

SCHOOL OF CIVIL & ENVIRONMENTAL ENGINEERING

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ALUMNI PROFILE

# Stephen L. Dickerson's Vision Creates First Endowed Chair Residing in the School of Civil and Environmental Engineering

Georgia Tech Emeritus Professor Stephen L. Dickerson can be described as an educator, a researcher, an inventor, and an entrepreneur, but what defines him most, like his father before him, is that he is a generous family man. His recent gift to the School of Civil and Environmental Engineering



**Stephen L. Dickerson and his wife, Jane** (CEE) will ensure that his generosity will live on in perpetuity. Dickerson and his wife, Jane, have provided \$1.5 million to create the first endowed CEE chair, named the Frederick R. Dickerson Chair in honor of his late father.

The Frederick R. Dickerson Chair is intended to serve as the foundation for major CEE research and education initiatives in advancing the technological sophistication of urban

transportation systems, particularly the application of advanced communications and computing to facilitate congestion reduction and energy efficiency. Although Dickerson's research as a professor in Tech's School of Mechanical Engineering was in manufacturing automation and not transportation, he has experience in the field. He served a year with the office of the Secretary for the U.S. Department of Transportation, started a successful bus and vanpool service in metro Atlanta in 1975, and once taught the graduate urban transportation course in civil engineering. In addition to honoring his late father, the endowed chair will help make Dickerson's dream of thirty years come true. The chair's research will help alleviate traffic and air pollution through real-time communications and data processing that enhances public transit, ride-sharing systems, and car rentals.

Dickerson explains that his inspirations for the creation of the Frederick R. Dickerson Chair are threefold. Says Dickerson, "A great father and mother, the benefit I received from association with Georgia Tech, and the desire to contribute to resolving a significant problem all motivated our gift to Tech."

Dickerson's father has always been a primary source of inspiration in his son's life. Frederick (Fred) R. Dickerson was born in 1915 in Rockford, Illinois, and married Margaret Alice Nelson in 1938. His entire career was spent with Roper Industries, which originated in Rockford, Illinois, as the George D. Roper Corporation, and later relocated

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READER OPINIONS

Have questions or comments  
about the newsletter?  
We want to know what you think!

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## LETTER FROM THE CHAIR



By Dr. Joseph B. Hughes, Chair

Georgia Tech's School of Civil and Environmental Engineering (CEE) is one of the largest civil and environmental engineering programs in the nation. Right now, CEE enrolls approximately 1,000 students, employs over 90 faculty and staff, and has over 7,000 alumni. While I do not know each and every CEE alumni or student, I do know that all of us share some common characteristics. Passion is certainly one common thread, and so is an interest in helping others. I would also include generosity and curiosity in this list. In this newsletter, we illustrate how these similar traits are expressed by individuals within the wide range of their interests, from Advisory Board member Doug Hooker's path to his *Sinai Symphony* (see story on page 3) to 2003 alumnus Jordan Smith's success in competitive rowing (see story on page

5). Whatever our passion, we in CEE put our curiosity to work as we forge successful paths, whether in academics, athletics, culture, or our communities.

One of the most important paths that we are forging is in the emerging field of nanotechnology. Many leading scientists believe that nanotechnology and nanodevices have the potential to create a world that to date has only been possible in science fiction. Only time will tell what effect nanotechnology will have in areas of health, security, energy, and environmental protection, but one thing is certain: CEE professors will have a role in defining the future of nanotechnology. Today, many of our faculty members are engaged in work at the nanoscale, manipulating objects one billion times smaller than the head of a pin. To give you an example of the breadth of our nanotechnology activity and our passion for innovation, we have included an article that gives insight into our work in this exciting field (see story on page 7).

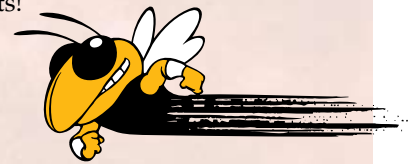
In addition to our work in nanotechnology, I am also pleased to present our annual fellowships, scholarships, and award winners (see list on page 11), as well as announce the establishment of the Frederick R. Dickerson Chair in CEE (see front page article). As the first endowed chair to reside in the School

of Civil and Environmental Engineering, the Dickerson Chair represents an important step in achieving our ambitious plan for the future. With this gift, CEE will be able to expand efforts in technology applications in transportation engineering and increase our multidisciplinary activities with other Tech schools and colleges. As many of you know, the establishment of endowed chairs in the School is my highest priority. These positions allow us to provide our students with world-class educational and research experiences from the best minds in the world, such as those featured on page 10.

If you have not been to campus recently, I invite you to drop by. In particular, I encourage you to visit the quad outside of the Ford Environmental Science and Engineering Building. A gift from Charlie Jones, CE '52, in memory of his late wife has transformed this area into a stunning landscape that all of us will enjoy for many, many years (see story on page 4).

As always, I hope that you enjoy this newsletter and look forward to hearing your comments about it.

Go Jackets!



## Kindsvater Symposium

On April 24, 2006, over one hundred participants gathered at Georgia Tech for the first annual Carl E. Kindsvater Environmental and Water Resources Symposium and Distinguished Lecture. The event was organized by the Environmental Technical Group (ETG) of the Georgia section of the American Society of Civil Engineers (ASCE), the Georgia Water Resources Institute (GWRI), the School of Civil and Environmental Engineering, and the U.S. Geological Survey. The symposium is named in honor of Professor Carl E. Kindsvater (1913-2002), who had a distinguished career at Georgia Tech from 1945-1972. Professor Kindsvater began his career in the area of hydraulic engineering and then moved into the field of water resources engineering and planning in a multidisciplinary academic setting. Professor

Kindsvater built the hydraulics laboratory in the old civil engineering building and created the graduate program in hydraulics and water resources at Georgia Tech. In addition, he initiated and led the GWRI from its infancy into a viable research entity that continues today. He was the winner of numerous ASCE awards, including the Collingwood Prize, the Norman Medal (twice), the Rickey Medal, and the Julian Hinds Award. Professor Kindsvater also served as president of the Georgia section of ASCE, and director of the District 10 ASCE Board.

The symposium was opened with welcoming remarks from College of Engineering Dean Don Giddens, CEE Professor Aris Georgakakos, director of GWRI, and Dr. Jim Wallace, who served as symposium moderator

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Carl E. Kindsvater (1913-2002)



## ALUMNI PROFILE

## A Mountain Inspires the Music

Inspirational moments come at different times and from many different places. For some it comes from a Sunday sermon at church, a visit to an art gallery on a rainy Saturday afternoon, or even a series of unfortunate events. For Georgia Tech alumnus Doug Hooker, ME '78, inspiration first came to him while he was climbing to the top of Mount Sinai in 1990 and eventually resulted in the composition of his first symphony. When Hooker debuted his *Sinai Symphony* with the DeKalb Symphony Orchestra on April 4, 2006, it was the musical achievement of a lifetime.

Hooker, who is the vice president and district director for the Southern States at Post, Buckley, Schuh & Jernigan, says that he often describes himself as having the training of an engineer and the soul of a musician. A native of Ohio who spent five years with the Cincinnati Youth Symphony Orchestra, he grew up playing the violin, viola, oboe, and saxophone in school orchestra and marching and jazz bands. "My mother tells the story that I came home from school one day when I was in the third grade and pronounced, 'Mother, I want to play the violin,'" says Hooker, who recalls that his mother sacrificed part of their grocery budget so she could rent a violin for him to play in his first school orchestra.

Although music played a large role in his early years, after high school he decided to focus on his professional career. After receiving his BS in Mechanical Engineering and his MS in Technology and Science Policy from Tech, he earned his MBA from Emory University. He then used his varied education to create a business niche, blending his engineering background with his public policy, technology, and business expertise. Initially hired as deputy commissioner of City of Atlanta Public Works because he understood engineers and also had management and policy experience, he was soon promoted to commissioner, paving the way for a management career within the civil engineering profession, including a stint as the Georgia State Road & TollWay Authority's executive director.

Although his extensive background in civil engineering makes him an excellent member of the School of Civil and Environmental Engineering's (CEE) External Advisory Board, it is his musical gifts that make him unique.

Hooker says that without inspiration, he would never have created his symphony. His first inspirational moment occurred in 1990, when he embarked on the trip of lifetime after being invited by a friend on a trip through parts of the Middle East. Sponsored by the Pittuloch Foundation, the trip's purpose was to expose future religious



Doug Hooker, ME '78

leaders to the history, geography, culture, and peoples in the area of the world where the three monotheistic faiths originated, especially Christianity. Part of the exposure included climbing Mount Sinai to provide the travelers with a better sense of the context of biblical writings. It was ascending the mountain, first on camelback and then on foot, that Hooker received the first inspiration for his symphony. He says he started hearing the musical concepts in his head, "but like a lot of other musical tunes that have come through my head during my life, I didn't do anything with it." Two years passed before he started waking up in the middle of the night, again to those musical tunes swirling around in his head. After this happened for several nights in row, his sleep-deprived wife (IM '80) encouraged him to capture the music and write it down. Although he had never written a musical score, he began what would become his symphony.

The second inspirational moment came courtesy of a friend he met while on the 1990 trip. His friend, who was planning on showing her artwork inspired by the trip, invited Hooker to premiere his symphony at her opening. Hooker remembers saying to her: "Have you lost your mind? You haven't even heard a note of it and I have only just begun to write it down." Despite his reservations, his friend's faith in his musical ability eventually gave him the courage to pursue his dream, and he premiered the second movement of his symphony, "Sinai: The Meditations," at her opening in 1992. Little did he know it would be another twelve years before the symphony would be completed.

In late 2004, he again turned to the music in his head and with the help of a Georgia Perimeter College music composition teacher, he began to refine his symphony. The instructor told him that Dr. Thomas Anderson, the music director and conductor of the DeKalb Symphony, might be interested in his work and took a copy of Hooker's symphonic score to him. Anderson told Hooker that he was so taken with the music he wanted to include it in the next season's concert series. Unfortunately, Anderson died in October 2005 without conducting the piece. Although the interim conductor of the symphony could have decided not to conduct the symphony, he opted to do so, and the full *Sinai Symphony* premiered in April 2006. "This was God bringing the creation of music through me," says Hooker, who hopes to have the *Sinai Symphony* performed again in the Atlanta area and other cities. "It was divinely inspired and divinely recreated."

He says that he learned a valuable experience by writing the symphony. "The only way to fully experience life in all its dimensions is to put yourself at risk," says Hooker, who is already working on different projects that involve jazz and string quartet interplay and a piece mixing chorus with symphony. "It is actually in failing or achieving that we grow. Attempting to write this symphony and having it performed was a way of putting myself at risk. I plan to do something every year to put myself at risk from now on."

## ALUMNI PROFILE

## Charlie Jones Gives a Gift that Will Keep on Giving

Alumnus Charles (Charlie) H. Jones, CE '52, is donating nearly one hundred trees through White Oak Farm to the School of Civil and Environmental Engineering (CEE). His generous gift will help beautify the Georgia Tech courtyard quadrangle between the Parker H. Petit Institute for Bioengineering and Bioscience building, the Ford Environmental Science and Technology Building (EST), the Wallace H. Coulter Biomedical



Charles H. Jones

Engineering building, and the M building (currently being erected). The trees will be planted outside the EST Charles H. Jones Auditorium by the end of June 2006. This area in the northeast part of the

Georgia Tech campus has seen tremendous growth over the past few years, with the addition of buildings housing some of Tech's most innovative schools and programs. Jones's gift will not only benefit Georgia Tech, but will also serve as a memorial to his late wife, Judith Davis Jones, who lost her battle with cancer in September 2005.

Jones gained his appreciation for all things outdoors at an early age from his involvement with the Boy Scouts of America, who emphasize personal development through community service, leadership, and individual challenge. Throughout his life Jones has embodied all of these traits, as evidenced by his many accomplishments. He readily credits his Scout master and mentor, William (Bill) Green with encouraging him to attend Georgia Tech and become a civil engineer. Jones's own father and an older brother both attended Tech's rival, the University of Georgia, but Green, a Tech graduate and civil engineer, had

a great deal of influence on Jones. "He was a Georgia Tech civil engineer so I wanted to be one, too," says Jones. "He was a person you had to love and admire because of the way he lived his life." Because of Green's influence, Jones decided to go to Tech and follow in the path of Green and an older brother, who graduated with a PhD from Tech.

Jones says at first he was not prepared for the amount of discipline that Tech demanded from him. "At the end of the first quarter, I went home and told my Dad that I wanted to transfer to someplace else," he recalls. His father told him that he had to finish the first year and after that he could attend college anywhere else in the United States. "He knew what he was doing," says Jones. "At the end the year, I was happy and decided that I could pass." He continued his education and graduated from the civil engineering program, firmly planting his roots at Georgia Tech.

After graduating, Jones, who received a military commission through the Advanced ROTC program, embarked on a two-year military assignment in Detroit. He remembers, "I got my degree from Tech one day, my commission as the second lieutenant the next day, and my order to report to active duty the next day." After serving time "defending Detroit" he returned to Atlanta, where he went to work for his former Boy Scout master, Green, at a well known Atlanta-area civil engineering firm.

It was during this time that he met his future wife, Judy Davis, on a blind date. Jones remembers not being able to recall her name because while on the date he was also introduced to several of her roommates. By the end of the evening, he recalls, "I left with the prettiest girl—but I had to ask Judy what her name was. She never let me forget that." Despite his memory slip, they soon began a partnership that would span fifty years and produce three children.

While she set up their household, he branched out at work. It was not long before he discovered that he would not be able to advance his career within the civil engineering firm where he was working. He did, however, develop a close friendship with two colleagues, a friendship that eventually blossomed



Charles and Judy Jones on their wedding day

into the partnership that would form Jordan, Jones, and Goulding, a well known Atlanta firm specializing in engineering, management, and planning. Jones says that he and William Jordan started out in Jordan's basement doing simple civil site projects at first, then began to break into municipal work. One of the company's earliest large-scale projects was to design a water and wastewater system for everything north of the Chattahoochee River in North Fulton County, Georgia, a project that kept the company busy for around four years. During this time, Randolph Goulding joined the partnership, and soon the company was completing a variety of civil and environmental engineering projects, as well as tunneling and transport projects.

In 1999, Jones retired from the successful company that bore his name, but he continued to indulge his entrepreneurial spirit with other business ventures. One such venture was White Oak Farm, a 230-acre farm in Social Circle, Georgia, that he purchased during the 1970s. It was on the farm that he and his wife developed a passion for plants and trees that spawned Southeastern Wholesale Nursery. The nursery was recently sold, but the farm continues to provide trees to Atlanta-area nurseries.

It is only fitting that Jones, who has lived on the farm since retiring, would honor his wife by combining his love for Tech with his wife's passion. "I had a sweet wife," says Jones. "She loved trees and the farm. It would warm her heart to know about this gift."



## ALUMNI PROFILE

## Jordan Smith Engineers His Passion for Rowing

From a young age, Jordan Smith, CE '03, knew that physical activity made him happy. A native of Forestville, California, Smith was a high school track and basketball star. "I am the type of person that will work out for three hours a day, whether I need to or not," he says. "I actually get kind of moody if I don't." He also knew that he wanted to work outside. "I always wanted to be an environmental engineer," says Smith, who participated in a regional drafting program while in high school.

When it was time to decide which college to attend, he seriously considered two schools, California Polytechnic State University (Cal Poly) and Georgia Tech. "My mom grew up in a town near Gainesville, Georgia," says Smith, "so my parents said, 'You have your choice of Georgia or California.' I did a lot of praying to figure out what to do and I thought that if I didn't leave California, I would never get out. I needed to see the rest of the world." Athletics also played a key role in his decision to come to Tech. "I really wanted to play basketball," says the six-foot, seven-inch Smith, "and the Cal Poly program was nothing special compared to Georgia Tech's."

While attending Tech, however, Smith discovered that basketball was not his sport. He tried volleyball, but found it, too, was not a perfect fit. Then he met the woman who would become his wife, and she introduced him to what would become his athletic passion. "The first time I met Joy, she recruited me in two ways," he says. "She said that if I wanted to spend any time with her that I would have to row."

Immediately, Smith knew that the bar was set high—not just by Joy, but also by Georgia Tech Crew Head Coach Rob Canavan. A graduate of Temple University, Canavan was a two-time gold medalist at the American Nationals and the U.S. Nationals, and a U.S. Olympic Festival gold medalist. Since he became Tech's head coach in 1995, Tech's rowing program has grown significantly, becoming one of the most successful programs in the South.

"When I first saw Jordan, I knew that he was an athlete," says Canavan. "He was a coach's dream—the perfect size and build for the sport."

Although he had never been part of a rowing crew prior to his fateful introduction to Joy, Smith accepted the challenge of learning a new sport while balancing the demands of being a student at Georgia Tech. At first, the balancing act did not come easily. "My first quarter at Tech, I got a 2.33," says Smith, who earned top grades in high school. "That was a shock, a very rough adjustment."

But Smith, who often practiced his rowing skills two times a day, noticed that as his rowing skills improved, so did his grades. He praises his School of Civil and Environmental Engineering professors for their assistance. "Dr. Saunders has done worlds for me—he was always there whenever I had a problem," says Smith. "Dr. Jacobs is a close second." Although he stayed focused on his studies, he knew that rowing had earned a special place in his life. "My true love and passion was with rowing."

His passion soon translated into personal and team success. His proudest accomplishments include setting erg records for individual competitive

rowing on a machine and winning a silver medal at the Intercollegiate Rowing Association's National Championship during his senior year, the first year Georgia Tech crew members won medals at the competition.

His success with rowing did not end with his graduation in 2003. After briefly

retiring from the sport and coaching the Atlanta Juniors, he began to train again in earnest in 2004, this time for a place on the National Team to represent the United States at the 2005 World National Championships in Japan and the 2008 Summer Olympics in Beijing.

His success did not come without sacrifices. On January 5, 2005, the day after he and his wife celebrated their anniversary, he loaded his belongings and boat and drove to Philadelphia—alone. After months of intense training, Smith and his pair partner, Micha Boyd, won two trial races, earning them a place on the National Team, which traveled to Japan for the 2005 World National Championships. In Japan, despite their training, Smith and Boyd finished in third place.

After the disappointing finish in Japan, Smith began to focus more on two-oar rowing, which is called sculling. He was ready to train at the National Team's warm weather training center in San Diego when he received another disappointment, this time in the form of a back injury five days before his scheduled leave date.

Despite the setback, Smith, who has not been able to row for four months, continues to coach rowing and is optimistic that he will be able to resume rowing this summer, with a long-term goal of competing at the Beijing Olympics.

Whether he becomes an Olympic athlete or continues his work as a civil engineer for Pennoni Associates in Philadelphia, he knows that he will be successful. He attributes much of his success to his experiences as a Georgia Tech student athlete. At Tech, "we have a slogan at the boathouse: Plan to win, prepare to win, expect to win," explains Smith. "From day one we make a plan to win. We go out and prepare for that win. Focus, focus, focus on that win. To be at Georgia Tech, you are a winner. You are already a step above."

For more information on Jordan Smith, visit his Web site at <http://trainedgenotes.blogspot.com>.

For more information on the Georgia Tech Crew team, visit [www.gtcrew.com](http://www.gtcrew.com).



Jordan Smith (right) practicing his craft.



*Stephen L. Dickerson's Vision Creates First Endowed Chair Residing in the School of Civil and Environmental Engineering*  
Continued from front page

to Commerce, Georgia, as the company grew into several divisions. Dickerson, who retired in 1980 as chairman of Roper, served his community by organizing a sewer system for Durand, serving as chairman of the Commerce Library Board, and serving as the Commerce School Board chairman as the Commerce School System underwent desegregation.

Steve Dickerson earned his bachelor's degree at the Illinois Institute of Technology, his master's at the University of California-Berkeley, and his doctorate at the Massachusetts Institute of Technology. He then launched his career at Tech in 1965 as an assistant professor in the Woodruff School of Mechanical Engineering.

His long history of philanthropy and service at Georgia Tech include serving as an Alumni Association trustee. He is a member of the Phoenix Club, the Presidents' Council, and the Hill

largest infrastructure problems, we need to have endowments in place that allow innovative faculty to work with their students on asking new questions and creating new solutions. Steve Dickerson is a shining example of an academic who utilized creative thinking to create success through the formation of patents and companies. Whoever steps in as the Frederick R. Dickerson Chair can learn a lot from looking at Steve's experiences."



The Dickerson men from left to right: Gregg, John, Fred (beloved father), Jim, Steve, and Mark.

Fred Dickerson was passionate about hard work and education, as evidenced by his five sons' degrees: three have doctorates from Harvard, the Massachusetts Institute of Technology, and the California Institute of Technology, and the other two sons have BS degrees from Georgia Tech and the University of Georgia. All but one son has been associated with Tech. Steve, the oldest, joined the Tech faculty in 1965 as an assistant professor in the Woodruff School of Mechanical Engineering and retired in 1996. John is a professor at the University of South Carolina and was a visiting faculty member in the Woodruff School from 1975-76. Stuart received his BSME degree from Georgia Tech in 1973 and retired as the manager of a National Steel mill in Detroit. Gregg is the public utility manager for the Georgia Department of Revenue and was a student at Georgia Tech from 1967-1969.

Society, and also regularly contributes to the Machine Vision Fund within the School of Mechanical Engineering. In December 2004, he was awarded the Honorary Alumnus Award from the Georgia Tech Alumni Association for his work as a non-alumnus on behalf of the greater good of Georgia Tech. A 2004 Fellow of the Society of Manufacturing Engineers, he is the recipient of the Inventors Club of America's New Technology Award and the Atlanta Business and Technology Alliance's Most Innovative Technology Award. He holds several patents that have been the basis for Georgia Tech spin-off companies in robots and machine vision for manufacturing applications.

"The establishment of the Frederick R. Dickerson Chair is a significant step for the School," states Dr. Joseph B. Hughes, CEE chair. "To continue to compete at the highest levels and solve the world's



## RESEARCH NEWS

## It's a Small, Small Nanoworld

### Research in Nanotechnology and Science

If you are like many people, the first time you ever heard of "nano" was when Apple® introduced the iPod nano, the strikingly smaller version of the popular iPod music player. But it seems Apple® leveraged the trendy "nano" for the product from the scientific term "nanotechnology." What is nanotechnology? The National Nanotechnology Initiative defines nanotechnology as "the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale. Nanotechnology research and development is directed toward understanding and creating improved materials, devices and systems that exploit these new properties." While the origins of nanotechnology research began in the laboratories of chemists and material scientists, civil and environmental engineers are becoming increasingly involved in this area of discovery that has tremendous potential to create solutions to problems new and old.

School of Civil and Environmental Engineering (CEE) Professor and School Chair Dr. Joseph B. Hughes, who also holds a joint appointment as a professor in the School of Materials Science and Engineering, is looking forward to new nanotechnology innovations created by civil and environmental engineers. "There are many areas of civil and environmental engineering that will be dramatically influenced by the understanding of nanoscale processes and the ability to create nanodevices," he explains. "The potential applications are seemingly endless and include revolutionary materials, sensors, imbedded devices, catalysts, and sorbents, just to name a few." Hughes is excited about the range of nanotechnology projects that civil and environmental engineers are already exploring, such as the fabrication of nanomaterials to test applications in the areas of water treatment. "What is interesting is that areas of on-going research in CEE have direct applications to many of the

challenges in nanotechnology research today," he says, citing examples like the study of properties of naturally occurring nanomaterials. "Civil and environmental engineers have a large role to play in nanoscale research. In fact, we have a number of faculty members that are very active in the 'nanoworld!'"

One example of the extension of civil engineering in the nanoworld is solid mechanics at nanoscales. Historically, civil engineers have contributed significantly to theoretical and numerical aspects of analysis of large-scale structures, e.g., bridges, tall building, towers, and dams. With the new advances in nanotechnology and the potential of building very small devices and producing new materials with engineered microstructures, civil engineers are faced with new and exciting areas for solid mechanics research and discovery. CEE has expanded its focus in solid mechanics to include an understanding of solid mechanics in the nanoscale in order to design civil engineering materials with engineered microstructures that can replace existing materials for a wide range of applications.

New efforts in CEE also include the work of Dr. Jim Spain, who recently joined the faculty at Georgia Tech and works on environmental biotechnology to solve environmental problems. Spain and his collaborators, Dr. Heather Luckarift of the Air Force Research Laboratory, and Dr. Ken Sandhage, in the School of Materials Science and Engineering, are utilizing biologically-inspired design to harness the activity of enzymes as catalysts. Spain, Luckarift, and their research team have utilized peptides that form diatom shells to fuse nanotechnology and biotechnology through the formation of silica nanospheres. Enzymes and other biomolecules encapsulated in these tiny porous spheres become stabilized and more practical for a range of potential applications. One application, for example, is the ability to detect or detoxify hazardous pollutants and chemical warfare agents.

An important societal concern in a growing nanomaterials manufacturing base is the impact that these new materials will have on our environment. CEE professors Dr. Jaehong Kim and Dr. Kurt Pennell are actively investigating

this nanotechnology area by considering human-fabricated nanomaterials' behavior as environmental pollutants. They are working with fullerenes (also known as buckyballs or C<sub>60</sub>) as pollutants of the future. Fullerenes were discovered in the early 90s, earning their investigators a Nobel Prize in Chemistry. Projected uses of fullerenes include fuel cell development, diamond manufacturing, super conductivity devices, drug delivery agents, and high temperature lubricants. Industrial scale production of C<sub>60</sub> will begin in the near future and the release of high levels of nanofullerenes into the environment will occur. Kim's research focuses on how fullerenes will be affected by water treatment processes. Pennell and his research team are focused on the movement of fullerenes in nature. Pennell contends that it is not known how nanomaterials will interact with soils, or whether nanoparticle transport can be accurately modeled using existing theory.

It is anticipated that production of nanomaterials will increase greatly in the future. There is no doubt that nanotechnology research will have an enormous impact on our society. The nanotechnology revolution is well under way and professors in CEE and other Georgia Tech schools are among the leaders in the cutting edge of this growing research field.



Graphic illustration of the encapsulation of lysozyme molecules within a self-assembled nanoscale silica framework.



## CEE NEWS

## Professor Awarded Nathan M. Newmark Medal



**Dr. Bruce Ellingwood**

Professor Bruce Ellingwood of the School of Civil and Environmental Engineering was presented with the Nathan M. Newmark Medal by the American Society of Civil Engineers at its recent

ASCE/SEI 2006 Structures Congress in St. Louis, Missouri. Ellingwood was honored for outstanding contributions to enhancing and incorporating probabilistic mechanics and structural reliability tools in code development and engineering practice.

## Professor Receives NIH Career Development Award



**Dr. Kurt D. Pennell**

Dr. Kurt D. Pennell, associate professor in the field of environmental engineering, has been awarded the Mentored Quantitative Career Development Award from the National Institutes of Health (NIH). The award is intended for

investigators at any level of experience, from the postdoctoral level to senior faculty level, who have shown clear evidence of productivity and research excellence in the field of their training, and would like to expand their research capability, with the goal of making significant contributions to behavioral, biomedical (basic or clinical), bioimaging, or bioengineering research.

The Mentored Quantitative Career Development Award will allow Pennell to rapidly advance his career through a combination of didactic learning, mentored research, and multi-disciplinary proposal development. Pennell will study the effects of how chronic exposure to persistent environmental toxicants, including polychlorinated biphenyls (PCBs) and chlorinated organic insecticides, increases the risk of developing neurodegenerative disease, such as Parkinson's disease (PD). Recent studies suggest that these toxicants contribute to elevated intracellular dopamine levels, increased oxidative stress, and ultimately dopaminergic cell death, a hallmark of PD. The career development plan, which includes coursework in bioinformatics, advanced spectroscopy, and neurotoxicology, builds upon his analytical skills and his training in science and engineering and his research on contaminant transport and remediation in subsurface systems. The underlying hypothesis of the proposed research is that biomarkers of oxidative stress and metabolomic profiles can be correlated to chronic toxicant exposures and neurodegenerative disease. This research is relevant to public health as it will advance understanding of the relationship between chronic exposure to environmental toxicants and neurodegenerative disease, provide quantitative methods to rapidly screen for oxidative stress and adverse metabolic profiles, and offer the possibility for early detection and intervention.

Pennell's research activities will be carried out at Georgia Tech and at Emory University's Department of Neurology, where he holds the title of visiting associate professor.

## Professor Leads Project to Protect Ports from Earthquake Damage

Dr. Glenn J. Rix, CEE professor in geosystems engineering, is project director for a newly funded National Science Foundation (NSF) project aimed at developing strategies to help safeguard ports from earthquake damage. The project, titled NEESR Grand Challenge: Seismic Risk Mitigation for Port Systems, will utilize the resources

of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES), a program initiated by the



**Dr. Glenn J. Rix**

National Science Foundation to advance the field of earthquake engineering. NEES is a shared national network of experimental sites and tools, a centralized data repository, and an

archive of earthquake engineering simulation software, all linked together by ultra-high-speed Internet2 connections. Together, these resources provide the means for collaboration and discovery in the form of more advanced research based on experimentation and computational simulations of earthquakes.

The project, which will receive \$3.6 million in funding over the next five years, will try to help port authorities and other stakeholders manage seismic risk more effectively. Georgia Tech is part of this multi-university project, which includes experts from the University of California; Decision Research; Drexel University; University of Illinois at Urbana-Champaign; Massachusetts Institute of Technology; Seismic Systems & Engineering Consultants; University of Southern California; University of Texas at Austin; and University of Michigan.

"Modern ports are large, complex systems. Our project team includes researchers and practitioners with expertise in civil engineering, logistics, risk analysis, and social science to address seismic risk issues in every aspect of the system," says Rix.

Visit the project Web site at:  
<http://www.neesgc.gatech.edu/>.



## CEE NEWS

## Mega-City Water Forum

The Georgia Water Resources Institute and the School of Civil and Environmental Engineering (CEE), in cooperation with the City of Atlanta and CIFAL Atlanta, co-hosted the first Mega-City Water Forum, "An integrated approach to Water Resource Management: Strategies for the 21st Century," at the Georgia Tech Learning Center on May 1-3, 2006. This event was also co-sponsored by several professional associations, foundations, and corporations, including the International Water Association, the American Water Works Association and Research Foundation, the World Bank Institute, the Global Environment and Technology Foundation, the Alliance to Save Energy, Veolia Water, Coca-Cola, Bank of America, Western Summit, Goldman Sachs, King and Spaulding, Rockdale Pipeline, and Delta. The Mega-City Water Forum was attended by more than eighty-five city officials, executives, and utility managers from some of the world's largest cities in seventeen countries.

The Forum was officially opened by Tech President Wayne Clough,

Atlanta Department of Watershed Management Commissioner Rob Hunter, and Atlanta Mayor Shirley Franklin, who welcomed the participants and emphasized the urgency to secure a clean and safe urban water supply and to develop innovative strategies for water supply as well as sanitation management. The Key Note Address was delivered by Paul Reiter, executive director of the International Water Association.

The Mega-City Water Forum attendees deliberated the mega-city water challenges from an integrated perspective. Parallel breakout sessions focused on water supply and sanitation using the United Nation's interactive and

participatory knowledge management approach. The findings of these discussions were evaluated within the context of watershed management and ecological sustainability and distilled into a summary of best practices. This summary document will be available through the Web sites of the Georgia Water Resources Institute (gwri.org) and CIFAL Atlanta (cifalatlanta.org).

In their closing remarks, Forum participants and organizers, including CEE Professor Aris Georgakakos, declared the Forum a success and reaffirmed their commitment to continue the dialogue on sustainable water supply and sanitation strategies for U.S. and international mega-cities.



**Mega-City Water Forum Inaugural Luncheon (from left to right): Atlanta Department of Watershed Management Commissioner Robert Hunter; CIFAL Atlanta Executive Director Axel Leblois; Georgia Tech President Wayne Clough; City of Atlanta Mayor Shirley Franklin; and International Water Association Executive Director Paul Reiter.**

### *Kindsvater Symposium* Continued from page 2

representing the ETG of ASCE. In the afternoon session, participants enjoyed the rare treat of listening to speakers whose careers spanned more than three decades as directors of environmental and water resources planning and regulation in the State of Georgia. Leonard Ledbetter, former commissioner of Natural Resources, Harold Reheis, former director of the Environmental

Protection Division (EPD), and Dr. Carol Couch, current director of EPD, discussed Georgia environmental and water resources issues from the early days of environmental regulation through the Georgia-Florida-Alabama "water wars" to the present-day efforts to develop a policy and planning framework for the State Water Plan that is currently under development. A panel discussion led by Dr. Jim Kundell of the University of Georgia highlighted regional water issues in

Georgia. At the banquet, a brief synopsis of Professor Kindsvater's career was given by Dr. Terry Sturm of CEE. In the evening session following the banquet, Dr. L. Douglas James, program officer of Hydrologic Sciences at the National Science Foundation (NSF), delivered the Kindsvater Distinguished Lecture.



## STUDENT NEWS

## CEE Students Help Generate Interest in Engineering, Math, and Science

Students in the United States continue to lag in math and science, according to the 1999 *Third International Mathematics and Science Study-Repeat* (TIMSS-R). This report has become the basis for benchmarking the U.S. against the world. The study reported that United States eighth graders ranked 19th out of 38 countries in



**Current EERI President Matthew Speicher watches over as high school students prepare a model building to be shake tested.**

math and 18th in science. How do we bridge the gap between U.S. students and students in other countries such as Singapore, China, South Korea, Japan, and Canada? One approach is to introduce students in elementary and middle schools to practical applications for using math, science, and engineering at an early age. Members of the Georgia Tech student chapter of the Earthquake Engineering Research Institute (GT EERI) are trying to do their part to combat the problem and have organized a community outreach program targeting Atlanta-area elementary through high school students. The program was developed to stimulate interest in engineering, math, and science, and share lessons on earthquake hazard, earthquake preparedness, and structural response.

This spring GT EERI students participated in the Super Saturday program, where they conducted a two-hour seminar for local high school students. Students participated with hands-on activities, building structures made of

K-NEX, which were then subjected to earthquake ground motions using a small-scale demonstration shake table. Dr. Reginald DesRoches, School of Civil and Environmental Engineering (CEE) faculty supervisor to the GT EERI group, says these activities are critical for exposing students to the role that civil engineers play in helping to mitigate the effects of natural hazards such as earthquakes. The graduate students structure the program in a manner that is both informative and fun.

In particular, the shake table is a big hit with the elementary and high school students. Seeing a structure they have built subjected to an earthquake really engages the students, and brings out some of the most interesting questions.

GT EERI students have also hosted on-site community outreach activities on the Tech campus. Students from middle and high schools were invited to participate in Civil Engineering Day. During this day, students were introduced to the various fields and job opportunities within civil engineering and learned about basic structural dynamic principles. GT EERI

to get out in the community and share our interest with the younger students. It is rewarding to see their interest and



**Students attending the Super Saturday program participate in hands-on activities.**

excitement, and gratifying to feel like we may have even some small impact on their educational experience or future career path. The outreach program is a good opportunity not only for us to express the exciting opportunities there are in areas related to engineering, math, and science, but also to let the students experience it firsthand. The students particularly seem to enjoy the hands-on activity with the instructional shake table."

Clearly, the challenge to strengthen the curricula for K-12 students in Georgia in the areas of math, science, engineering, and technology has been laid out before us. While Georgia Tech actively participates in K-12 outreach with programs such as the Center for Education Integrating Science, Mathematics, and Computing (CEISMC), there is still the need to form other partnerships, as evidenced by the GT EERI community outreach program. It is programs such as these that help to ignite student passion toward future educational and career paths in science and technology,



**Dr. Reginald DesRoches (left) and graduate student Murat Engindeniz explain an experimental test set up to students.**

students used the "each one, teach one" approach to learning. Former GT EERI President Jamie Padgett, a PhD candidate in CEE, describes the outreach experience: "We all enjoy the opportunity

by engaging them in hands-on activities and learning.



## CEE AWARDS

### Civil and Environmental Fellowship, Scholarship, and Award Recipients 2005-2006 Academic Year

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