mulkey giving the keynote address during the 2013 Sisterhood Dinner.

**King Brown, Hana Chmielewski, Rachel Ingham, Megan Jaunich, Haritha Malladi, and Stephanie Vereen.** CCEE professors Drs. **Min Liu** and **Brina Montoya** also attended. •



# NEWS FROM CCEE STUDENT GROUPS



Students from the NCSU-ACI chapter visit the Panama Canal Expansion Project.

## AIR & WASTE MANAGEMENT ASSOCIATION

Members of the Air & Waste Management Association (A&WMA) student chapter attended the A&WMA Annual Meeting in Chicago in June. **Yuanfang Sun** won First Place for Best Master's Thesis (see Honors and Awards on page 09). **Karoline Johnson** won First Place for Best Undergraduate Poster. Graduate students **Brandon Graver**, **Gurdas Sandhu**, **Bin Liu**, **Wan Jiao**, and **Jiangchuan Hu**, and graduating senior **Karoline Johnson** each received Student Travel Awards to attend and present papers from the Research Triangle Park Chapter and South Atlantic States Section of A&WMA. During the Spring 2013 semester, chapter president **Bin Liu** organized monthly meetings featuring A&WMA Fellow **Leo Stander**, Eastern Research Group, Inc. Vice President **Mae Thomas**, and Base-Trace CEO and co-founder **Justine Chow** on career and practice-oriented topics. The chapter looks forward to the 2014 Annual Meeting in Long Beach, CA and the 2015 Annual Meeting, to be held for the first time at the Raleigh Convention Center.

## AMERICAN CONCRETE INSTITUTE

During the spring break of 2013, 14 students from the ACI Student Chapter and four CCEE faculty visited the Panama Canal Expansion Project in Panama City, Panama. The trip was funded by student chapter fundraising activities, CCEE, the Constructed Facilities Laboratory, and generous NC State faculty and alumni. The group visited the \$5.25 billion project, guided by **Luis Ferreira** from the Panama Canal Authority and **Gerry Delrio** from CH2M HILL. Members of the NC State group provided a 1-day training program for local quality control technicians. Host organizations included Universidad Tecnológica de Panama, ACP, CH2M HILL, Grupo Unidos por el Canal, APACRETO, and Fall Line. Student participants included **Zach Anderson**, **Ingrid Arocho**, **Nick Blaser**, **Sam Brewer**, **James Freeman**, **Alan Herndon**, **Christopher Jones**, **Shadi Kamel**, **Lauren McCauley**, **Camila Perez**, **Cameron Richards**, **Stephanie Vereen**, **Ryan Weaver**, and **Travis Wetteroff**. The trip was led by NC State faculty **Roberto Nunez**, **Edward Jaselskis**, **William Rasdorf**, and **Matthew Poisel**.

## ASSOCIATION OF GENERAL CONTRACTORS

The AGC student chapter met monthly during the 2013 Spring semester, and hosted speakers from **Shelco**, **Mashburn Construction**, **McDonald York**, and **Clancy & Theys**. Student chapter members participated in several social events and site tours, including Service Raleigh, a Carolina Hurricanes game, a Buckner Steel facilities tour, and a Carol Johnson Poole clubhouse site visit. Members also took part in a technical training seminar to gain a working knowledge of the scheduling software, Primavera. The semester concluded with the first annual Industry Kickball Fundraiser, where students and professionals joined together to test their skills on the kickball field. Local companies, including **Brasfield & Gorrie**, **Norfolk Southern**, **Zachry Construction**, **S&ME**, and **AECOM**, sponsored this event.

## CHI EPSILON

NC State's Alfred P. Norwood Chapter of Chi Epsilon continued its tradition of honoring excellence by welcoming 10 new members in the Spring 2013 semester: **Jarel R. Duncan**, **Meredith L. Richardson**, **Michael A. Corwin**, **Kyle A. Hovey**, **David T. Overby**, **Sarah D. Lempert**, **Liya Weldegebreliel**, **James E. Corbett**, **Samuel K. St. Clair II**, and **Andrew R. Rice**. The new members were honored at the April 26th initiation ceremony and banquet at the NC State University Club. Banquet attendees recognized Dr. **Jim Nau** for receiving the 2013 Chi Epsilon Excellence in Teaching award for the Cumberland District. **Robert Macia**, President of Stewart Engineering, delivered a presentation that explored the importance of creativity and innovation in civil engineering design. He provided examples that included the expansion and renovation of the Talley Student Center and the 40-ft tall glass wall in the atrium of the Hunt Library.



## ENGINEERS WITHOUT BORDERS - USA

In May 2013, seven students and one mentor from the NC State chapter of Engineers Without Borders-USA travelled to the highlands of Bolivia to implement a rainwater harvesting



NCSU EWB-USA project team with students and faculty of CETHA technical school in Asanquiri, Bolivia.

system at a rural technical school, the Center of Humanistic Education in Asanquiri (CETHA). The rainwater harvesting system was designed to combat malnutrition in surrounding communities using sustainable agriculture and to increase the per capita water supply to students and teachers from 5 L/day to 30 L/day during the three-month-long dry season. **Kia Whittlesly**, of Rain Dance Engineering, served as mentor for the trip. The chapter was also recently awarded a \$10,000 grant from the Kenan Institute to support two project teams working to supply renewable energy and water to the Dele School in Freetown, Sierra Leone. Over the summer, chapter president **Velvet Gaston** (ENE), traveled to Freetown to support community development and education initiatives with Dele School and a partner NGO. The EWB-USA NC State chapter will host a fall benefit dinner on November 15, 2013.

## GEO-INSTITUTE

The Geo-Institute Graduate Student Organization (GI GSO) was founded over the summer and is sponsored by the ASCE Geo-Institute. The purpose of GI GSO is to create a network for geotechnical graduate students and

enhance career development for members through academic events and industry interactions. The GI GSO will hold geotechnical seminars, workshops, field trips, symposia, and social events. For Fall 2013, **Zahra Aghazadeh** will serve as president, and **Amr Helal**, **Hamed Mousavi** and **Jinfu Xiao** will serve as committee members.

## INSTITUTE FOR TRANSPORTATION ENGINEERS

Thirty-five members of the ITE student chapter attended the Transportation Research Board annual meeting in January in Washington, DC, including ten students who presented papers. The chapter hosted an Eat 'n Educate session with the North Carolina Section of ITE in February on tolling facilities, the NC Safe Routes to School program, and traffic signal timing optimization. **Chris Cunningham** (BS 2002 and MCE 2004) taught a Synchro® workshop exclusively for 20 student chapter members. Five chapter members delivered research presentations at the Southeastern Transportation Research, Innovation, Development, and Education Center (STRIDE) held in Orlando in April. The chapter's Traffic Bowl team competed well but will not be able to defend its 2012 ITE International Championship after finishing third at the Southern District ITE Annual Meeting in Charlotte in April.

## NC SAFEWATER

The NC State NC-Safewater Student Chapter, which is affiliated with the American Water Works Association (AWWA), continued meeting monthly and hosting socials for students and young professionals during the spring semester of 2013. In February, **Aaron Forbis-Stokes**, a PhD candidate in the department, gave a talk entitled "Decentralized Waste Water Treatment for Developing Communities." **Allison Reinert** from Hazen and Sawyer

gave a presentation entitled "Water Quality Impacts of Extreme Weather-Related Events" in April. **Amber Greune**, an MS student, was awarded a \$1,000 scholarship from the NC Safewater Endowment.

## PROFESSIONAL ENGINEERS OF NORTH CAROLINA

The student chapter of PENC will continue to have monthly meetings where professionals from local industries have an open discussion with students on current issues in engineering. The student chapter also has several networking socials with local professionals scheduled for this academic year. PENC will also be hosting Boy Scout engineering day again in the Spring.

## TAU BETA PI

In the 2012-2013 academic year, the NC Alpha chapter of Tau Beta Pi, the National Engineering Honor Society, welcomed 79 new members from across the College of Engineering, bringing the total number of chapter members to 5,860. Tau Beta Pi reinforced its commitment to service by volunteering with the Boys and Girls Club, Habitat for Humanity, Service Raleigh, and the College of Engineering's Family STEM Nights. NC Alpha also sent representatives to the 2012 National Convention in Lexington, KY and the 2013 Regional Conference at NC A&T in Greensboro. At the Regional Conference, NC Alpha received a Project Award for tutoring with the Boys and Girls Club. For the 2013-2014 academic year, **Landon Talley** was elected president, replacing **Andy Wagner** as the second consecutive president from the CCEE Department. **Elizabeth Hunter**, a graduate student in civil engineering, moved from vice president in 2012-2013 to NC-Alpha's graduate advisor. •

# NC STATE SHOWS WELL AT THE 2013 ASCE CAROLINAS CONFERENCE

The NC State Chapter of the American Society of Civil Engineers sent 25 students to the 2013 ASCE Carolinas Conference held April 5-6, 2013 at the University of South Carolina in Columbia. They competed in the Concrete Canoe, Steel Bridge and other competitions, earning several high finishes during the weekend. NC State competed against teams from Duke, UNC Charlotte, N.C. A&T, Clemson, the Citadel, University of South Carolina, Georgia Tech, and Trident Tech.

NC State's concrete canoe entry, *Blitzenwolf*, was led by captain and conference chair, **Joshua Smith**, and won 3rd place in Final Product Design, 1st in Men's Endurance with **Derek Dussek** and **Christopher Mattox**, and 2nd in Women's Sprint with **Vivian Chung** and **Ondine Paitel**.



Awards Banquet  
NC State's 2013 Conference Participants.

**Brad Chamberlain** and **Spencer Holloman** competed in the Surveying Challenge and placed 3rd. Freshmen and sophomore participants **Emily Gaye**, **Kristofer Malpica**, and **Vivian Chung** competed in the "Freshmore" challenge. A Tug-of-War competition rounded out the first day. The women's team (**Deborah Martogi**, **Ondine Paitel**, **Emily Gaye**, and **Vivian Chung**) finished 4th, and the men's team (**Gregory Adams**, **Weston Murphy**, **Spencer Bowman**, and **Brad Chamberlin**) finished 2nd.

This year's Steel Bridge, *Bloody Mary*, was led by **Evan Brigham** and teammates were **Dusty Griffin**, **Andrew Allison**, **David Overby**, **Gregory Adams**, **Weston Murphy**, and **Rhett Bunce**. Other competitions included: Transportation, Hydraulics, Quiz Bowl, Geotechnical, and the Mead Paper Presentation. The chapter earned a 3rd place finish in Hydraulics (**Nick Fitzgerald**, **Dylan Horne**, and **Spencer Bowman**), and a 2nd place finish in



Women's Tug-of-War Competition (Vivian Chung, Ondine Paitel, Deborah Martogi, and Emily Gaye).

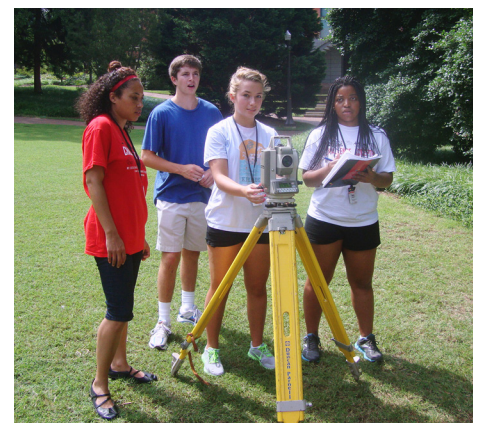
Transportation (**Julian Martinez**, **Dylan Horne**, and **Evan Brigham**).

The 2014 ASCE Carolinas Conference will be held in Charleston, SC, March 6-8 at the Citadel. 2014 Concrete Canoe Captains **Kristofer Malpica** and **Emily Gaye** and 2014 Steel Bridge Captain **Dusty Griffin** are eager to begin design and construction and invite students to join their teams. •

## CCEE HOSTS SUMMER CAMP FOR HIGH SCHOOL STUDENTS

The Department hosted a week-long summer camp for 24 high school juniors and seniors on June 23-28, 2013 on the theme of "The Multifaceted World of Civil Engineering." The camp's goal was to expose high school students to the variety of career paths available to civil engineering. Attending students came from North Carolina, Florida, Louisiana, Texas, and California. Students were exposed to problems in construction, structures, environmental, transportation, surveying and computer

aided engineering through a combination of field trips, exposure to engineering software and laboratory exercises. Instructors included Drs. **Mike Leming**, **Jim Nau**, **Joe DeCarolis**, **Tarek Aziz**, **Billy Williams**, **Brian Matthews** and **John Stone**, CCEE Senior **Bailey Wilson**, and doctoral students **Stephanie Varen** and **Ingrid Arocho**. Participating students commented that the camp "introduced me to the specific fields of engineering," and "made me think about which field of civil engineering I would like to study." •



Camper Surveying Team.





Practicum Students with Dr. John Stone (back row, third from left) and UCAB Engineering Dean Jose Ochoa (front row, right) outside the Hunt Library.

## PROF. STONE LEADS 12TH CCEE PRACTICUM FOR VISITING VENEZUELAN STUDENTS

For the 12th time since 2001, Prof. **John Stone** organized and led the CCEE Practicum in summer 2013 for a group of 27 rising senior civil engineering students from Venezuela, in collaboration with two faculty from Venezuela and with the assistance of 13 faculty and 3 graduate students in CCEE. Accompanying the students from Universidad Católica Andrés Bello (UCAB) and one student from Universidad Metropolitana were UCAB Dean of Engineering **Jose Ochoa** and UCAB civil engineering professor **Jose Gerardo**. For three weeks, CCEE instructors provided the students a wide variety of lectures, labs, and field trips. A typical day started with three lecture hours followed by an afternoon lab, experiment, or field trip related to the morning topic. CCEE faculty and graduate students led 12 sessions on

topics including concrete design, waste water treatment, structural dynamics, energy systems, nanotechnology, asphalt, lean construction, railroad engineering, traffic engineering, construction risk management, water filtration, and geotechnical engineering. The participating faculty included **Tarek Aziz, Chris Bobko, Joe DeCarolis, Andy Grieshop, Cassie Hintz, George List, Min Liu, Vernon Matzen, Brina Montoya, Roberto Nunez, Ranji Ranjithan, Rudi Seracino, and Billy Williams**. The participating graduate students included **Hana Chmielewski** (MS ENE 2013), **Nehemiah Mabry**, and **Matt Nifong**.

New features for the 2013 CE Practicum were student team contests focused on experiments and lecture topics. Teams of two to four students competed on estimating failure loads for a fiber-

reinforced polymer (FRP) reinforced concrete beam versus a steel rebar beam, identifying examples of asphalt pavement distress on nearby streets, and building home-made turbidity filters for nearby Pullen Park pond water.

Dr. Stone stresses that “the experience was not all academics and engineering.” The students enjoyed Triangle area entertainment, learned about North Carolina and US culture, shopped, and visited Washington, DC.

For the closing ceremonies, participating students created two videos ([go.ncsu.edu/2013\\_Practicum](http://go.ncsu.edu/2013_Practicum) and [go.ncsu.edu/2013\\_Practicum\\_2](http://go.ncsu.edu/2013_Practicum_2)) posted on YouTube, highlighting “a great opportunity” and “the best experience ever.” The students “learned a lot,” “had good times in Raleigh,” and “hope to come back to NC State.” •



# UNDERGRADUATE STUDENT FIELD TRIPS ENHANCE TECHNICAL KNOWLEDGE

Undergraduate students in CCEE participated in several field trips this spring to complement their classroom education.

On March 28th, a group of fifteen seniors from the department, accompanied by Dr. **James Nau** and Mr. **Irving Nazario**, traveled to New York City for a one-day visit to the George Washington Bridge and other civil engineering landmarks. This trip was made possible by the very generous support of alumnus **Otis Crowder** (BSCE-Construction Option, 1970). The students were selected in part on the basis of essays, in which they expressed the importance of such a trip for their professional development.

The group visited the George Washington Bridge Port Authority Administration headquarters, which is located near the New Jersey anchorage of the bridge. **Hector Eugui**, supervisor of maintenance planning for the bridge,



Andy Pordon of Stewart Inc. (first from right) leads CE 420 students through the UNC Hospital construction site in Hillsborough, NC.

escorted the group on an extensive tour. The George Washington Bridge is the busiest bridge in the world, in terms of traffic volume. Highlights of the tour included watching film from the 1920's on construction of the bridge, a descent into the bottom of one of the anchorages where the individual suspension wires are looped around eye bars embedded in the rock, and an ascent to the top of the



Dr. James Nau (in last row, with hat) and Mr. Irving Nazario (second from left) with CCEE seniors on top of the NJ tower of the George Washington Bridge, with New York City in the background.

tower located on the New Jersey side, 604 feet above the Hudson River.

In the afternoon, the group traveled by subway to Brooklyn where they walked across the Brooklyn Bridge. This trip afforded a fine view of Lower Manhattan, Upper New York Bay, and the Statue of Liberty. The day concluded with a walking tour of 1800's brownstone row houses in Brooklyn Heights and a subway trip to Grand Central Terminal in Manhattan.

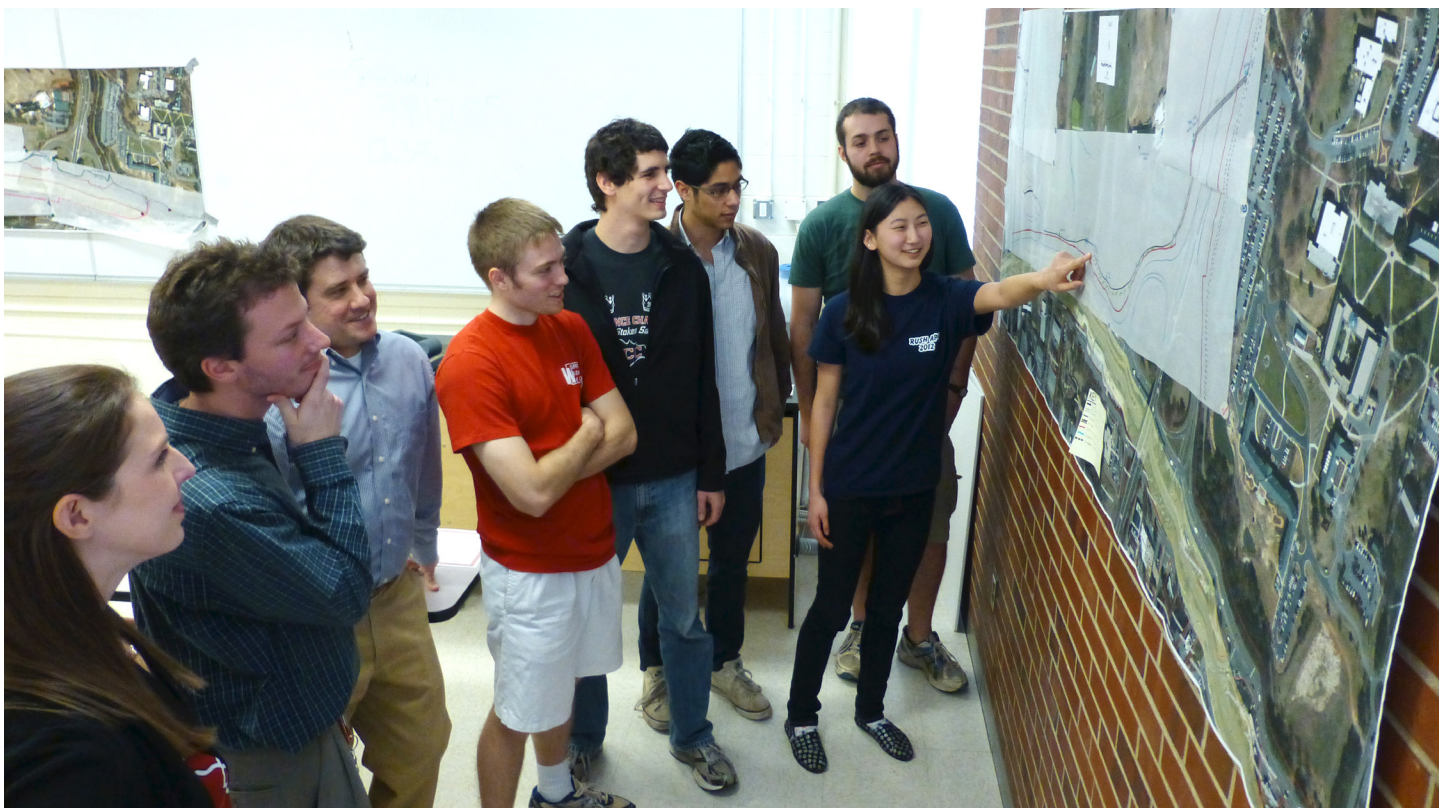
On April 11th, students from the CE 420 Structural Engineering Project class visited the construction site of a new UNC Hospital complex in Hillsborough, NC. The students were shown steel-framed building construction similar in many ways to the building designs they were developing for their semester project. They were also able to see the extensive foundation systems. The tour was led by **Andrew Pordon**, P.E., Structural Project Engineer at Stewart Inc., and **Joe Cox**, Senior Superintendent, and **Jason Tobias**, Project Manager, both representing Skanska USA Building, the construction management firm for the project.



Erik Hall, Plant Manager at the Cates Utility Plant on campus, points out equipment to students from CE 367 Mechanical and Electrical Systems in Buildings.

On April 18th, students in the CE 367 Mechanical and Electrical Systems in Buildings class toured the NC State Cates Central Utility Plant to see how mechanical and electrical systems provide heating and cooling for many buildings on campus. The tour was led by **Erik Hall**, Plant Manager, and **Paul Reynolds**, Plant Supervisor. The facility is one of the newest on campus, and its equipment, including chillers, boilers, and a co-generation system featuring a pair of gas turbines, represents some of the most up-to-date technology commercially available. Hall and his staff have been hosting our students at utility plants on campus for several years. •





The winning team in the spring 2013 KHAmptition discuss their conceptual design of a Greenway segment near NC State's College of Veterinary Medicine. From left to right are Kelly Busch Sizemore, Michael Ousdahl, Chad Beck (BSCE 2004), Zac Barker, Elam Summey, Bryan Lopez, Matt Daniels, and Katie Arbogast.

## KIMLEY-HORN SPONSORS 3RD ANNUAL STUDENT DESIGN COMPETITION

The third annual design KHAmptition, sponsored by Kimley-Horn and Associates, gave student teams a unique experience to apply their classroom education to a real-life engineering problem, with members of the winning team receiving \$250 scholarships. The competition, which took place on Saturday, February 23, 2013, was planned by **Chad Beck** (BSCE 2004), **Aaron Heustess** (BSCE 2007), **Elizabeth Lynch** (BSCE 2006) and **Richard Rohrbaugh** (BSCE 1981) with assistance from **Taylor Honeycutt** (BSCE 2012), all from Kimley-Horn and Associates. They challenged six teams of juniors, seniors, and graduate students to determine the best conceptual design for a new segment of the City of Raleigh's Greenway system. The project outline detailed the goals of the segment, to connect the existing

Greenway at Meredith College across the I-440 Beltline near Hillsborough Street to NC State's College of Veterinary Medicine. In addition to the engineering challenges, student teams were asked to address not only the needs of the City of Raleigh as the primary client but various other stakeholder groups.

Upon receiving the project information, teams had four hours to develop their concept and prepare a sketch design. Helping each team was a KHA mentor including **Jason Meadows** (BSCE 2006), **Julie Parham** (BSCE 2005), **Vance Blanton** (BSCE 2007, MCE 2009), **Trung Vo**, **Jeff Wilson** (BSCE 2008, MCE 2009), and **Cathy Murrell**. Some teams conducted a site visit, revealing the existence of a building under construction that was not shown in the aerial base map.

In the afternoon, teams had 10 minutes to present their concepts to a panel of judges, including Beck and Rohrbaugh, **Michael Ousdahl** from the NC State Transportation Department, and **Dave Josephus** from the NC State Architects Office.

The winning team was Employable Associates, consisting of students **Zac Barker**, **Bryan Lopez**, **Matt Daniels**, **Elam Summey**, and **Katie Arbogast**. Arbogast appreciated the opportunity to "work with professionals in the industry while I'm trying to get a job." Lopez added that the KHAmptition was "eye-opening to the consulting experience" and recommended it as a "worthwhile experience for upcoming students." •





Completed Constructed Facilities Laboratory.

## CCEE DEPARTMENT HISTORY: CONSTRUCTED FACILITIES LABORATORY AND SPACE JUGGLING

This article is one of a series intended to describe the department's history. This is the last of four articles that have focused on the buildings that have served as our homes. Other articles on faculty, students, development of programs, and educational and research facilities will follow. In parallel, a history section will be developed on our website. If you have photo images of the current Mann Hall under construction or in use that you could share, please contact David Johnston ([johnston@ncsu.edu](mailto:johnston@ncsu.edu)) with a description.

Following occupancy in December 1963, Mann Hall provided excellent space for the department for over a decade. But increasing enrollment and research activity spurred by the new facility began to create pressures. In 1975, the Department of Engineering Mechanics (EM) was disbanded. Its faculty moved to either Civil Engineering or Mechanical Engineering based on their preference and the fit of their teaching and research interests.



CFL structures lab lower mat and geotechnical sand pit.

Some EM laboratory space in Riddick transferred to CE with the EM faculty, but office space was a problem and several faculty offices were temporarily located in Burlington until a limited renovation of Mann Hall to convert classroom space to offices was completed in 1979. At the same time, the Mann environmental laboratories and machine shop were moved to Riddick, allowing Mann lab space to expand for materials, mechanics, structures, transportation and construction.

After state land was transferred to create the Centennial Campus in 1984, Dr. Paul Zia began to advocate for added laboratory space on the Centennial Campus as a part of an envisioned engineering research complex. Many years were required to secure state funding for the design and construction. Finally, in 1993, construction began on the Constructed Facilities Laboratory (CFL).



CFL structures lab and offices take shape.

Anticipating the need for new equipment for the CFL and other department labs, several faculty applied for a grant from the National Science Foundation which, including state matching funds, provided \$2.9 million for constructed infrastructure research equipment. Designer for the CFL was Odell Associates of Charlotte and the general contractor was Fowler-Jones Construction of Winston-Salem. A gradual move of equipment and offices to the CFL occurred in Spring 1997.



The CFL provided new specialized space for structural, materials and geotechnical research. With the move of those activities from Mann Hall, teaching and research labs were expanded for construction, materials, and mechanics. In other shifts, the machine shop moved back into Mann into space occupied by surveying instruments that were consolidated in a smaller space. In 2003, a traditional classroom was converted to a distance education classroom outfitted with the necessary cameras, monitors and control room.



CFL geotechnical lab becomes visible.



CFL structures lab prior to occupancy.

The move of Chemical Engineering and Materials Engineering to the Centennial Campus started a process of renovating Riddick for Chemistry and the loss of Riddick space for environmental engineering labs. Those labs were moved to renovated temporary space in the basement of the Broughton Diesel Wing. Growing programs overall resulted in the move of some offices to Daniels Hall and a new air quality laboratory into Burlington.

At one time, many other departments used classroom space in Mann, but the

need to expand computing space and graduate student office space has resulted in fewer classrooms and less use for non-CE courses. Although the use of spaces has evolved to meet ever changing technical needs, the general plan has served the department well.

Once again, the CCEE department looks forward to a new facility, this time to be located next to the Hunt Library on the Centennial Campus Engineering Oval when funding becomes available. •



Environmental Engineering Lab.

## CCEE GRADUATES 165 STUDENTS IN MAY 2013

The spring 2013 CCEE baccalaureate ceremony was held on Saturday May 11, 2013. A total of 109 students were awarded undergraduate degrees, including 79 in civil engineering, 14 in construction engineering and management, and 16 in environmental engineering. Master's degrees were awarded to 43 graduates, with 34 in civil engineering and 9 in environmental engineering. Doctor of philosophy degrees were conferred to 13 recipients.

The audience of about one thousand was greeted with opening remarks from Dr. **Mort Barlaz**. Dr. **Jim Nau**, Associate Head for Undergraduate Programs, recognized **James Corbett**, who delivered the valedictory address. Corbett is from Valdosta, Georgia, and will move to New York City, where he will pursue a graduate degree. **Farrell Sikes** delivered the Chi Epsilon address. Chi Epsilon is the National Civil Engineering Honor

Society. Sikes is from Polkton, NC, and will begin her career with the Louis Berger Group in Raleigh.

The College of Engineering honors outstanding seniors with four awards. Department nominees for the college awards were recognized, including Corbett for Scholarly Achievement and for Humanities, **Wyatt Starnes** for Leadership, and **Caitlin Melvin** for Citizenship and Service.

The commencement speaker was **Stacey Smith**, (BSCE-Construction Option 1992, MCE 2004), President of Smith Gardner, Inc. in Raleigh. Smith, a licensed Professional Engineer and a member of the department's external Advisory Board, also serves on the Research Council of the Environmental Research and Education Foundation. Smith offered three rules to live by: live simply, love deeply, and work with your hands. Smith closed by adding, "I believe



Farrell Sikes delivers the Chi Epsilon address.

the group before me is quite exceptional and fortunate. This institution is steeped in the production of great engineers, and I know that you will be a part of our history." •

## FIRM OF THE MONTH: VIEWS FROM PARTICIPATING FIRMS

*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, demonstrates to students the ways that they can use their degrees after graduation, and provides information on employment opportunities.*



**Kimley-Horn  
and Associates, Inc.**

It was an honor for Kimley-Horn and Associates, Inc. to be the CCEE Firm of the Month for February 2013. Founded in 1967 by NC State alumni, Kimley-Horn has continued to support the university by hiring NC State graduates and interns. We continue to look for ways to assist engineering students through scholarships, mentoring, and on-campus interactions by strengthening our connections with Wolfpack staff and professors.

College recruiting has always been a big priority for our firm and serving as Firm of the Month provides a great way for our engineers to spend quality time with students. Our on-campus events included a “Meet and Greet,” an information session, and interviews. For the third year in a row we also conducted our design KHAmptition (see article on page 19), where six student groups were given a Request for Proposal and asked to present their findings to a judging panel of Kimley-Horn and NC State engineers. Each member of the winning team received a scholarship. As usual, the students exceeded our expectations, and we’re pretty sure they had fun and learned a few things, too.

We pride ourselves in being one of the nation’s premier design consulting firms. Hiring, developing, and retaining the very best professionals and building relationships like those we have with NC State and CCEE make that possible. We appreciate the chance to participate as CCEE’s Firm of the Month — we are confident that our continued partnership with the Department will help grow the next generation of successful NC State engineers.



**McKIM & CREED**

Thank you for selecting McKim & Creed as the Firm of the Month for March. Both **Herb McKim**, PE, PLS, and **Michael Creed**, PhD, PE, are NC State graduates, and when they established McKim & Creed in 1978, they never dreamed that one day they would lead a 400-person engineering, surveying and planning firm headquartered on the Centennial Campus of their alma mater. From our Centennial Campus location, we enjoy interacting with the students of the Civil, Construction, and Environmental Engineering Department (several of whom we’re sure will become future employees) and truly believe that the enthusiasm, creativity, and resourcefulness we have seen from these students bode well for the future of engineering and its contribution to our communities.

It is gratifying to have been one of the CCEE Department’s Firms of the Month. We are proud of the work we do and were pleased to have an opportunity to share examples of our work with the students and faculty.



**STEWART**

Stewart was honored to be the CCEE Firm of the Month for the summer months of 2013. As an engineering, design and planning firm with offices in Raleigh, Durham and Charlotte, NC, we have many Wolfpack graduates working with us, including CEO **Willy Stewart** (BSCE-Construction Option 1981, MCE 1984). Our firm serves clients throughout the southeastern US. With a unique collaborative cross-disciplinary approach that results in stronger and more creative designs, Stewart offers a variety of services to meet the needs of its clients, including land planning and design, structural engineering, transportation, geomatics and construction services.

Founded in 1994 and enhanced by a merger with HadenStanziale in 2012, the firm has more than 100 employees. Stewart provides services in a variety of markets within the public and private sectors. Clients include education, healthcare, institutions, municipalities, architects, departments of transportation and the federal government as well as commercial, retail, residential and mixed-use developers.

We are proud to be active in NC State's CCEE program!



# CCEE ADVISORY BOARD 2013

## Board Chair's Notes – August 2013



Another school year is beginning and the CCEE Department Advisory Board is busy. We serve as a resource for the Department head, his leadership team, and CCEE students,

offering our business and career perspectives. The Advisory Board met in April, focusing its attention on student liaison activities, university and department development, engagement with alumni and other stakeholders, and the 2013 Zia Lecture plans. Board members also broke into smaller groups by discipline, working with teams of faculty members on more discipline-specific topics.

We held our second meeting of the year in September, in conjunction with the Zia Lecture. At this session we met with this year's new Student Advisory Board members, representing the student professional societies. As always, the Advisory Board is interested in what the current CCEE students are doing and are delighted to support student projects, speakers, and conferences. We also discussed the CCEE curriculum and pre-planning for the department's ABET accreditation periodic review.

Another of our major emphases will be development and how we and other friends of the department can help tell the powerful NC State story:

- Preparing workforce-ready students,
- Conducting world-changing research, and
- Accelerating job creation.

Expanding that message to an even broader group, the Advisory Board will also hold a joint luncheon with the Department Fellows where Dr. Barlaz will detail the department's exciting plans and projects. This has been a good year for CCEE, and we in industry are pleased to be part of the NC State team.

**Suzanne M. Beckstoffer**, BSCE 1982  
Chair, CCEE Advisory Board

*The Department receives valuable input from its Advisory Board. The Board maintains and fosters relationships with students, faculty, the Dean of the College of Engineering, the community, and alumni and supporters. The Advisory Board assists the department head in achieving department goals and objectives and provides counsel and advice from its unique perspective. The Board also advocates for the Department with the College of Engineering, the broader university and the community. Board members are also typically engaged in other ways, such as advising students in design courses, helping to connect faculty with industry stakeholders, and development. The Advisory Board meets each semester. Members serve for a four-year term.*

*The following distinguished alumni and friends of the Department currently serve on the Board:*

**Sepi Asefnia**, BSCE 1993  
SEPI Engineering & Construction

**Suzanne M. Beckstoffer**, BSCE 1982  
(Chair)  
Newport News Shipbuilding

**Thomas W. Bradshaw, Jr.**  
NC State Ports Authority

**Michael Creed**, BSCE 1973  
(Past Chair)  
McKim & Creed

**Heather Denny**, BSCEC 1995  
McDonald-York Building Co.

**Barry Gardner**, BSCEC 1975  
Shelco Construction Co.

**John Jenkins II**, BSCE 1990  
Stewart Engineering

**Christopher Murphy**, MSCE 1999  
FDH Engineering, Inc.

**Bill Pope**, BSCEC 1983  
Pope Custom Homes

**Richard Rohrbaugh**, BSCE 1981  
Kimley-Horn and Associates

**Stacey Smith**, BSCEC 1992, MCE 2004  
Smith Gardner, Inc.

**David Simpson**, BSCE 1981  
Simpson Engineers & Associates, P.C.

**Pam Townsend**, BSCE 1984, MSCE 1987  
AECOM

**Hans Warren**, BSCEC 1984  
Warco Construction, Inc.

**Tony Warner**, BSCEC 1966  
Warner Construction

**Dr. James Wilson**  
NC State University  
Edward P. Fitts Department of Industrial  
and Systems Engineering

# ALUMNI NEWS AND UPDATES

➤ **Clay Barclay**, (BSCE, 1990) graduated with a Master of Public Administration in December 2012 from NC State and in February 2013 was promoted to Chief Warrant Officer 5 in the US Marine Corps Reserves. Clay has been with the North Carolina Department of Transportation for 21 years and in the USMCR for 29 years.

➤ **Everette Curlee** (BSCEC 1958) was honored by the Professional Engineers of North Carolina (PENC) for 50 years of service to the PENC South Piedmont region on May 20th.

➤ **John Eichenberger**, PE, CIH (MCE 1994) has been working as an environmental engineer in New Mexico and Virginia for the past 19 years. He is a Senior Consultant at Faulkner & Flynn. He has completed projects related to landfills, wastewater treatment, hydrology/hydraulics, environmental remediation, regulatory support, and industrial hygiene, and has served as an expert witness. He lives in Charlottesville, Virginia. His oldest son is a freshman at Virginia Commonwealth University where he has a full scholarship in jazz performance. His youngest son has started high school.



➤ **Joseph M. Hatcher, Jr.** (BSCEC 1986) has been promoted to Chief Executive Officer at RESOLUTE Building Company,

a commercial general contractor in Chapel Hill, NC. Mr. Hatcher has been with RESOLUTE for 9 years, serving as a Project Manager and most recently as Vice President. He is also a licensed attorney in North Carolina and a member of the Construction Law Section of The North Carolina Bar Association. He graduated Cum Laude with a B. S. degree in Civil Engineering-Construction from NC State University in 1986 where he was awarded the "Outstanding Senior in Construction" award presented by the Carolinas AGC. He earned his Juris Doctor from NC Central University School of Law Executive Evening Program in 1999.

➤ **Joseph K. Hoffman** (BSCE, 1970) retired at the end of March 2012 as Executive Director of the Interstate Commission on the Potomac River Basin in Rockville, Maryland. He directed water supply, water quality and living resources programs in the 14,700-square mile Potomac River basin in PA, MD, VA, WV and DC. Previously, he spent 27 years with the Pennsylvania Department of Environmental Protection working in water management programs. He also served in the U.S. Army Reserve for 27 years, beginning with an NCSU ROTC commission in 1970 and culminating in military retirement as a Lieutenant Colonel in the Corps of Engineers. He and his wife, Karen, have relocated to Mechanicsburg.

➤ **Harry Mashburn** (BSCE 1964), Chairman and CEO of Mashburn Construction Company, has been awarded the 2013 Construction Hall of Fame Award by the Clemson University Department of Construction Science and Management (CSM). The Award recognizes the accomplishments of those who have distinguished themselves throughout their careers in construction.

➤ **Chris Millis** (BSCE 2005) was recently elected a state representative in the NC House of Representatives for District 16 representing Onslow and Pender counties. He serves as a vice-chairman on both the Commerce and Job Development Committees and a subcommittee on Energy and Emerging Markets. He is also a member of the Appropriations, Environment, Public Utilities and Energy, Regulatory Reform, and State Personnel Committees.

➤ **Douglas Morton** (BSCEC, 1983) is a Rear Admiral in the Civil Engineering Corps of the U.S. Navy. In August 2012, he became commander of the Naval Facilities Engineering Command (NAVFAC) in Norfolk, VA. After graduating from NC State in 1983, he was commissioned as an ensign in the Civil Engineer Corps through the collegiate program. He earned a master's degree in civil engineering at Georgia Tech in 1988, and is a registered professional engineer in Georgia.

➤ **James Robinson** (BSCE 1974, MCE 1976) was voted Engineer of the Year for Jacksonville, FL.

## 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](mailto:lora_bremer@ncsu.edu):

**Name, Mailing and Email Address**  
**Company Name and Address**  
**Work and Cell Phone Numbers**  
**Degree, Major and Class Year**



NC State's Talley Student Center Renovation and Addition

➤ **BD Rodgers** (BSCE 1949), of Rodgers Builders is Engineering News Record's Southeast "Contractor of the Year." In addition to health-care contracts, Charlotte, N.C.-based Rodgers Builders also found success in the higher-education market, such as its \$92-million Talley Student Center project at NC State University.

600 copies of this document were printed at a cost of \$2,017.20.



## FDH ENGINEERING SPONSORS CCEE NEWS



FDH Engineering, Inc., is the proud sponsor of CCEE News. The multi-disciplinary consulting firm, founded in 1994, has an international presence, having worked on projects throughout the United States as well as Puerto Rico, the Virgin Islands, South America, Korea and Japan. Its staff includes more than 170 professionals at the forefront of their industry in structural engineering, geotechnical engineering,

water resources engineering and non-destructive testing. Additionally, FDH offers a broad array of services to the construction industry, including construction management, sustainable engineering and LEED consulting services. FDH has offices in Baton Rouge, LA, and St. Louis, MO, in addition to its headquarters in Raleigh. Printing of this issue of CCEE News is sponsored by FDH Engineering, Inc.

## CCEE DEPARTMENT LOGO STORE



**DepartmentLogoStore.com** features apparel with the name and logo of the Department of Civil, Construction, and Environmental Engineering. Available items include polo and twill shirts, t-shirts, hooded sweatshirts, jackets and windbreakers. Items can be shipped within the United States or can be picked up, free of shipping, in Cary, NC.

To view the available selection and to place an order, visit [www.departmentlogostore.com](http://www.departmentlogostore.com).

## INVESTING IN THE DEPARTMENT

We ask you to invest in our future and make a commitment to CCEE. Your gift will help us take CCEE to a new level of excellence. As a result, we anticipate having better educated and prepared students entering the work force, which will raise the visibility and build the stature and prestige of the CCEE Department. There are many ways to give to the Department. Whether an annual gift, an endowed gift, or a one-time gift, it will have a significant impact on current as well as future students and faculty at NC State University.

Thank you for supporting CCEE.

Checks should be made payable to:

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For more information, contact:  
**Lora Bremer**, CCEE, Director of Development  
Phone: 919.513.0983  
Email: [lora\\_bremer@ncsu.edu](mailto:lora_bremer@ncsu.edu)



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