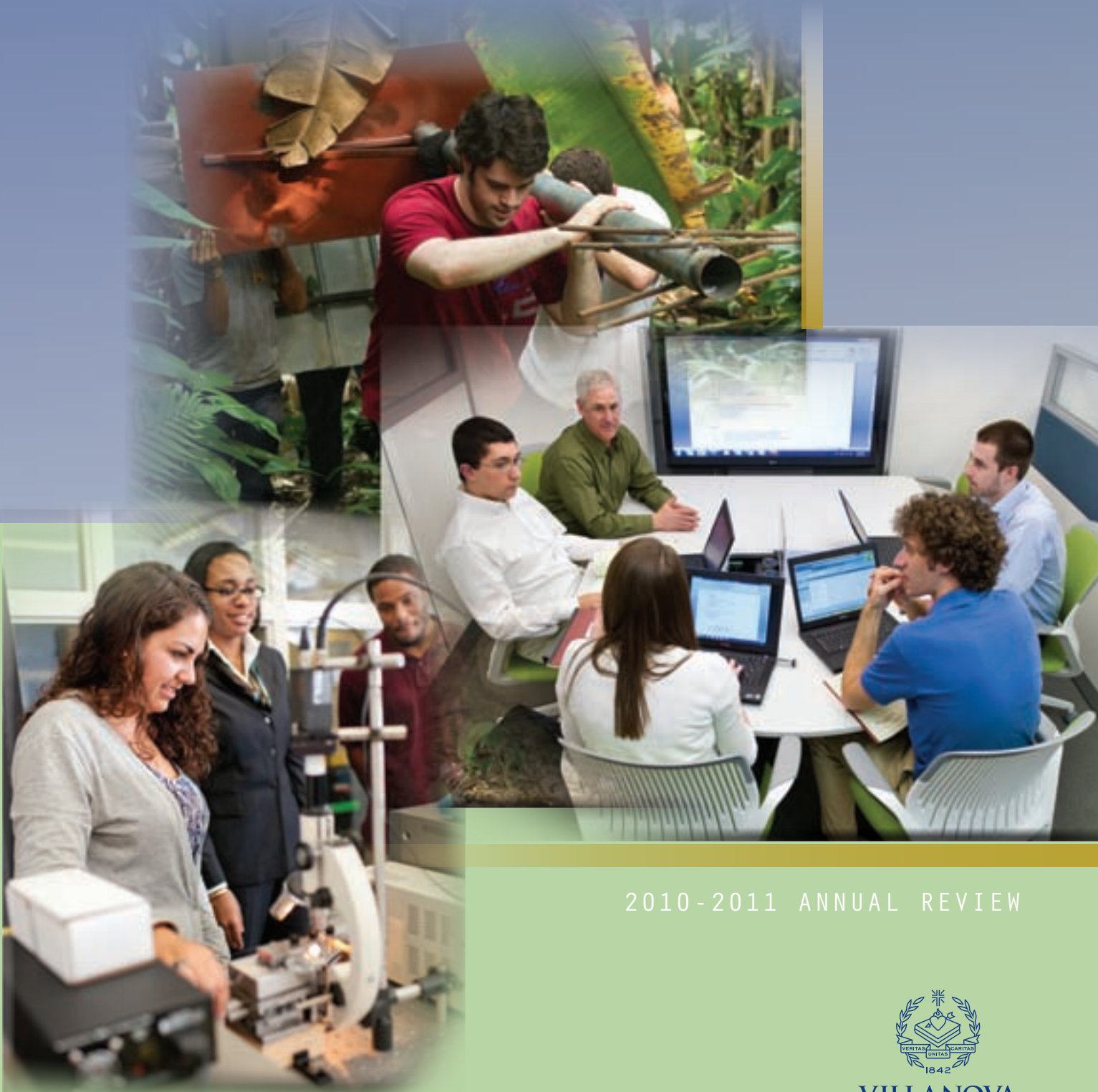


VILLANOVA

ENGINEERING



2010-2011 ANNUAL REVIEW



VILLANOVA
UNIVERSITY
College of Engineering

C O N T E N T S



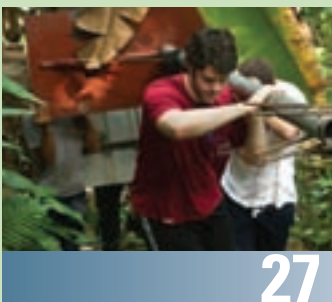
2

Each academic department continued its commitment to curriculum innovation.



20

The College of Engineering will help establish the first NSF-sponsored center of research on green data centers.



27

Seasons come and go, but the College's commitment to service remains constant.

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Drosdick Endowed Dean of the College of Engineering
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On the Cover:
Students at work in Panama; a group meeting in the new Villanova Multidisciplinary Design Laboratory; Emily Battinelli, Dr. Rosalind Wynne, and William Harkins in the Laboratory for Lightwave Devices



Stay up-to-date on College, student, and faculty news with protoTYPE, the College's e-newsletter. Visit www.engineering.villanova.edu or send your email address to carly.keeny@villanova.edu to be added to the distribution list.



Greetings,

As you may have seen, the University recently launched a new effort to help tell the Villanova story in a way that truly encapsulates what it means to be a student here and to give voice to those intangibles – like “Augustinian,” “community,” and “service” – that set us apart. In the coming days and months, you’ll see how this effort comes to life, punctuated by the new tagline “Ignite Change. Go Nova.”

In the College of Engineering, we’re proud that our students, faculty, and alumni stand as strong examples of what it means to ignite change. After all, in our line of work and study, it’s part of what we do every day.



IGNITING CHANGE IN 2010-2011

...IN THE CLASSROOM:

- We launched the Villanova Multidisciplinary Design Lab to bring together students from a variety of disciplines to solve real-world industry problems in a state-of-the-art setting. These ‘in-house co-ops’ are changing the way our students approach problem-solving, collaborate across fields, and work with industry.
- The first group of students to complete the Engineering Entrepreneurship minor graduated, taking with them a sharper understanding of an engineer’s contribution to American business.
- We completed work on our new center of learning at the Philadelphia Navy Yard. This new location has changed the way we offer graduate studies within the region’s hub for engineering and technology.

...IN THE LABORATORY:

- Our teacher/scholar faculty continue to develop new engineering solutions to challenges that plague business, infrastructure, defense, and even health care. In the pages that follow, you’ll see how they – and their students – are making the most of some unique research collaborations to change the way we live and work.
- And speaking of unique research collaborations, the College received a National Science Foundation grant, in partnership with Binghamton University and the University of Texas at Arlington, to establish the nation’s first industry/university collaborative research center for creating “greener” data centers.

...IN THE COMMUNITY:

- Our students, faculty, and alumni are changing the way young students think about engineering and opening their eyes to future careers in the profession.
- They also fanned out around the globe to bring life-changing engineering solutions to impoverished communities, where access to clean water, electricity, and medical attention are scarce.

These are just a few of the examples you’ll read about in our 2010-2011 Annual Review. As always, we are grateful for the unwavering support of our alumni, friends, and industry partners, whose generosity and belief in our mission help make our capacity to ignite change possible.

Sincerely,

A handwritten signature in black ink, reading "Gary A. Gabriele". The signature is fluid and cursive, with a large initial "G".

Gary A. Gabriele, PhD
Drosdick Endowed Dean of Engineering

CHEMICAL ENGINEERING

UNDERGRADUATE AND GRADUATE

Dr. Randy Weinstein

*Professor and Chair,
Department of Chemical Engineering*



In 2010-2011, the Chemical Engineering Department finalized details of its refreshed curriculum, which now includes key topics such as ethics, safety, lifelong learning, statistics, hands-on experiences, societal impacts, and teamwork throughout each academic year. Faculty also continued work to expand chemical engineering components of the bioengineering minor, freshman curriculum, and additional opportunities for undergraduates to present research at conferences. The department's graduate studies and PhD program also continued to attract high-achieving students.

ChE students also garnered recognition from the University for service and from industry organizations for research and scholarship.

- The Chemical Engineering Department finalized details of its updated upper level curriculum, which now offers increased flexibility for students to select chemical engineering electives and science courses or a full-year undergraduate research experience.
- For the first time, the department awarded a Master of Science degree in Chemical Engineering earned via distance learning. The department also welcomed its first two PhD candidates.
- A team of undergraduate and graduate students took their biodiesel production research a step further by creating sustainable soap from a byproduct of the waste cooking oil conversion.
- Jeffrey Sved ChE '11 received the 2011 Thomas J. Mentzer Award from the University's Center for Peace and Justice for his efforts to expand opportunities for the poor and marginalized.
- Ryan Lojek ChE '12 placed first in the Delaware Valley International Society of Pharmaceutical Engineers Student Poster Contest. Guy Kamguia MSChE '11 was named the graduate student runner-up.
- Christina Rosati ChE '11 received the annual Coyne Family Scholarship, given by Stephanie Hopper ME '90 in honor of her father, John W. Coyne CE '46, to the College of Engineering.
- Andrew Ferens ChE '09, MSChE '11 was one of five winners named at the Catalysis Club of Philadelphia's graduate student poster session for his research into how the structure of graphite nanofibers affects their catalytic properties. He also presented his work at the American Institute of Chemical Engineers national conference and was published in the scholarly journal *Carbon*.

Bridget Nyland ChE '11 converts waste cooking oil into biodiesel fuel and sustainable soap.



Use your smartphone to scan the QR code to the right to watch a video about this project!





The Chemical Engineering Department now offers undergraduates the option of conducting a yearlong research experience.

FACULTY

- Dr. Zuyi (Jacky) Huang joined the department in August as an Assistant Professor. His research focuses on applying systems theory to modeling complex chemical reaction networks with an emphasis on signal transduction pathways in the field of systems biology.
- Dr. Vito Punzi, Professor, taught the first offering of Catholic Social Thought and the Engineer.
- Dr. William J. Kelly, Associate Professor, was named to the Board of the European Society of Biochemical Engineering Science.
- Dr. Charles Coe, Assistant Professor, received the Catalysis Club of Philadelphia Award for outstanding contributions to adsorption science, catalysis, and its application for organic syntheses. He also secured a laboratory equipment donation valued at \$140,000 from Air Products and Chemicals.
- Under the direction of Dr. Randy Weinstein, Professor and Chair, the Master of Science degree program in Sustainable Engineering added a built infrastructure track. Approximately 60 students are currently enrolled in the program, with the first graduate completing the degree in May 2011.

RESEARCH INITIATIVES

TARGETING BREAST CANCER CELLS

With funding from the Delaware Valley section of the International Society of Pharmaceutical Engineers, **Dr. Noelle Comolli**, Assistant Professor, spent the summer exploring the development of degradable nanoparticles to deliver targeted amounts of anti-cancer drugs to breast cancer cells. The slow, limited release of chemotherapy drugs may increase their efficiency. And because they are traditionally released systematically – attacking all cells – ensuring their targeted release may decrease the amount of unwanted side effects, such as nausea, vomiting, and fatigue, normally associated with chemotherapeutics. With initial research into the nanoparticle and targeting mechanism underway, Dr. Comolli is currently investigating collaborations for cellular testing.

PREVENTING NOSOCOMIAL INFECTION USING A SYSTEMS BIOLOGY APPROACH

Dr. Zuyi (Jacky) Huang, Assistant Professor, applies a systems engineering and process controls approach to investigating biosystems involved in human diseases with the goal of providing a systems-level platform for drug development. He has developed mathematical modeling and system analysis techniques to study biological reaction networks (characterized by hundreds of highly interactive genes, enzymes, and metabolites) and predict how cells respond to extracellular stimuli. He is currently studying metabolism specific to biofilm formation of pathogens that cause severe nosocomial infections acquired by hospitalized patients, as the biofilm can enhance the drug resistance capability of pathogens and allow them to survive in hostile environments.

CIVIL + ENVIRONMENTAL ENGINEERING

Dr. Ronald Chadderton, PE

*Professor and Chair,
Department of Civil & Environmental Engineering
and the Edward A. Daylor Chair in Environmental
Engineering*

In 2010-2011, the Department of Civil and Environmental Engineering further streamlined its undergraduate curriculum, which has added flexibility for students when choosing engineering electives and science courses.



It also further grounds freshmen and sophomores in mechanics and fundamentals, while reducing the overall course load to improve the student experience. Undergraduate and graduate students earned prestigious awards and scholarships for academic excellence, while faculty members won funded research projects in the fields of transportation, built infrastructure, water resources, and structural engineering.

Students and faculty also participated in civil engineering-focused service-learning trips abroad and expanded their commitment to STEM outreach and support.

UNDERGRADUATE AND GRADUATE

- The Civil and Environmental Engineering Department introduced the third semester of a new three-part mechanics sequence and a new multidisciplinary introduction to fundamentals. Ethics and professional practice topics are also now woven throughout each academic year.
- More than 10 graduates of the class of 2011 have begun their master's degree programs in Civil Engineering at Villanova. Five received graduate assistantships.
- Seventeen undergraduate students were inducted into Chi Epsilon, the Civil Engineering Honor Society.
- For the second consecutive year, senior structural engineering students took first place in the American Society of Civil Engineers Structural Engineering Institute Capstone Competition. Team members included Matthew Bandelt, Adam Beckman, Brian Czenszak, and Shane Moran.
- Michael Colletti CE '11, Austin Mattus CE '11, and Andrew Horgan CE '11 received scholarships from the American Society of Highway Engineers.
- The Transportation Research Board of the National Academies invited David Mensching MSCE '12 to its Committee on Flexible Pavement Design, while Jiang Liang MSCE '12 joined the Committee on Signing and Marking Materials.
- A dozen CE students spent spring break at Amigos de Jesús children's home in Poses Verdes, Honduras, where they improved a water treatment system and investigated the feasibility of installing a solar-powered auxiliary pump to boost water supply. Dr. Andrea Welker, PE and Dr. Bridget Wadzuk CE '00, both Associate Professors, served as faculty advisors.

Senior structural engineering students won first place in the American Society of Civil Engineers Structural Engineering Institute Capstone Competition for the second consecutive year.





Adrienne Donaghue CE '11 is one of several graduates of the class of 2011 to continue her graduate level studies in Civil Engineering at Villanova.

FACULTY

- Dr. Metin Duran was promoted to the rank of Professor. Dr. Bridget Wadzuk CE '00 was promoted to Associate Professor with tenure.
- Dr. David Dinehart, Professor, was named Assistant Department Chair to increase opportunities for student service-learning and external partnerships.
- Dr. Joseph Yost, PE, Associate Professor, and Director of the Structural Engineering Teaching and Research Laboratory; Dr. Aleksandra Radlińska, Assistant Professor; and Dr. Leslie McCarthy, PE, Assistant Professor, secured the department's first research contract with the Pennsylvania Department of Transportation to investigate coatings and treatments for bridge beam ends.
- Dr. Robert Traver, PE, WRE, MSCE '82, Professor, and Director of the Villanova Center for the Advancement of Sustainability in Engineering (VCASE) and the Villanova Urban Stormwater Partnership (VUSP), served on the National Academy of Sciences panel to review new water resource planning guidelines proposed by the White House.
- Dr. Brian P. Chaplin, Assistant Professor, secured a two-year, \$83,000 National Science Foundation Small Business for Innovative Research Grant in collaboration with Advanced Diamond Technologies (ADT) to explore the development of synthetic diamond electrodes used to generate chlorine and other oxidants on-site within water treatment plants.

RESEARCH INITIATIVES

STORMWATER CONTROL MEASURES

Increased development leads to more impervious area, runoff, and disruption to the natural hydrologic cycle. **Dr. Bridget Wadzuk CE '00**, Associate Professor, designs, implements, monitors, and analyzes stormwater control measures (SCMs) to mitigate stormwater's impact on waterways and conveyance systems. With more than \$428,000 in two, three-year grants from the Pennsylvania Department of Environmental Protection, she is measuring evapotranspiration amounts from various SCMs on campus to create predictive models for use in their design and regulation. She and her students are also building a treatment train, through which SCMs work in a series, to maximize and diversify the system's performance to determine the cumulative effect and benefit.

ON-SITE OXIDANT GENERATION

Chlorine delivers reliable, cost-effective water disinfection, but it may form hazardous byproducts, and its transport carries safety and security concerns. With a two-year, \$83,000 National Science Foundation Small Business for Innovative Research Grant, **Dr. Brian P. Chaplin**, Assistant Professor, is collaborating with Advanced Diamond Technologies to develop synthetic diamond electrodes to generate and characterize chlorine and other oxidants on-site within water treatment plants and for other industries. Using boron-doped ultra-nanocrystalline diamond electrodes, they hope to fabricate and apply novel electrochemical cells to targeted water treatment applications to determine efficacy and develop strategies to generate other oxidants less likely to create harmful byproducts.

ELECTRICAL + COMPUTER ENGINEERING

Dr. Pritpal Singh

*Professor and Chair,
Department of Electrical and Computer Engineering*



In the classroom, the Electrical and Computer Engineering Department developed a new mini-project for the College's freshman curriculum and introduced new course offerings that reflect timely industry focuses for seniors and graduate students. ECE students received recognition for innovation in design and social entrepreneurship and developed engineering solutions for those living in developing countries from Latin America to Africa. Students and faculty also continued to support STEM outreach initiatives to promote excitement for engineering to middle- and high-school students.

Department faculty continued to distinguish themselves for scholarly contributions to their fields. They also sought to expand cross-disciplinary educational opportunities for engineering students with the College of Nursing and the Villanova School of Business.

UNDERGRADUATE AND GRADUATE

- ECE faculty developed a new multidisciplinary project for the freshman curriculum – “Automatic Blood Pressure Measurement.”
- The department introduced a new cybersecurity elective and a new introductory course for seniors in power electronics. At the graduate level, the department introduced a new cloud computing course.
- Students initiated new design projects in Tanzania, the Democratic Republic of Congo, and Nicaragua.
- Senior CpE students began developing an electronic medical record system for the Unity Clinic in Philadelphia, a community health resource.
- Emily Battinelli EE '12 and Gerry Mayer EE '12 joined Amanda DelCore MSSE '12 in winning first place in the Institute of Electrical and Electronics Engineers (IEEE) Humanitarian Technology Challenge in Reliable Electrical Power for Developing Countries for a solar headlamp design.
- Peter Shaw EE '11, Andrew Robinson EE '11, Brendan McCoy EE '11, and Craig Baumer CpE '11, along with teammates from the College of Nursing and the Villanova School of Business, took first place in the Villanova Social Entrepreneurship Competition for their project, Nova Mobile Health.
- ECE students worked alongside faculty to install two solar electric systems in Waslala, Nicaragua, as part of an ongoing initiative to improve health communication in remote villages. They were joined by counterparts from the College of Nursing and the Villanova School of Business.

Amal Kabalan, a PhD student, works on solar energy research in the Solid State Devices Laboratory.





Dr. Rosalind Wynne, Associate Professor, and William Harkins, who is pursuing his master's degree, in the Laboratory for Lightwave Devices

RESEARCH INITIATIVES

IMPLEMENTING CONTROL SYSTEM DESIGNS

As part of a combined teaching and research initiative funded by the National Science Foundation (\$150,000), and by the MathWorks, Inc. (\$85,000), **Dr. James Peyton Jones**, Professor; **Connor McArthur CpE '12**; and **Tyler Young CpE '11**, released a new toolbox for automatic code generation and implementation of Simulink-based control system designs on the LEGO MINDSTORMS NXT. The toolbox enables students to implement high-level Simulink-based designs without being hindered by low-level programming issues. The project has generated considerable interest within the STEM community, and a paper on the subject received the Best Paper Award at the 2010 American Society for Engineering Education Mid-Atlantic Conference.

NEXT-GENERATION NETWORK TRANSITION

Dr. Sarvesh Kulkarni, Associate Professor, and **Dr. Vijay Gehlot**, Associate Professor of Computing Sciences in the College of Liberal Arts & Sciences, formalized plans to help Comcast transition to next generation IPv6 technologies. Focusing on pre-empting network problems, they will develop software tools to collect diagnostic data, measure, and analyze network performance in real-time to enable meaningful troubleshooting and reporting. They also plan to build mathematical models of data traffic to simulate performance and infer the user experience. Lastly, they hope to develop models of traffic and capacity projection to predict performance implications of changes in network topology and the impact of outages on different network sections.

FACULTY

- Dr. Kevin Buckley EE '76, MSEE '80, Professor, received the College of Engineering's Farrell Award, given annually to a faculty member who demonstrates personal concern for students.
- Dr. Rosalind Wynne was promoted to Associate Professor with tenure. She also led the department in continued support of the HE²ARTS STEM program for Immaculate Heart of Mary School in Brooklyn.
- Dr. Pritpal Singh, Professor and Chair, played an instrumental part in advancing a memorandum of understanding with Universidad Nacional de Ingeniería (UNI) in Managua, Nicaragua. He also taught an energy efficiency class as part of UNI's master's degree program in renewable energy.
- Dr. Anthony Zygmunt, Professor, was appointed Assistant Department Chair.
- Dr. Sarvesh Kulkarni, Associate Professor, received the "Woody Everett Best Poster Award" at the 2010 American Society of Engineering Education (ASEE) Conference in Louisville, Ken. Dr. James Peyton Jones, Professor, earned the "Best Paper Award" at the ASEE Middle Atlantic Section Conference held at Villanova last fall.

MECHANICAL ENGINEERING

Dr. C. Nataraj

*Professor and Chair,
Department of Mechanical Engineering*

In 2010-2011, the Department of Mechanical Engineering continued to innovate within its undergraduate curriculum. These efforts have resulted in increased flexibility for students, new opportunities to pursue research and advanced courses, and an enhanced student reputation among employers and graduate schools, as well as a steady increase in undergraduate admission quality. The department also continued to strengthen its commitment to graduate studies and graduated its first PhD students this year. In addition, the department secured more than \$70,000 from industry partners,



alumni, and friends of the College to fund strategic initiatives for students.

Students and faculty also collaborated on international service-learning opportunities and STEM initiatives aimed at elementary, middle- and high-school students.



James O'Brien, Assistant Professor, with students from the Mechanical Engineering Analysis and Design class

UNDERGRADUATE AND GRADUATE

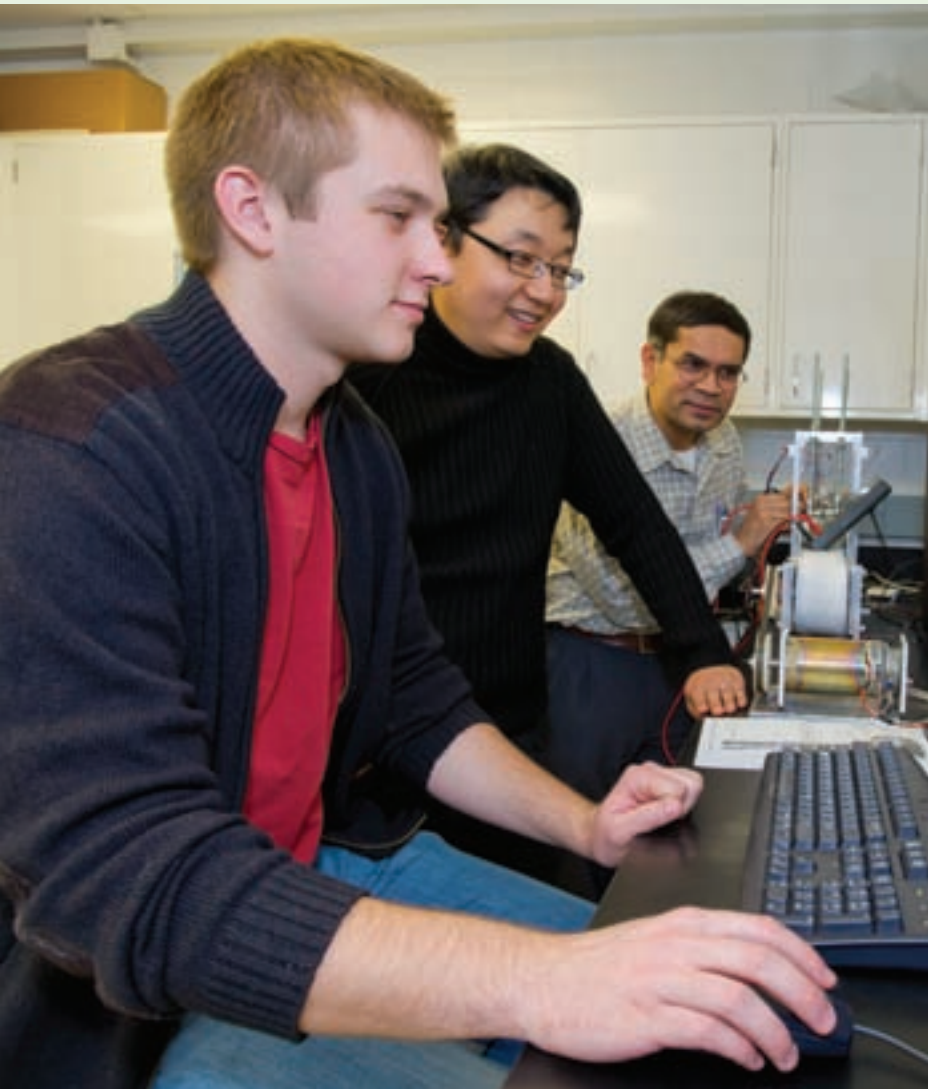
- Karthik Kappaganthu MSME '97 and Andres Jose Diaz Alarcon earned their PhD in Engineering. Dr. C. Nataraj, Professor and Chair, advised Kappaganthu, while Diaz was advised by Dr. Alfonso Ortega, the James R. Birlle Professor of Energy Technology and Associate Dean for Graduate Studies and Research. ME faculty currently advise 19 PhD candidates.
- The department launched "Professional Development Evenings," through which employers visit the campus to speak with students about internship and career opportunities in mechanical engineering.
- ME students conducted service-learning projects in countries around the world, including Nicaragua, Panama, and the Philippines.
- Students worked alongside faculty on department-specific STEM initiatives such as Girls in ME Day for local Girl Scouts (70 students) and the second annual Marine Advanced Technology Education regional competition (part of a larger international program), which involved nearly 300 high-school students.
- Approximately 25 ME students worked as undergraduate research assistants, many of whom were supported by external funding.
- The ME Department committed to offering at least two graduate courses every semester at the College's new learning center at the Philadelphia Navy Yard.
- The department secured \$25,000 from the Air Products Foundation and \$20,000 from Rolls Royce Marine Corporation to fund scholarships and outreach activities designed to attract women and other under-represented groups to mechanical engineering. Other funding for strategic initiatives came from Mr. and Mrs. John Y.K. Peng ME '62, Dr. and Mrs. Jean-Pierre Arnoux, and NAVAIR.

RESEARCH INITIATIVES

FACULTY

- Dr. Calvin Li, Assistant Professor, became the department's newest faculty member. Dr. Li teaches Thermodynamics and is establishing a Nanoengineered Multiphase Flow and Heat Transfer Laboratory within the College.
- Dr. Amy Flesicher ME '91, MSME '96, Associate Professor, was named the 2010 Woman Engineer by the American Society of Mechanical Engineers' Electronic & Photonic Packaging Division.
- Dr. Qianhong Wu and Dr. Sergey Nersesov were promoted to the rank of Associate Professor with tenure.
- Dr. Gerard Jones ME '72, Professor, and Associate Dean for Academic Affairs, published the book *Gravity-Driven Water Flow in Networks*. Dr. Nersesov co-authored *Stability and Control of Large-Scale Dynamical Systems: a Vector Dissipative Systems Approach*.
- Dr. C. Nataraj, Professor and Chair, started an initiative to establish student exchange programs with international institutions such as National Cheng Kung University of Taiwan, with which the department is currently pursuing a memorandum of understanding.

Thomas Gacka, graduate student; Dr. Qianhong Wu, Associate Professor; and Rungun Nathan in the Cellular Biomechanics and Sport Science Laboratory



ROADSIDE BLAST PROTECTION

Dr. Sridhar Santhanam, Professor, and collaborators have proven the feasibility of using tubes filled with viscous fluid to enhance energy dissipation in structures by up to 30 percent on impact, which could be used to protect military personnel from roadside explosions. Computer simulations and weight drop tests, involving a range of fluids, tube sizes, and speeds, demonstrate that tubes filled with viscous liquids experience less damage.

Dr. Gerard Jones ME '72, Professor and Associate Dean for Academic Affairs; **Edmond Dougherty EE '69, MScS '86**, Visiting Assistant Professor of Electrical and Computer Engineering; and **Ledjan Qato MSME '11** were active participants in this research. The team hopes to conduct full-scale tests to simulate live explosions to determine whether this concept can be built into military vehicles.

PHYSICS OF HIGHLY FLEXIBLE STRUCTURES

Building on a career-long interest in autonomous systems, **Dr. C. Nataraj**, Professor and Chair, is investigating the physics of highly flexible structures to improve unmanned air vehicles. In collaboration with robotics researchers from Drexel University and biologists from Harvard University, Dr. Nataraj is conducting analytical and numerical research to model the fundamental physics of bird wings and fish fins, which offer high energy efficiency, acceleration, and time response, as well as important adaptive attributes. The team, which also includes **Dr. Garrett Clayton**, Assistant Professor, and **Casey St. Fleur**, PhD student, hopes to use the data to develop concept vehicles that approach these efficiencies.



UNDERGRADUATE RESEARCH

Students from every major discipline work alongside faculty members and graduate students to advance funded or exploratory research that can help solve some of society's toughest challenges.

The College's teacher/scholar model encourages faculty to bring their latest research problems into the classroom, which can spark students' interests in gaining firsthand experience with real-world research.

Students may get involved with faculty-led projects in an area that interests them, pursue an independent research project with approval and oversight from a faculty member, or apply for a competitive fellowship through the Villanova Undergraduate Research Fellows (VURF) program.

Sponsored in part by the College of Engineering, VURF provides financial support for student research, naming a select group of undergraduates as "fellows" each year. In 2011, engineering students accounted for 35 percent of all VURF fellows.

The following students received funding in the spring and spent their summers in the lab working on a variety of projects under the advisement of faculty.

- **William Albert ME '12** – "A Comprehensive Study of the Mechanics of Gold Nanoparticle Indentation," mentored by Dr. Gang Feng, Assistant Professor of Mechanical Engineering
- **Emily Battinelli EE '12** – "Microstructured Optical Fiber for Cellular Temperature Sensing," mentored by Dr. Rosalind Wynne, Associate Professor of Electrical and Computer Engineering
- **Thomas Belatti ME '12** – "Experimental Validation of Nonlinear Tracking Control of a UAV," mentored by Dr. C. Nataraj, Professor and Chair of Mechanical Engineering
- **Blake Campbell CE '13** – "Pervious Concrete Pavement for Sustainable Stormwater Management," mentored by Dr. Aleksandra Radlińska, Assistant Professor of Civil and Environmental Engineering
- **Ian Dardani ME '13** – "Validation of Optimization Algorithm for Cost Minimization of Multiple-Pipe, Gravity-Driven Water Networks," mentored by Dr. Gerard Jones ME '72, Associate Dean for Academic Affairs and Professor of Mechanical Engineering
- **Daniel Fritch ME '13** – "Using Microdroplets to Model Nonequilibrium Freezing in Cryopreserved Cells," mentored by Dr. Jens Karlsson, Associate Professor of Mechanical Engineering

- **Atish Gupta ME '13** – "Influence of Collagen Fibrils and Sacrificial Bonds On Bone Fracture Behavior," mentored by Dr. Ani Ural, Assistant Professor of Mechanical Engineering
- **Thomas Hoffman CE '13** – "Optimizing Reactive Electrochemical Membrane Performance," mentored by Dr. Brian P. Chaplin, Assistant Professor of Civil and Environmental Engineering
- **Ellen Knapp CHE '13** – "Understanding the Effect of Different Pyrolysis," mentored by Dr. Justinus Satrio, Assistant Professor of Chemical Engineering

Dr. Joseph Yost, PE, Associate Professor of Civil and Environmental Engineering; Dr. Aleksandra Radlińska, Assistant Professor of Civil and Environmental Engineering; and Krista Sullivan CE '12, a 2010 Undergraduate Research Fellow



STUDENT ACCOMPLISHMENTS



Amanda DelCore MSSE '12; Emily Battinelli EE '12; Dr. Pritpal Singh, Professor and Chair of Electrical and Computer Engineering; and Gerry Mayer EE '12

Engineering Students Win IEEE Humanitarian Technology Challenge

Amanda DelCore MSSE '12, Emily Battinelli EE '12, and Gerry Mayer EE '12 won first place in the Institute of Electrical and Electronics Engineers (IEEE) Humanitarian Technology Challenge in Reliable Electrical Power for Developing Countries for their design of a solar-powered headlamp inspired by a stand-alone hybrid power system known as the Solar Suitcase.

Engineering Students Win Villanova Social Entrepreneurship Competition

Along with teammates from the Villanova School of Business and the College of Nursing, **Peter Shaw EE '11, Andrew Robinson EE '11, Brendan McCoy EE '11, and Craig Baumer CpE '11** took top honors at the 2nd annual Villanova Social Entrepreneurship Competition (VSEC) for their project, Nova Mobile Health, which seeks to bring healthcare services to remote, impoverished villages that have limited access to modern technology. They received \$10,000 in funding from Halloran Philanthropies.

ACI Student Chapter Receives National Award

After only one year in action, the Villanova chapter of the American Concrete Institute (ACI) was named one of 15 ACI Outstanding Universities for 2010 by the national organization.

Civil Engineering Students win SEI Structural Design Competition – Again

Matthew Bandelt, Adam Beckman, Brian Czenszak, and Shane Moran won the 2010 Student Structural Design Competition for their senior capstone bridge design for a major New Jersey roadway, marking the second consecutive year that Villanova civil engineering students took first place in the national competition.

Chemical Engineering Student Awarded Annual Coyne Family Scholarship

Christina Rosati ChE '11 received the annual Coyne Family Scholarship, given by Stephanie Hopper ME '90 in honor of her father, John W. Coyne CE '46, to the College. This merit-based scholarship is awarded to an engineering student who demonstrates both excellent academic achievements and leadership qualities.

Entrepreneurship Students Take Second Place in National Ford Innovation Contest

Scott Rogener CpE '12, Daniel Xavier Rosato CE '12, Jeetsingh Bhujun EE '11, and Yazid El Hilali CE '12 placed second at the 2010 University of Detroit Mercy (UDM)/Ford Innovation Contest for their concept of using the computing power of today's smartphones to provide a customized driving experience.



Scott Rogener CpE '12, Daniel Rosato CE '12, Yazid El Hilali CE '12, and Jeetsingh Bhujun EE '11 won second place in a national Ford innovation contest.

Jeffrey Sved ChE '11 Named Winner of Thomas J. Mentzer Award for Service

The University's Center for Peace and Justice recognized **Jeffrey Sved ChE '11** with the Thomas J. Mentzer Award for his significant contributions to expanding opportunities for the poor and marginalized.

Chemical Engineering Students Create Sustainable Soap

Led by **Adam Hoffman ChE '09, MSChE '11**, the student team behind the biodiesel production project – through which chemical engineering students convert waste cooking oil from Dining Services into biodiesel – took their project a step further by creating sustainable soap from a byproduct of the original oil conversion.

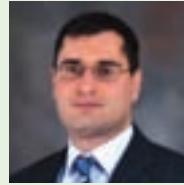
FACULTY

ACCOMPLISHMENTS

Faculty Make Another Strong Showing at ASEE's Annual Conference

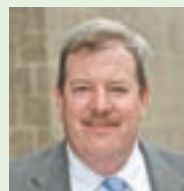
The College of Engineering's faculty made another strong showing at this year's American Society for Engineering Education conference, with a total of 15 engineering professors authoring or contributing to 10 conference papers, with topics including interdisciplinary instruction for engineering and business students, student design project-based learning, and STEM outreach (among others).

Dr. Gerard Jones ME '72, Associate Dean for Academic Affairs and Professor of Mechanical Engineering, was published as author of the book *Gravity-Driven Water Flow in Networks*.



Dr. Sergey Nersesov, Associate Professor of Mechanical Engineering, was published as co-author of the book *Stability and Control of Large-Scale Dynamical Systems: a Vector Dissipative Systems Approach*.

Dr. Moeness Amin, Director of the Center for Advanced Communications and Professor of Electrical and Computer Engineering, was published as the editor of the book *Through-the-Wall Radar Imaging*. He was also elected Fellow of the Institute of Engineering and Technology and was named to the editorial board of the *European Association for Signal Processing Journal*.



Dr. Robert Traver, PE, WRE, MSCE '82, Director of the Villanova Center for the Advancement of Sustainability in Engineering and Professor of Civil and Environmental Engineering, served on the National Academy of Sciences panel to review federal water resource planning guidelines.



Civil Engineering faculty **Dr. Shawn Gross**, Associate Professor; **Dr. David Dinehart**, Professor; **Dr. Joseph Yost, PE**, Associate Professor; and **Dr. Aleksandra Radlińska**, Assistant Professor, received the Best Paper Award for their work entitled "Overarching Problems in Sophomore Mechanics Courses" from the Mechanics Division of the American Society for Engineering Education (ASEE) at the annual conference.

Faculty Promotions

Dr. Metin Duran, Department of Civil and Environmental Engineering, was promoted to Professor.

Dr. Sergey Nersesov, Department of Mechanical Engineering, was promoted to Associate Professor with tenure.

Dr. Bridget Wadzuk CE '00, Department of Civil and Environmental Engineering, was promoted to Associate Professor with tenure.

Dr. Qianhong Wu, Department of Mechanical Engineering, was promoted to Associate Professor with tenure.

Dr. Rosalind Wynne, Department of Electrical and Computer Engineering, was promoted to Associate Professor with tenure.

Dr. James Peyton Jones, Professor of Electrical and Computer Engineering, received the Best Paper Award for his work, entitled "From Design to Implementation with Simulink and LEGO NXT," at the American Society of Engineering Education Middle Atlantic Section conference held at Villanova. **Dr. Pritpal Singh**, Professor and Chair of the Department of Electrical and Computer Engineering, led planning efforts for hosting the conference on campus.



Dr. Amy Fleischer ME '91, MSME '96, Associate Professor of Mechanical Engineering, was named the 2010 Woman Engineer by the Association of Mechanical Engineers' Electronic & Photonic Packaging Division.

Dr. Charles Coe, Associate Professor of Chemical Engineering, received the 2010 Catalysis Club of Philadelphia Award.

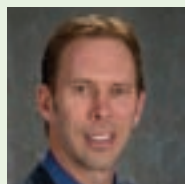
Dr. Aaron Wemhoff, Assistant Professor of Mechanical Engineering, was appointed a regional editor for the *International Journal of Transport Phenomena*.



Dr. Kevin Buckley EE '76, MSEE '80, Professor of Electrical and Computer Engineering, received the College's 2011 Farrell Award, which recognizes an engineering faculty member who has demonstrated personal concern for students and exceptional dedication to the College.

Dr. Jens Karlsson, Associate Professor of Mechanical Engineering, and **Dr. Noelle Comolli**, Assistant Professor of Chemical Engineering, received funding from Merck & Co., Inc. and the International Society of Pharmaceutical Engineering to provide summer research opportunities for undergraduate students interested in biotechnology.

Dr. Sarvesh Kulkarni, Associate Professor of Electrical and Computer Engineering, won the Computers in Education Division's Best Poster Award for his work entitled "Using VOIP as a Common Framework for Teaching a Second Course in Computer Networks" at the 2010 American Society for Engineering Education's annual conference.



Dr. William J. Kelly, Associate Professor of Chemical Engineering, was selected to serve as a Board Member for the European Society for Biochemical Engineering Science.

Dr. C. Nataraj, Professor and Chair of the Department of Mechanical Engineering, and **Dr. Robert Traver** both appeared as featured speakers for the University Science Center's "Lunch for Hungry Minds" monthly event.



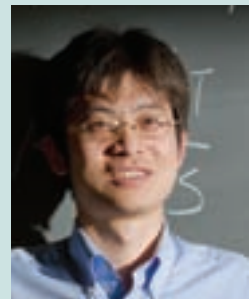
Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering, was re-elected to the Supreme Council of Alpha Chi Sigma professional chemistry fraternity. He serves as Grand Collegiate Alchemist (or first vice president).

George Simmons was named Director of the Villanova Multidisciplinary Design Lab.



New Faculty (hired in the 2010-2011 academic year)

Dr. Calvin Li,
Assistant Professor, Mechanical Engineering
Joined the College in January 2011



- Thermo-fluidics, renewable energy (fuel cell and concentrating solar power), nanotechnology, and biofuel combustion
- PhD, Mechanical Engineering (nanoengineering thermophysics of multiphase energy transport), Rensselaer Polytechnic Institute
- M.S., Mechanical Engineering (thermophysics and multiphase materials), Tsinghua University
- B.S., Mechanical Engineering (cryogenics), Xian Jiaotong University

New faculty members also established new instructional and research laboratories:

Dr. Justinus Satrio, Assistant Professor of Chemical Engineering, established the Biomass Resources & Conversion Technologies Laboratory.

Dr. Brian P. Chaplin, Assistant Professor of Civil and Environmental Engineering, established the Environmental Chemistry and Analytical Laboratory.

Dr. Calvin Li established the Nanoengineered Multiphase Flow and Heat Transfer Laboratory.

Faculty Scholarship

Faculty members continued to enhance the College of Engineering's reputation for scholarship in 2010-2011. Year over year, faculty increased scholarly contributions in nearly all categories measured.

Books/monographs published	5
Refereed journal articles	85
Book chapters	4
Conference papers published	153
Other publications	66
Grant applications	190
Papers presented	176
Service on editorial boards/ professional leadership positions	74

CENTER FOR ADVANCED COMMUNICATIONS (CAC)

Dr. Moeness Amin

Director of the Center for Advanced Communications and Professor of Electrical and Computer Engineering

Within the Center for Advanced Communications' (CAC) world class research and instructional laboratories, internationally-renowned scholars work with university, industry, and government partners to investigate critical



research and development questions in the areas of wireless and digital communications, high resolution imaging, ultrasound and acoustics, antenna design, radio frequency identification, satellite navigation, and more.

In 2010-2011, center members secured more than \$1.2 million in new funding, strengthened relationships with government partners, and initiated research into emerging areas of importance within communications. They also earned continued recognition as leading scholars in their fields and received accolades from a number of prestigious organizations.

CAC HIGHLIGHTS

- The CAC secured more than \$1.2 million in new funding for six projects. Work on five additional projects also continued, bringing the total of active research funds to more than \$4 million. Key funding partners included the U.S. Air Force Research Lab, the U.S. Army Research Lab, the U.S. Army Research Office, Defense Advanced Research Projects Agency, the National Science Foundation, Naval Undersea Warfare Center, and the Office of Naval Research.
- Dr. Moeness Amin, Director of the CAC and Professor of Electrical and Computer Engineering, received the North Atlantic Treaty Organization (NATO) Scientific Achievement Award for his work on the NATO Task Force on Sensing through Walls. He was also elected Fellow of the Institute of Engineering and Technology.
- Dr. Yimin Zhang, Director of the Wireless Communications and Positioning Laboratory and CAC Research Professor, received a two-year, \$267,000 contract from the U.S. Air Force to develop “next generation” over-the-horizon radar technology to mitigate clutter and improve target geo-location accuracy.
- The Office of Naval Research selected Dr. Amin to receive one of only 10 Chief of Naval Research Challenge awards through its prestigious \$1 million annual competition. He is using the \$100,000 award to advance research in the area of compressive sensing.
- Dr. Fauzia Ahmad, Director of the Radar Imaging Laboratory and CAC Research Associate Professor, initiated a new annual conference on compressive sensing as part of the Society of Photographic Instrumentation Engineers Symposium.
- Dr. Moeness Amin edited the first book on *Through-the-Wall Radar Imaging*, published by CRC Press. CAC members also published six book chapters, 13 journal articles, and 45 conference papers.
- Christopher Thajudeen, a PhD student working in the Antenna Research Lab, placed first at the international 2010 FEKO Student Competition for his paper entitled “From Electrically Small Ultra-Wideband Antennas to Large Scale Building Imaging; Using FEKO to Synthesize Full Building Through-the-Wall Radar Imaging Scenarios.”
- The CAC hosted four professors from the University of Montenegro and Darmstadt University of Technology (Germany), as well as three graduate students from Australia and France who interned at the CAC for six months.



Dr. Ramazan Demirli, Research Assistant Professor and Director of the Acoustic and Ultrasound Laboratory

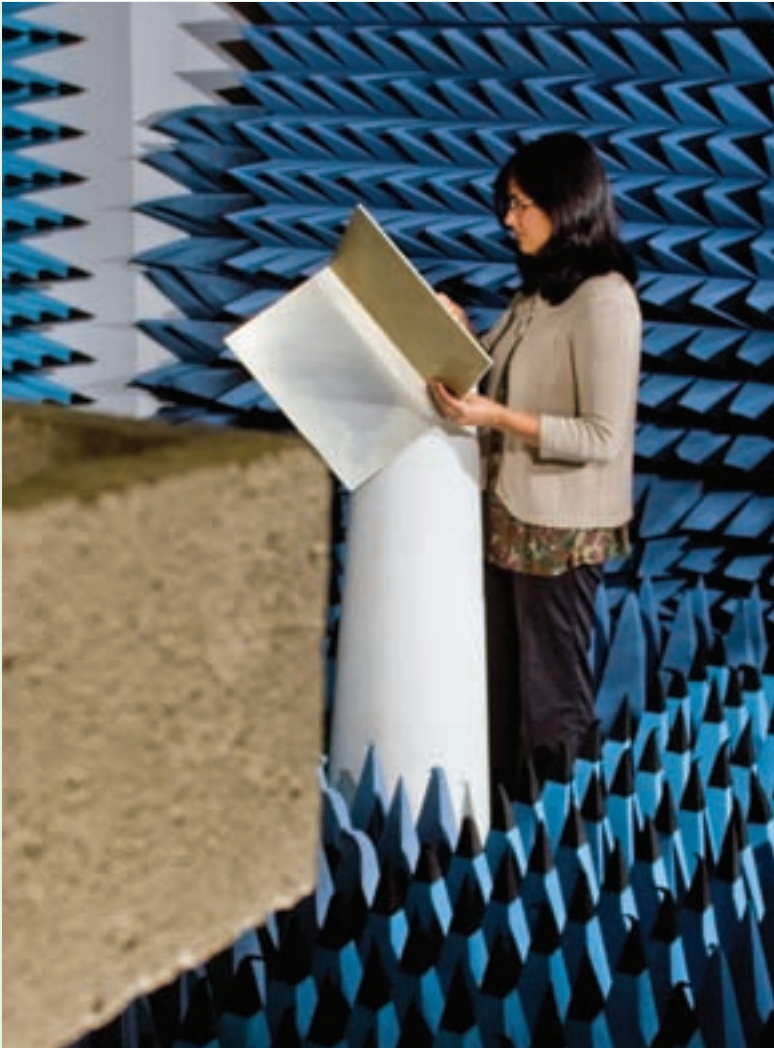
RESEARCH INITIATIVES

NEXT-GENERATION OVER-THE-HORIZON RADAR

The CAC received a two-year, \$267,000 contract from the United States Air Force to develop “next generation” over-the-horizon radar technology to mitigate radar clutter and improve target geo-location accuracy. Led by **Dr. Yimin Zhang**, Director of the Wireless Communications and Positioning Laboratory, researchers will leverage advances in multiple-input multiple-output radar technology to enhance maneuvering target detection and tracking. They will also develop novel time-frequency analysis techniques to improve position estimation of targets hundreds and thousands of miles away, and in particular, their altitude information. These new algorithms will permit faster and more robust altitude tracking.


COMPRESSIVE SENSING

Dr. Moeness Amin, Director of the CAC, will use his highly competitive \$100,000 Chief of Naval Research Challenge award to advance research in compressive sensing (CS), an emerging technology that can improve radar imaging for civilian and defense applications. A powerful approach to sensing sparse environments, which exist in radar, communications, and acoustics application, CS achieves improvements and efficiencies in information extraction and data acquisition time. In particular, CS will be employed by CAC researchers for indoor radar imaging and urban operations to reduce both bandwidth and array aperture, allowing significant reductions in cost and acquisition time.



Dr. Fauzia Ahmad, Research Associate Professor and Director of the Radar Imaging Laboratory, conducted an annual conference on compressive sensing at the Society of Photographic Instrumentation Engineers Symposium.



 Use your smartphone to scan the QR code to the right to view the CAC's website!

TOPICS OF STUDY:

- | | |
|---|--------------------------------------|
| Acoustics and ultrasound | Multimedia and video compression |
| GPS technologies | Radar imaging |
| Low-profile antenna modeling and measurements | Sensor technology |
| Microwave and RF | Signal processing for communications |
| | Smart antennas |

CAC LABORATORIES

Radar Imaging Laboratory

Director: Dr. Fauzia Ahmad, CAC Research Associate Professor

Antenna Research Laboratory

Director: Dr. Ahmad Hoorfar, Professor of Electrical and Computer Engineering

Wireless Communications and Positioning Laboratory

Director: Dr. Yimin Zhang, CAC Research Professor

Acoustic and Ultrasound Laboratory

Director: Dr. Ramazan Demirli, CAC Research Assistant Professor

Radio Frequency Identification Laboratory

CENTER FOR NONLINEAR DYNAMICS & CONTROL (CENDAC)

Dr. James Peyton Jones

Director (outgoing), Center for Nonlinear Dynamics and Control and Professor of Electrical and Computer Engineering

The Center for Nonlinear Dynamics & Control (CENDAC) delivers cutting edge research and education across a broad range of application areas, applying a common core of nonlinear dynamic theory to practical real-world problems. New research initiated in 2010-2011,



for example, included projects in autonomous systems, mobile robotics, unmanned surface vehicles, analyses of brain behavior, HVAC systems, automotive combustion, and more. The Center fosters interdisciplinary collaboration across the College of Engineering and provides the research environment necessary to solve problems in nonlinear, highly integrated, multi-domain systems. Graduate students also benefit from this interdisciplinary systems approach and from a coordinated sequence of graduate Control Systems courses.

CENDAC HIGHLIGHTS

- Dr. James Peyton Jones, Professor of Electrical and Computer Engineering, stepped down from the position of CENDAC Director after serving since 2007. Dr. Hashem Ashrafiuon, Professor of Mechanical Engineering, has been appointed as his replacement from fall 2011.
- CENDAC welcomed Dr. ‘Subbu’ Ramakrishnan as its first Research Professor starting in fall 2011. His focus will be to initiate new research proposals and activities.
- The number of PhD students working within the Center continued to grow rapidly with six new students joining the program in 2010-2011. Overall, 14 PhD students and 20 Master of Science students are currently pursuing thesis work within the Center, funded by research project grants and awards. The Center also encourages undergraduate research; approximately 20 undergraduates worked on projects within the Center in the 2010-2011 academic year.
- Center members authored a total of 79 scholarly publications. Dr. Sergey Nersesov, Associate Professor of Mechanical Engineering, co-authored a book entitled *Stability and Control of Large-Scale Dynamical Systems: a Vector Dissipative Systems Approach*. Other scholarly work consisted of 19 journal articles, 53 conference publications, and five book chapters, all of which have been published or are currently in press.
- Center members secured \$443,500 in new research funding, bringing the total active funding for research to nearly \$2 million. New grants were awarded by the Office of Naval Research, National Institutes of Health, NAVSEA, Briar Hill Foundation, ExxonMobil, Cummins Inc., Brain-Computer Interface, and Villanova University.
- The Center’s activities continued to have a significant impact on undergraduate education. The VU LEGO Real Time Target software, developed as a low-cost target for research and education, has been downloaded more than 600 times, and was the subject of the Best Paper Award at the American Society for Engineering Education Mid-Atlantic Conference.
- Center members continued their commitment to K-12 outreach, providing modules for the Leadership Education And Development (LEAD) program hosted by the College, hosting the regional Marine Advanced Technology Education (MATE) competition, and participating in the Philadelphia School District’s “STEM Secrets” outreach program.

*Dr. Pritpal Singh,
Professor and Chair of
Electrical and Computer
Engineering, and
Christopher Darvell,
MSEE student*



RESEARCH INITIATIVES

DIESEL PARTICULATE MATTER SENSOR ANALYSIS

Diesel engines offer increased fuel economy and efficiency but require careful monitoring and control of the exhaust in order to avoid harmful NO_x and particulate matter (soot) emissions. **Dr. James Peyton Jones**, Professor of Electrical and Computer Engineering, received \$96,000 in funding from Cummins Inc. to investigate the behavior of new particulate matter sensors and to develop new on-board diagnostic algorithms for determining the health of the diesel particulate filter (DPF). The problem is challenging due to the wide range of engine operating conditions, the nonlinear behavior of the sensor, and the need to discriminate between failure of the DPF and failure of the particulate matter sensor itself.

PREDICTING PERIVENTRICULAR LEUKOMALACIA (PVL)

With five-year funding of \$1.9 million from the National Institutes of Health and Children's Hospital of Philadelphia (CHOP), **Dr. C. Nataraj**, Professor and Chair of Mechanical Engineering, adapts a machinery diagnostic approach to predicting cases of periventricular leukomalacia (PVL) – a common brain injury that affects infants who have cardiac issues. Tracking complex signals from hemodynamic data and MRI studies, Dr. Nataraj and **Ali Jalali, PhD student**, developed algorithms to predict when PVL may occur among at-risk populations. Now, they will conduct more elaborate studies with more patients to develop complex data for use in predicting the severity of a PVL case so that medical staff can take preventative measures or apply effective treatments.



Dr. Hashem Ashrafiun, Professor of Mechanical Engineering, has been named CENDAC's new director, beginning fall 2011.



Use your smartphone to scan the QR code to the right to view CENDAC's website

CENDAC Faculty Researchers

Dr. Hashem Ashrafiun, Professor of Mechanical Engineering
 Dr. Garrett Clayton, Assistant Professor of Mechanical Engineering
 Dr. Steve Konyk, Assistant Professor of Electrical and Computer Engineering
 Dr. Sarvesh Kulkarni, Associate Professor of Electrical and Computer Engineering
 Dr. C. Nataraj, Professor and Chair of the Department of Mechanical Engineering
 Dr. Sergey Nersesov, Associate Professor of Mechanical Engineering
 Dr. James Peyton Jones, Professor of Electrical and Computer Engineering
 Dr. 'Subbu' Ramakrishnan, Research Professor
 Dr. Pritpal Singh, Professor and Chair of the Department of Electrical and Computer Engineering

Core Skills

Nonlinear System Modeling and Identification
 Nonlinear System Analysis and Design
 Nonlinear Control Methodologies
 Prognostics & Diagnostics

CENDAC Laboratories

Unmanned Surface and Underwater Vehicles Laboratory
 Innovations in Robotics Laboratory
 Dynamic Systems Laboratory
 Automotive Research Laboratory
 Advanced Control Theory & Applications
 Image-based Controls Laboratory
 Prognostics and Diagnostics Laboratory

VILLANOVA CENTER FOR THE ADVANCEMENT OF SUSTAINABILITY

Dr. Robert Traver, PE, WRE, MSCE '82

*Director, Villanova Center for the Advancement of Sustainability in Engineering;
Director, Villanova Urban Stormwater Partnership; and
Professor of Civil and Environmental Engineering*



In its second year, faculty within the Villanova Center for the Advancement of Sustainability in Engineering (VCASE) further refined their research focus areas and increased both their research proposal output and

the number of grants awarded. A competitive summer research seed grant program was also initiated to fund sustainability projects that bring together faculty members from across different academic departments or across the University's colleges. VCASE faculty members also recruited sustainability experts from around the country to share their research results and insights with members of the College community. In addition, VCASE students and faculty continued their commitment to service learning through a number of College and University programs.

- In 2010-2011, faculty members within VCASE established research focus areas: Environmental, Biorenewable Resources and Conversion Technologies, Alternative and Renewable Energy, Infrastructure Materials and Transportation Systems, the Villanova Urban Stormwater Partnership (VUSP), and the Global Learning Community.
- Faculty researchers closed out VCASE's second year with a 75 percent increase in grant proposals submitted and doubled the number of grants secured. Sixteen proposals, representing every focus area, received more than \$645,435.
- The Center provided summer research sustainability seed grants to multidisciplinary projects in which faculty researchers are working across departments or with colleagues from the College of Liberal Arts & Sciences.
- Faculty secured funding from private and public sources. For example, Harry Halloran, Jr., Chairman and CEO of American Refining and BioChemical Company, commissioned a research project with Dr. Metin Duran, Professor of Civil and Environmental Engineering. He and Yasemin Yilmazel, PhD candidate, explored the use of enzymes and hyperthermophilic bacteria to generate/accelerate the release of methane and hydrogen as alternative energy sources. Enzymes break down feedstock such as biosolids and cellulosic biomass under anaerobic conditions. Public funding included a 15-month, \$78,000 National Academy of Science Transportation Research Board grant secured by Dr. Leslie McCarthy, PE, Assistant Professor of Civil and Environmental Engineering, to compare hot mix asphalt dynamic modulus test data measured by axial compression and indirect tensions methods.
- Through the VCASE Visiting Lecture Series, subject matter experts from across the country presented lectures on cutting-edge research to the College community, including undergraduate and graduate classes. All lectures were broadcast live through the College's award-winning distance education facilities.
- Within the VUSP focus area, four undergraduates worked with graduate students to advance stormwater research and presented their findings at the Civil and Environmental Engineering Department's annual year-end presentation celebration.
- VCASE granted funding for the Electrical and Computer Engineering Department for the purchase of a novel type low-cost, electrodeposition technique for "growing" solar cell layers.
- VCASE faculty and students remained active in College-sponsored service-learning trips, University-wide community service activities, and Engineers without Borders.

Dr. Brian P. Chaplin, Assistant Professor, with Adrienne Donaghue CE '11, graduate student, in the Environmental Chemistry and Analytical Laboratory




IN ENGINEERING (VCASE)



Dr. Leslie McCarthy, PE, Assistant Professor of Civil and Environmental Engineering, with James Matzke CE '13 and Francis Nagel CE '12 in the Structural Engineering Teaching and Research Laboratory



 Use your smartphone to scan the QR code to the right to view the VCASE website!

VCASE FOCUS AREAS

- Alternative and Renewable Energy
- Biorenewable Resources and Conversion Technologies
- Environmental
- Global Learning Community
- Infrastructure Materials and Transportation Systems
- Villanova Urban Stormwater Partnership

RESEARCH INITIATIVES

SUSTAINABLE CONSTRUCTION PRODUCTS

Dr. Aleksandra Radlińska and **Dr. Brian P. Chaplin**, Assistant Professors of Civil and Environmental Engineering, received a VCASE seed grant to investigate the technical feasibility of expanding the use of coal combustion fly ash (CCFA) waste materials in concrete construction products. Converting CCFA into concrete can help minimize waste and landfill storage, mitigate global CO₂ emissions, and reduce costs for concrete production. They plan to develop CCFA-based concrete materials that mitigate heavy metal leaching and meet desired concrete performance criteria, as well as guidelines for the sustainable management of CCFA reuse and a detailed life cycle assessment of its impact on the economy, environment, and society.

GREEN DATA CENTERS

Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and the James R. Birle Professor of Energy Technology, and **Mechanical Engineering faculty** members are collaborating with researchers from Binghamton University and the University of Texas at Arlington to make data computing centers more energy and cost efficient. The three schools were awarded a National Science Foundation Industry/University Cooperative Research Center grant to create the country's first Center for Energy-Efficient Electronic Systems (NSF E3S). The team will work on research aimed at energy efficiency in data center operation for Center member companies such as Comcast, Verizon Wireless, Microsoft, and others.

VCASE FACULTY RESEARCHERS (PARTIAL LIST)

- Dr. Brian P. Chaplin, Assistant Professor of Civil and Environmental Engineering
- Dr. Metin Duran, Professor of Civil and Environmental Engineering
- Dr. Amy Fleischer ME '91, MSME '96, Associate Professor of Mechanical Engineering
- Dr. Gerard Jones ME '72, Associate Dean for Academic Affairs and Professor of Mechanical Engineering
- Dr. John Komlos, Visiting Assistant Professor
- William Lorenz, Adjunct Professor
- Dr. Leslie McCarthy, PE, Assistant Professor of Civil and Environmental Engineering
- Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and the James R. Birle Professor of Energy Technology
- Dr. Justinus Satrio, Assistant Professor of Chemical Engineering
- Dr. Pritpal Singh, Professor and Chair of the Department of Electrical and Computer Engineering
- Dr. Dorothy Skaf, Associate Professor of Chemical Engineering
- Dr. Aleksandra Radlińska, Assistant Professor of Civil and Environmental Engineering
- Dr. Bridget Wadzuk CE '00, Associate Professor of Civil and Environmental Engineering
- Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering
- Dr. Andrea Welker, PE, Associate Professor of Civil and Environmental Engineering

E3S FACULTY FROM THE COLLEGE OF ENGINEERING INCLUDE:

- **Dr. Alfonso Ortega**, Associate Dean for Graduate Studies and Research and the James R. Birle Professor of Energy Technology
- **Dr. Gerard Jones ME '72**, Associate Dean for Academic Affairs and Professor of Mechanical Engineering
- **Dr. Amy Flesicher ME '91, MSME '96**, Associate Professor of Mechanical Engineering
- **Dr. Aaron Wemhoff**, Assistant Professor of Mechanical Engineering
- **Dr. Kamran Fouladi**, Adjunct Professor of Mechanical Engineering

Regionally, this team has recruited member companies Comcast, Verizon Wireless, DVL Group, Inc., and Steel Orca to join the research consortium. Other participating corporations include Microsoft, Bloomberg, General Electric, Corning Inc., Emerson Network Power, and Endicott Interconnect Technologies.

www.engineering.villanova.edu/research

FIRST NSF CENTER FOR ENERGY-EFFICIENT ELECTRONIC SYSTEMS BREAKS NEW GROUND

The College of Engineering has joined forces with Binghamton University and the University of Texas at Arlington to create the Center for Energy-Efficient Electronic Systems (E3S), the first research center of its kind in the United States. With funding from the National Science Foundation's Industry/University Cooperative Research Center grant program, faculty researchers from each school, along with experts from Georgia Tech and the University of Illinois Urbana-Champaign, will solve issues of energy efficiency in data center operation for national and international companies.

Data centers play a crucial role in the way we conduct our daily lives. They house the computer systems that manage everything from commerce, finance, and secure personal data, to the content we download, the television shows we watch, and the cell phones we use. As our reliance on technology grows, more energy is required to run these systems, and to cool them.

"In the United States, about 2.5 percent of our national energy expenditure comes from powering data centers alone. While the need for efficient data management and processing has never been more important, it needs to be done in a more sustainable way," says **Dr. Alfonso Ortega**, Associate Dean for Graduate Studies and Research and the James R. Birle Professor of Energy Technology. "Through this unique collaboration, Villanova will play an integral role in research that could revolutionize the way we use and re-use energy from data centers. The E3S will also open up new teaching opportunities and unique faculty research collaborations."

E3S researchers have begun recruiting member companies that depend on the success of data center performance to become stakeholders in the Center. The stakeholders will identify research focus areas that are vitally important to the industry as a whole as it strives toward energy efficient systems. From there, Center researchers from each institution will contribute their expertise to develop new approaches to improving data center energy efficiency. The results have the potential to not only reduce costs for member companies but also make the centers themselves more sustainable.

Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and the James R. Birle Professor of Energy Technology (right), with Philip Lin ME '10 and current graduate student, in the Laboratory for Advanced Thermal and Fluid Systems





Dr. Justinus Satrio, Assistant Professor of Chemical Engineering, and Laura-Ann Chin, ChE graduate student



Use your smartphone to scan the QR code to view the College's research clusters online!



Other Research Collaborations

The College's teacher/scholar faculty have a longstanding tradition of reaching across specialty areas and departments, and outward to other schools, colleges, and industries to advance research that impacts the way we live and work. All of these experiences add new teaching layers to classroom lessons and create new opportunities for undergraduate and graduate student research.

Collaborations take many forms. For example:

- Faculty researchers in the **Center for Advanced Communications** are working with partners from **Bucknell University**, **Gwynedd-Mercy College**, **Siemens**, **The Boeing Company**, **Ben Franklin Technology Partners of Southeastern Pennsylvania**, and **Naval Sea Systems Command** to enable new research in acoustic and ultrasound technologies with funding from the National Science Foundation.

Research Clusters

Similar collaborations take place within each of the College's specialized research clusters in:

- Cellular and Molecular Bioengineering
- Chemical Engineering
- Computer Engineering
- Electronics, Photonics, and MEMs Devices
- Nanotechnology, Materials and Manufacturing
- Structural Engineering Teaching and Research
- Thermal and Fluid Sciences

Just a few of the strategic cross-collaborations taking place within these areas include:

- **Dr. Jens Karlsson**, Associate Professor of Mechanical Engineering, works with **Dr. Angela DiBenedetto**, Associate Professor of Biology, on cryopreservation processes for zebrafish.

- In the **Center for Nonlinear Dynamics and Control**, **Dr. James Peyton Jones**, Professor of Electrical and Computer Engineering; **Dr. Sarvesh Kulkarni**, Associate Professor of Electrical and Computer Engineering; and **Dr. C. Nataraj**, Professor and Chair of Mechanical Engineering, are collaborating with **Dr. Frank Klassner**, Associate Professor of Computing Sciences, on "Introducing Undergraduates to Complex Systems through Rapid Prototyping of Low-Cost Networked Mobile Robots" with funding from the **National Science Foundation** and **Nokia**.
- The **Villanova Center for the Advancement of Sustainability in Engineering** awarded four seed grants to collaborative research efforts this summer:
 - **Dr. William J. Kelly**, Associate Professor of Chemical Engineering; **Dr. Justinus Satrio**, Assistant Professor of Chemical Engineering; and **Dr. Ronald Balsamo**, Associate Professor of Biology, for "Development of a Sustainable System for Producing Biofuels from Biomass Grown for Remediating Soils."
 - **Dr. Aleksandra Radlińska** and **Dr. Brian P. Chaplin**, Assistant Professors of Civil and Environmental Engineering, for "Fate of Heavy Metals in Concretes with Fly Ash."
 - **Dr. Satrio** and **Dr. Calvin Li**, Assistant Professor of Mechanical Engineering, for "Energy Density Enhancement of Biofuels by Using Nanoscale Energy Additives."
 - **Dr. Dorothy Skaf**, Associate Professor of Chemical Engineering, and **Dr. Amanda Grannas**, Associate Professor of Chemistry, for "Heterogeneous Photocatalytic Destruction of Dilute Aqueous Chemical Wastes: Reactor Design Issues and Byproduct Analysis."
- **Dr. Sridhar Santhanam**, Professor of Mechanical Engineering; **Dr. Gerard Jones**, and **Edmond J. Dougherty, EE '69, MSCS '86**, Visiting Assistant Professor of Electrical and Computer Engineering, are investigating the use of viscous fluid to reduce blast impact (see p.9).
- **Dr. Joseph Yost, PE**, Associate Professor of Civil and Environmental Engineering, and **Dr. Aleksandra Radlińska** and **Dr. Leslie McCarthy, PE**, Assistant Professors of Civil and Environmental Engineering, have blended their structural and infrastructure expertise to investigate beam end coatings for the Pennsylvania Department of Transportation.
- Work initiated by **Dr. Randy Weinstein**, Professor and Chair of Chemical Engineering, and **Dr. Amy Fleischer** led to funding to explore nanofibers and phase change materials. Their collaboration sparked a new partnership between Dr. Fleischer and **Dr. Aaron Wemhoff**, who have built on the initial research to now use modeling software to predict the phase change behavior of nanofibers in new shapes.

The MDL features:

- In-house co-ops for engineering students to conduct industry sponsored research
- A new option for completing the Senior Capstone Design project
- Opportunities for engineering students to work across disciplines
- A 16-foot wall of interactive whiteboard space
- Five collaborative work stations, each with a 42-inch 3D monitor; web-cam and video-conferencing capabilities; and a laptop Puck™ that connects up to six laptops at a time, allowing students to share their data on the 3D monitor with the press of a button

Project sponsors come from many industries, including (but not limited to):

- Manufacturing
- Aerospace
- Energy
- Performance and industrial materials
- Bioengineering

In other news...

- The College received National Science Foundation funding to create the first center for data energy management research (see p. 20)
- A new center of learning at the Philadelphia Navy Yard adds a new convenient location for graduate students (see p. 24)

THE VILLANOVA MULTIDISCIPLINARY DESIGN LAB: AN IN-HOUSE CO-OP

For the first time, senior engineering undergraduate students can complete their Senior Capstone requirement with an in-house co-op experience, thanks to the College's **new Villanova Multidisciplinary Design Lab (MDL)**.

Made possible by a generous gift from **John Paul Jones III ChE '72**, the MDL offers a high-tech collaboration space for students to work in teams across disciplines with engineers from partner companies to conduct real-world industry research. Students help companies solve some of their toughest engineering challenges in a space custom-made for and dedicated to design – a core activity of engineering.

Through exposure to industry challenges and mentorship, engineering students better understand the types of design problems that professional engineers face. Industry benefits from student creativity and fresh perspective. Companies may also see the MDL as an “in-house co-op,” which gives them a chance to see how a student works with the company.



Scott Deady ME '12 in the MDL



Use your smartphone to scan the QR code to the right to view the MDL's website!



Endowed Lecture Series Launched

Through the **Patrick J. Cunningham, Jr. and Susan Ward '80 Endowed Lecture Series in Engineering**, launched in the fall of 2010, distinguished engineers in unique fields share their insights and expertise with students. In the 2010-2011 academic year, **Dr. Peter Raad**, The Linda Wertheimer Hart Professor and Director, The Guildhall, at Southern Methodist University, served as the inaugural speaker and presented “They Speak in Pixels! Interactive Digital Games as the 21st Century’s Mode of Human Expression.” In the spring, former astronaut **Andy Allen ME '77** presented a lecture to the College of Engineering entitled “Technological Packing for a Trip to Space.” He shared personal photos and experiences from his own space travel, as well as thoughts on how engineers can impact new technology and space exploration.



Engineering Entrepreneurship students discuss brainstorming with Jamie Hyneman of Mythbusters.

CAC Honors Benjamin Franklin Medal Winner

In honor of her selection as this year's Benjamin Franklin Medal winner in Electrical Engineering by the Franklin Institute, the **Center for Advanced Communications (CAC)** saluted **Dr. Ingrid Daubechies**, Professor of Applied and Computational Mathematics at Duke University, with a workshop on her signature area of expertise – theory and application of wavelets. The event, co-sponsored by the Institute of Electrical and Electronics Engineers, was held during Franklin Institute Awards Week on April 28.

More than 100 engineers from academia and industry attended the workshop, which featured keynote speakers from Washington, Stanford, and Duke Universities, as well as Ecole Normale Supérieure de Lyon in France, who presented research on wavelets in emerging areas, such as image compression, sparsification, and compressive sensing. Dr. Daubechies presented "Wavelets: A Historical Perspective" to cap the day's discussions. The group also toured the CAC's research laboratories.

Graduation Firsts

The 2011 Commencement Ceremony marked two firsts for the College of Engineering. A group of senior engineering undergraduates became the first students to successfully complete the **Engineering Entrepreneurship minor**. At the same time, **Sarah Barnette ChE '09** became the first student to graduate with a Master of Science in Sustainable Engineering. Barnett currently serves as a consultant for Environmental Resources Management in Annapolis, Md.

College of Engineering Makes Headlines

The College of Engineering's teaching and research initiatives appeared in dozens of national, regional, and local media outlets throughout the 2010-2011 academic year.

In the fall, David Glenn, a reporter for the *Chronicle of Higher Education*, spent the day learning about the College's new freshman curriculum – marking the first time a reporter from the nation's most prestigious education publication paid a house call to the University. Glenn sat in on freshman courses, toured the College's labs, and spoke with faculty members about what makes the new first-year program so unique. The freshman curriculum was included in a larger trend story about the shift toward discipline-specific efforts to address assessment needs and leading student performance and was the subject of a featured blog post dedicated to program's particulars.

In addition, faculty members shared the details of their research and weighed in with expert commentary on issues of local, national, and international importance, with media outlets such as (but not limited to): *NPR*, *The Christian Science Monitor*, *The National Post* (Ontario, Canada), *the Philadelphia Inquirer*, and *the Philadelphia Business Journal*.

IN MEMORIAM

The College of Engineering mourned the loss of two students in the 2010-2011 academic year and continues to pray for their families.

DANIEL GILETTA

Daniel Giletta was well-known throughout the University as a member of the Lambda Chi Alpha fraternity. Within the College of Engineering, he had a reputation for friendliness. "Daniel was a warm student and always pleasant and polite. He was a hard worker – very committed to doing well and doing his best. He will be missed not only by the Department of Electrical and Computer Engineering, but also by the entire Villanova College of Engineering family," says Dr. Pritpal Singh, Professor and Chair of the Department of Electrical and Computer Engineering

MATTHEW AINSWORTH

Matthew Ainsworth was well-loved within the Chemical Engineering department and well-known on campus as a member of Beta Theta Pi fraternity; Villanova Ambassadors; Engineers without Borders; CEER PEERS; and the president of Le Cercle Francais, the Villanova French Club. "Matt never took life for granted, living every day to its fullest, with an enthusiasm for learning that made him such a fun student to have in class," says Dr. Noelle Comolli, Assistant Professor of Chemical Engineering and Matthew's advisor.



New Center of Learning Launched at the Philadelphia Navy Yard

Just in time for the fall 2011 semester, the College of Engineering opened a new high-tech facility in Philadelphia Technology Park at the Philadelphia Navy Yard to offer graduate programs, distance-learning courses, executive and professional engineering training programs, and space for corporate training with remote capabilities. The new learning center provides students with the opportunity to learn in a world-class research, development, and industrial setting and is strategically located in a rapidly emerging regional technology hub.

The 1,400-square-foot facility houses a 40-seat classroom and 10-seat collaboration area – both of which employ the latest in web broadcasting and video teleconferencing capabilities. Evening graduate engineering courses at the Navy Yard began Aug. 24. Classroom space is also leasable to area corporations for in-house training and special events.

The new Navy Yard facility will also be used by the Villanova Continuing Studies program and will accommodate other University strategic goals including graduate recruitment events and STEM education outreach programs for the region's K-12 students and educators.

MSSE Program Grows Rapidly

After only its second year, the College's Master of Science degree program in Sustainable Engineering has grown exponentially to 60 students, who take classes both on campus and through the Graduate Studies Department's award-winning distance education technology. In May, Sarah Barnett ChE '09 became the first student to complete the program.

Now, students may specialize in one of four tracks: Alternative and Renewable Energy Technology, Watershed Sustainability, Environmental Sustainability, and Sustainable Infrastructure and Built Environment.

The College's new Center of Learning is located in Philadelphia Technology Park at the historic Philadelphia Navy Yard.



Use your smartphone to scan the QR code to the right to view the Graduate Studies Department's website!



College Signs MOU with Universidad Nacional de Ingeniería

The College has signed a Memorandum of Understanding (MOU) with Universidad Nacional de Ingeniería (UNI), Nicaragua's premier college of engineering, to establish a formal alliance that will open the door to new collaborative research and teaching initiatives that can improve communities in the United States, Nicaragua, and beyond.

A formal signing was held on April 12 in the College's new Villanova Multidisciplinary Design Lab, following a three-day visit to Villanova by the UNI delegation of engineering administrators and faculty. The new MOU provides for a series of collaborative opportunities:

- UNI will host Villanova engineering students who are working on service-learning projects in the region and at various points throughout the year to allow for prototype testing, installations, etc. UNI students will also be invited to join these projects.
- Dr. Pritpal Singh, Professor and Chair of the Electrical and Computer Engineering Department, will serve as a Visiting Professor, teaching graduate courses on energy efficiency and solar and renewable energy.
- The MOU extends the College's existing Partnership for Global Faculty, which also includes the Universidad de Santiago de Chile. Through this program, faculty from both institutions will work together at Villanova or UNI on research that will improve local communities.

As a regional leader in STEM outreach, the College of Engineering renewed its commitment to educating the next generation of American engineers through a number of programs aimed at increasing middle- and high-school students' interests and abilities in science, technology, engineering, and math subjects.

NovaCANE Expands

In its second year, NovaCANE (Villanova Community Action by New Engineers) expanded its engineering clubs to include more grade levels, more topic areas, and more schools served.

The sixth graders who comprised NovaCANE's inaugural Engineering Club at St. Martin of Tours School in Philadelphia had such a positive experience with their monthly engineering lessons and accompanying hands-on activities that they asked for a seventh grade version of the experience. In response, Dr. David Dinehart, Professor and Assistant Chair of Civil and Environmental Engineering, and the NovaCANE team created a Green Club for them. Monthly lessons and experiments revolve around water resources, environmental, sustainable, and chemical engineering fundamentals. The team is also putting together a program for eighth graders that will weave in elements from electrical and mechanical engineering. NovaCANE also rolled out clubs for the sixth and seventh graders at St. Edmond's Academy (SEA) in Wilmington, Del. The Green Club has already started activities at SEA this fall. Each club has been incorporated as part of the school's extra-curricular offerings.

In addition, Dr. Dinehart brought a NovaCANE experience with him while visiting Universidad de Santiago de Chile as part of the College's Partnership for Global Faculty to tour sites affected by Chile's 2010 earthquake and share some of his most recent structural engineering research. Along with his daughter, Abigail, who attends Villa Maria Academy in Immaculata, Pa., Dr. Dinehart conducted a NovaCANE lesson and experiment with students at Villa Maria's sister school in Chile. Using SKYPE, the students connected with their counterparts in the United States to learn together and share the results of their experiments. The girls were so excited about the project that they will be initiating their own NovaCANE engineering club for sixth graders this fall.

NovaCANE has expanded its engineering clubs to include more grade levels, schools, and topics.



Brooklyn Students Visit for Enrichment

Sixty students from Brooklyn's Immaculate Heart of Mary School visited campus this spring as part of the school's Health Education Enrichment in Arithmetic, Technology, and Science (HE²ARTS) program, which is supported by the Electrical and Computer Engineering Department. Dr. Rosalind Wynne, Associate Professor, helped develop the HE²ARTS program in 2009 to assist Catholic middle schools in the enrichment of existing science and math curricula.

Led by Dr. Pritpal Singh, Professor and Chair of ECE, and Dr. Wynne, the visit illustrated partnerships between engineering and nursing. Students toured the College's laboratories and participated in hands-on engineering experiences involving electric car design, vision-guided robots, a fiber optic force meter, and electronic sensors for extreme sports. Faculty and students from the College of Nursing led interactive demonstrations in the Clinical Simulation Lab, which features robotic patient simulators.

MATE Competition Targets Environmental Clean-up

The Department of Mechanical Engineering and the School District of Philadelphia's Secondary Robotics Initiative hosted the second annual Marine Advanced Technology Education (MATE) Regional ROV Challenge on May 21. Through MATE, students competed using the underwater remotely operated vehicles they designed and built to navigate a series of challenges associated with deepwater technology. This year's theme focused on using ROV's to mitigate environmental disasters.

Nearly 50 teams of 500 elementary, high-school, and college students from Pennsylvania, Delaware, New Jersey, Maryland, and the District of Columbia competed to advance to the international competition, held at the NASA Johnson Space Center in Houston, Texas, in June. The day-long competition was organized by Dr. C. Nataraj, Professor and Chair of Mechanical Engineering; James O'Brien, Assistant Professor of Mechanical Engineering; and dozens of volunteers from the College and industry partners.

LEAD Engineering for Others

Led by Dr. Stephen Jones, Associate Dean for Student and Strategic Programs, and Dr. Frank Hampton, Assistant Professor of Civil and Environmental Engineering, Leadership Education and Development (LEAD) Engineering immersed 30 of the nation's top high-school students of diversity in engineering fundamentals with a focus on social entrepreneurship over three weeks of July.

As one of only three colleges to offer the LEAD Summer Engineering Institute (with CalTech and Georgia Tech), the College received high marks from its first class of LEAD students in 2010, who praised the program for its content, rigor, and accessibility of faculty members. This year, students worked with faculty members and graduate students to learn the basics of mechanical, electrical, civil, and chemical engineering, while also experiencing them through hands-on experiments.



LEAD Engineering draws 30 of the country's top high school students of diversity to the College each summer for a three-week immersion experience in engineering.

Between classes, student teams worked on group projects that required them to develop a product or service that could be marketed in a developing country to improve the lives of those who live there. The program culminated with student presentations in which they pitched their product or service to an audience of faculty, students, parents, and College friends, who served as "potential investors." Projects included:

- Strengthening of Masonry Infrastructure for Earthquake Resistance
- Solar Lantern
- Design and Testing of Blades for Wind Turbines
- Design of a Water-Fueled Rocket
- Development of Various Soap Recipes for Developing Countries

Outside class, the students met with University admissions representatives for pointers on applying to college and networked with engineering professionals from PECO, Boeing, the University City Science Center, and Dow Chemical.

ME Department Hosts 2nd Annual Event for Girl Scouts

The Mechanical Engineering Department hosted a one-day workshop entitled "Invent, Improve, Impact" for more than 60 Girl Scouts in February to demonstrate how careers in mechanical engineering can positively impact society and the environment.

Led by Dr. Amy Fleischer ME '91, MSME '96, Associate Professor of Mechanical Engineering, the day's activities focused on solar energy systems, biomedical design, aerodynamics/fuel efficient design, and water distribution. Associate Professor Dr. Qianhong Wu and Assistant Professors Dr. Aaron Wemhoff, Dr. Leroy Alaways, and James O'Brien, as well as Mechanical Engineering students, worked with the girls to help them earn a special engineering patch for their participation. The day's activities were sponsored by Air Products and Chemicals, Inc. and Rolls Royce Marine Corporation.

FLAGSHIP PROGRAMS

VESTED (Villanova Engineering, Science, and Technology Enrichment and Development)

VESTED has brought more than 350 low-income middle- and high-school students from Philadelphia and the surrounding area to campus for hands-on engineering experiences and mentoring in college preparations. Many return multiple years to pursue in-depth experiences. According to statistical analysis and surveys of parents and students, VESTED increases participants' understanding and appreciation of engineering, improves all subject grades and school attendance, and increases college attendance.



Use your smartphone to scan the QR code to learn more about the VESTED program!



Robotics

In 2010-2011, the College completed its partnership with BEST (Boosting Engineering Science and Technology) Robotics, a national competition for middle- and high-school teams around the country. For approximately seven years, the College partnered with the School District of Philadelphia to host the regional competition, which drew more than 300 students.

New for 2011-2012, the College will initiate a partnership with FIRST Robotics, which partners with educational organizations across the country to host robotics competitions for students in kindergarten through twelfth grade.

SEASONS OF SERVICE

No matter what time of year it is, Villanova Engineers can always be found sharing their time and skills with people in need. The 2010-2011 academic year was no exception, particularly for service-learning experiences that took place outside the U.S. As the calendar pages turned, undergraduate and graduate students joined faculty and alumni all over the globe for life-changing engineering experiences.

FALL

Embera Puru, Panama: This year, the Villanova chapter of Engineers without Borders (a student organization that focuses on providing technical services to people in need) completed a feasibility study and a needs assessment in the isolated village of Embera Puru. During this one-week immersion trip, students worked with the local people to identify projects that would support the needs of the local community. As a result of this assessment, the team identified a project partner and focused their efforts on the design of solar systems for generating electricity and powering communication devices. This effort is being lead by **William Angiolillo CE '12** and **Benjamin Lawrence ChE '13**. **James O'Brien**, Assistant Professor of Mechanical Engineering, serves as mentor.

Waslala, Nicaragua: **Dr. Pritpal Singh**, Professor and Chair of Electrical and Computer Engineering; **Dr. Sarvesh Kulkarni**, Associate Professor of Electrical and Computer Engineering; and **Brendan McCoy EE '11** installed a prototype system for a telehealth project, which uses local cell phone networks and server connections to help improve communication between rural community health workers and hospital staff members in towns a day's journey away. They were joined by a team from the College of Nursing, which included **Dr. Ruth McDermott-Levy**, Assistant Professor; **Rebecca LaMarca '11**; and **Fruna Lara Vaamonde '11**, who also served as translator. **Victor Garcia MSEE '98**, an executive at Claro (a member company of the largest wireless provider in Latin America), helped the team secure cell phones and appropriate service plans to continue and expand their telemedicine system.

WINTER

Managua, Nicaragua: As part of an outgrowth of the College of Engineering's new Memorandum of Understanding with Universidad Nacional de Ingeniería, **Dr. Singh** and **Daniel Weeden EE '89**, President of Eneractive Solutions, enhanced the syllabus for graduate courses on energy efficiency and solar and renewable energy. They also explored options for partnering on local service projects in Nicaragua.

SPRING

Chepo/Bayano, Panama: Twelve engineering students from every discipline worked with **Father Wally Kasuboski** to develop a water resources master plan for the Chepo/Bayano region. This plan includes investigating the long-term sustainability of water availability in the area, as well as the engineering services that will be required to implement it. During this trip the team established relationships with a number of organizations in Panama, including two engineering schools, one architectural school, and the City of Knowledge non-profit organization. They also conducted research of a Vado design for flood control and prevention using a culvert bridge system for improving flood control interventions. The team was advised by **Dr. Gerard Jones ME '72**, Professor of Mechanical Engineering and Associate



Engineering students traveled far and wide to bring their skills to bear to communities in need around the globe.



Use your smartphone to scan the QR code to the right to watch a video about this project!



Summer Service Interns

The College launched a new Summer Service Internship program in 2011, which sent five engineering students to the Philippines and Panama to spend their summers immersed in the local culture while working on engineering initiatives.

Philippines:

Kyle Johnson CE '13 worked with the local government of **Kiangan, Ifugao** on the creation of a solid waste management plan. **Colleen O'Neil CE '12** worked with the local government of **Taytay, Palawan** on the creation of an environmental eco-tourism plan, and **Carlin Joseph CE '12** worked with a non-profit organization in **Mindoro** to design an integrated water supply system for an organic farm.

Panama:

Ian Dardani ME '13 worked with **Father Wally** and **Professor Falcone** on a water resources master plan that includes innovative field methods for measuring water quality. **William Angiolillo CE '12** worked with Professor Falcone to research the design of Vado culvert bridges.



Dr. Gerard Jones ME '72, Associate Dean for Academic Affairs and Professor of Mechanical Engineering, with Father Wally Kasuboski

Professor O'Brien; Ronald Meier CE '99, Principal of MGW LLC; **Dr. Sarvesh Kulkarni**, Associate Professor of Electrical and Computer Engineering; and **Dr. Elizabeth Keech, R.N.** and Assistant Professor of Nursing.

Poses Verdes, Honduras: Led by **Dr. Andrea Welker, PE**, and **Dr. Bridget Wadzuk CE '00**, both Associate Professors of Civil and Environmental Engineering, 12 CE students made the annual trip to Amigos de Jesús to continue working on a water treatment system installed by last year's team. They also investigated the feasibility of installing a solar-powered auxiliary pump to augment the water supply.

SUMMER

Port-au-Prince, Haiti: **Jordan Ermilio ME '98, MSWRE '06, PE**, Director of Engineering Service Learning; **Professor O'Brien**; and **Kimberly Connolly**, Director, Center for Global and Public Health, traveled to Haiti to investigate possible collaborations with Catholic Relief Services. During this trip they met with CRS program managers, local staff, and other international agencies involved with the redevelopment effort. The team is discussing the creation of a certification program for local Haitian engineers to receive training in water resources and environmental health. The effort is being coordinated with the Department of Romance Languages in the College of Liberal Arts & Sciences to create an integrated, multidisciplinary service-learning experience for Villanova students.



Frank Falcone CE '70, MSCE '73, PE, Associate Professor of Civil and Environmental Engineering, and Raquel Burlotos CE '14 in Panama

Dean for Academic Affairs; **Frank Falcone CE '70, MSCE '73, PE**, Associate Professor of Civil and Environmental Engineering; and **Daniel Lutz CE '71**, president of Daniel R. Lutz & Associates, Inc.

Waslala, Nicaragua: Seven engineering students, along with faculty advisors and professional mentors, volunteered with Water for Waslala to support its goal of bringing reliable, clean water supply to remote villages in Waslala. Concurrently, three electrical engineering students worked with several nursing students to install a solar powered communication system for the telehealth project. Student teams were mentored by

The College of Engineering gratefully acknowledges the donors on these pages for their contributions to the College during the 2010-2011 fiscal year.

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To learn more about creating an endowed fund, contact Cynthia Rutenbar, Director of Development for the College of Engineering, at 610-519-6973.

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 Ronald J. Klammer
 George J. Klein
 Peter A. Klessel
 Kathryn A. Kline
 Erik C. Knudsen
 Raymond A. Koenig
 Benjamin S. Konopka
 Harry F. Koper
 Michael F. Kozempel
 Mary E. Krueger
 Stanley T. Krutsick
 James J. Kunard
 Darryl J. Kunzman
 Ley I. Kuoch
 Tyler C. Ladd
 John H. Lamprecht
 Walter Lang
 Christopher S. Lapworth
 Brian D. Larkin
 Robert O. Larkin
 Robert L. Lawler
 John L. Lear
 Richard Lenskold
 John G. Lesko
 Liberty Engine Parts, Inc.
 Jaimie V. Lively
 Vincent A. Locasale
 John A. Loftus
 Mr. and Mrs. Stephen Logoyda
 Michael R. Lombardi

Anthony P. Lordi
 Mark S. Lotto
 Lawrence G. Lovejoy
 James G. Lowery
 James and Regina Lump
 Joseph A. Lundy
 Joseph and Isabel Lundy
 Adam F. Lupisella
 Juliane Lynch
 Mark A. Lyon
 James K. Lyons
 John S. MacBlane
 William R. MacCain
 Edward T. Maciejewski
 Mary Cheryl Lynn Maggio
 James T. Maguire
 W. S. Mahle
 Lawrence P. Mai
 Anthony P. Malanoski
 Deacon Thomas J. Malinoski
 Michael A. Malloy
 Stephen W. Maloney
 John G. Mannix
 William F. Martin
 Kirk and Estrella Martini
 Eugene A. Martino
 Joseph B. Matis
 Jose L. Matton
 Michael J. McAtee
 Daniel J. McCoy
 Michael D. McDermott
 Thomas B. McDonough
 Joseph T. McFadden
 Daniel M. McGee
 Joseph P. McGonnell
 John N. McGrath
 Carl R. McHenry
 Charles M. McKeough
 John R. McLaughlin
 William A. McMahan
 Karen A. McNaboe
 Martin J. McNamara
 Christine U. McNelis
 Christine M. McSweeney
 Alan P. Mehldau
 Victor E. Mendia
 David R. Mennerich
 Joseph M. Mercadente



In addition to providing funding for the College, the Villanova Engineering Alumni Society brings Villanova Engineers past and present together at events held throughout the academic year.

John P. Gunn
 David and Ellen Gusick
 Joseph L. and Kathleen D. Hagan
 David M. Hagelin
 Kathleen M. Halcovage
 Francis J. Haney
 Kevin M. Haney
 John N. Happ
 Christopher E. Harkins
 Joseph A. Hassler
 Donald E. Hawk
 James J. Hearn
 Edward V. Heiskell
 Taylor A. Henderson

Lisbeth M. House
 Nicolas J. Hrynenko
 Mary Hunt
 Robert A. Hunter
 Joseph S. Iandiorio, Esq.
 Stanley J. Iarosis
 Jose M. Ibanez
 John F. Igoe
 Robert E. Imbrogno
 Maria Inneo
 Gerald T. Jannik
 Mark F. Jaros
 Gregory E. Johnson
 Jeffrey P. Jones



The support of alumni and industry partners helps the College's growing STEM outreach program continue to flourish. (Pictured: Students from LEAD Engineering on a visit to the Fairmount Water Works).

Robert J. Merkert, Sr.
 Elizabeth S. Miller
 Kurt Miller
 Walter T. Miller
 Chris and Cynthia Mills
 Vincent A. Mina
 William G. Minahan
 Argentino L. Minana
 Carol A. Miner
 James P. Mockler
 Arthur D. Montano
 Dennis V. Mordan
 Daniel A. Morgan
 Michael A. Morgan
 Francis X. Morrissey
 Joseph A. Morton
 Motorola Foundation
 Joseph R. Mountain
 Timothy C. Mudarri
 Benjamin and Meghan Mueller
 Joseph T. Muldoon
 Mark and Claudia Muller
 Edward V. Murray
 Charles F. Nash
 Richard E. Nelson
 Mr. Ralph J. Nevel
 Tin V. Nguyen
 George P. Nicolaus
 Benjamin M. Nolan

Ronald L. Norwood
 Kevin O'Brien
 Andrew B. O'Keefe
 Frank J. Olsen
 Jay R. O'Neil
 Cornelius O'Regan
 Louis G. Orsatti
 Stanley E. Ozga
 Richard K. Paetzold
 Joseph L. Parrillo
 Joseph G. Penarczyk
 Michael J. Perron
 Kathleen F. Peters
 Paul and Alicia Peterson
 John A. Petesich
 Henry K. Petter
 Jared and Stephanie Piccini
 Jason M. and Julia A. Piccini
 Paul A. Piccini
 Joseph R. Pietrzyk
 Joseph L. Piscitelli
 Kelly A. Pitera
 Rodney P. Plourde
 Joseph H. Pluscauskis
 Richard S. Poteet
 Albert L. Procassini
 Elizabeth A. Pujdak
 John B. Pyle
 David P. Quinn

Joseph A. Quinn
 Maureen L. Raichel
 Charles M. Rampacek
 John and Rebecca Reilly
 Joseph L. Renzetti
 John R. Reynders
 Carol A. Reynolds
 Robert J. Reynolds
 John J. Rigby
 Edward J. Rink
 Robert J. Robleto
 Douglas and Donna Rode
 Jeffrey R. Rode
 Stephen J. Rodgers
 Rodney E. Roeske
 Michael J. Rokosky
 Stephen F. Rollin
 Louis G. Rosanio
 Stephen J. Rosasco
 Robert B. Rozycki
 Louis J. Ruggeri
 William H. Ruiz
 Charles H. Rumpf
 James and Cynthia Rutenbar
 Francis P. Ryan
 Joseph L. Ryan

Miguel Sabater
 Caryl D. Sabine
 John F. Sadowski
 Ronald A. Salerno
 Philip J. Samulewicz
 Alberto J. Sanchez
 David J. Sands
 Leo J. Savio
 R.L. Schipani
 Charles Schlembach
 Brian J. Schmidt
 Paul M. Schmitz
 Ronald J. Schnellbacher
 Robert J. Schrier
 John J. Schwartz
 Philip J. Sconyo
 Leonard P. Scullion
 Stephen J. Secora
 Michael L. and Laura Seibert
 T. C. Sekella
 Nancy E. Sen
 William and Colleen Serencsits
 Michael M. Serra
 Paul A. Service
 Peter J. Sevcik
 Raymond M. Shanahan



The Patrick J. Cunningham Jr. and Susan Ward '80 Endowed Lecture Series in Engineering brings two distinguished speakers to campus each academic year. (Left to right: Ryan W. Cunningham; Dr. Peter Raad, inaugural lecture series speaker; and Dr. Gary Gabriele, Drosdick Endowed Dean of Engineering).

Continued: Gifts up to \$499

Jeremy T. Shook	Charles D. Trifiro
John R. Shuhler	Lisa A. Tuason
Robert M. Sim	Paul J. Tubito
John T. Sisson	Michael S. Turletes
Rabih Skaf	Mark F. Ulep
Mark J. Smith	Nancy-Ann B. Valaika
Richard P. Smith	Paul J. Valliere
Wyatt and Kathryn Smith	William H. Vaseliou
Edward D. Solarz	Andrea M. Veikos
Mr. J. Richard Spence	Francis V. Villani
William J. Spengel	Derek M. Voight
John A. Spina	Martin T. Walchak
Walter F. Staret	John F. Waller
Bartholomew J. Starkey	Daniel J. Walsh
John-Michael Staub	John P. Walsh
John A. Stefanik	Michael P. Walsh
Michael P. Stein	Lauren R. Walter
W. J. Stewart	John C. Watral
Thomas E. Stillely	Martha R. Weed
Casey St. Fleur	Gregory J. Weidman
Charles K. Stone	Joseph P. Welsh
Ellen C. Street	Alfred J. Wetzel
Brian J. Sullivan	James W. Whelan
John J. Sullivan	Brian K. White
Thomas F. Sullivan	Pierce Whitfield
Richard R. Sur	Matthew J. Wierzchowski
Imre A. Szalai	Adam G. Williams
Vincent J. Taddei	Michael M. Willoughby
Nicholas J. Tallos	Thomas G. Witte
Robert D. Tancibok	Joe Woo
Scott D. Tereshak	Kaitlin E. Worden
Paul M. Terruso	Jinfeng Wu
Albert H. Them	Francis J. Wuzzardo
Mrs. Mary A. Thomas	Jonathan and Erin Zacharkiw
Joseph T. Threston	Evan Zaletel
Theodore T. Tichy	Joseph A. Zebrowski
Philip R. Timm	Charles A. Zogby
Bernard C. Toth	Karl R. Zurn
William A. Trethaway	

This list has been compiled to the best of our abilities. If you have questions about or would like to make an update to your listing for future recognition, please contact Cynthia Rutenbar, Director of Development for the College of Engineering, at Cynthia.Rutenbar@villanova.edu.

Bequests and Planned Gifts

Alumni and friends often make their most significant gifts to the University through planned gifts. These donors are recognized as members of the College's 1842 Heritage Society, which honors alumni, parents, and friends who support the University through documented bequests in their wills or other planned gifts.

New planned gifts in the 2010-2011 fiscal year:

- A. Anthony Scarpa Trust
A. Anthony Scarpa '49 Endowed Engineering Scholarship
- Nicholas and Roselynn Calio
- John A. Janitz

For more information, visit www.villanova.edu/plannedgiving.

Other Ways to Give

Annual Fund Gifts: A contribution to the Villanova Annual Fund is a meaningful way to honor your Villanova heritage and help the University deliver a quality education to those following in your footsteps. An annual fund gift supports programs and initiatives that benefit the student community and helps to increase Villanova's alumni giving percentage. You may restrict your gift to the College of Engineering or a specific department.

Make a gift now through the secure online gift form at www.villanova.edu/advance/development/makeagift. Or, call 1-800-486-5244.

Organizational Partnerships

Organizational and corporate partners make a measureable impact on the educational experience the College provides. These partnerships align with the College's strategic plan by emphasizing practical application of theory and exposing students and faculty to real-world problem-solving. They also offer unique opportunities for student and faculty professional development. In exchange, partners gain access to top tier talent, the College's faculty experts and cutting-edge research facilities, and opportunities to enhance the quality of education received by students.

Partnerships take many forms. Specific areas of partner involvement include:

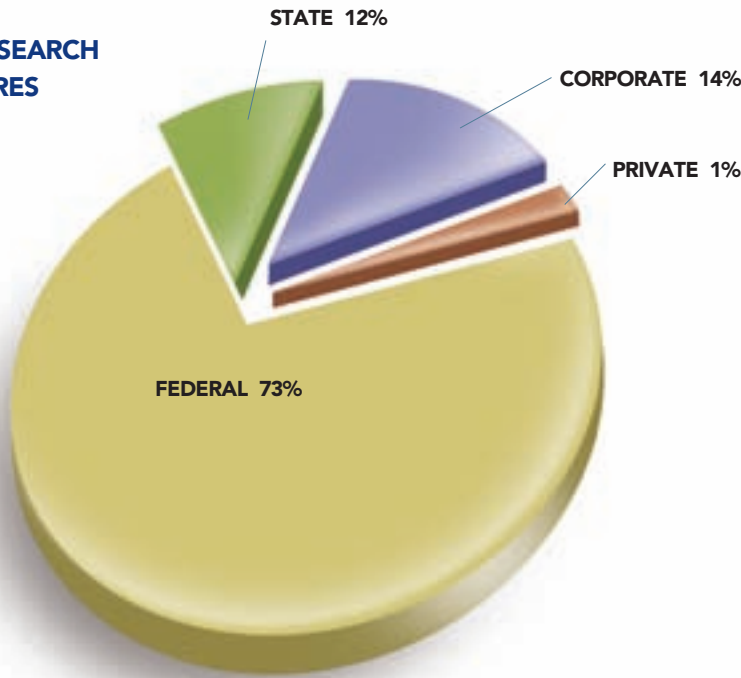
- Support for the College's growing number of STEM outreach opportunities
- In-house co-ops through the College's new Multidisciplinary Design Lab for students
- Internships for students and access to the highest quality new engineers
- Faculty fellowships that blend academic perspective with real-world research problems
- Sponsored faculty-led research projects
- Resources for student-led international service activities
- Gifts that support laboratory facilities and capability expansions or gifts in kind of equipment
- Student scholarships
- Service on departmental or College advisory committees
- Advocacy for Villanova Engineering within an organization
- Guest lecturers or serving as judges at student competitions

For more information about these or other opportunities available to organizational partners, please contact Burton Lane, Director of External Relations for the College of Engineering, at 610-519-6109.

RESEARCH EXPENDITURES FOR FISCAL YEAR 2011

(Total active grant funding for 2010-2011 was \$10.75 million)

ANNUAL RESEARCH EXPENDITURES
\$4.56 M Total



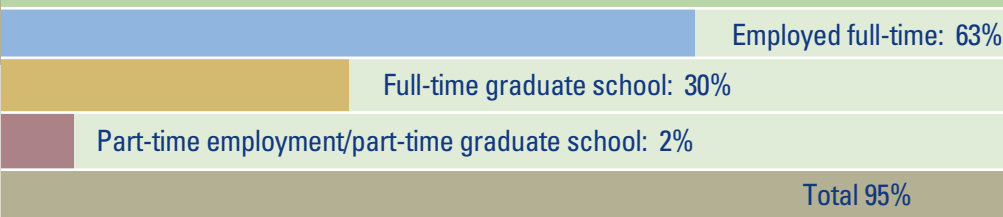
Retention

- Incoming class of 2010 returning to the College as sophomores in 2011: 94%

Persistence Figures for the Incoming Class of 2005*

Graduated in 4 years (in 2009):	78%
Graduated in 5 years (in 2010):	81%
Graduated in 6 years (in 2011):	81%

Career Choice, College of Engineering, Class of 2010*



Degrees Conferred at May 2011* Commencement

Total Bachelor of Science Degrees:	215	Total Master of Science Degrees:	111
B.S. Chemical Engineering	28	M.S. Chemical Engineering	18
B.S. Civil Engineering	63	M.S. Civil Engineering	21
B.S. Computer Engineering	24	M.S. Computer Engineering	11
B.S. Electrical Engineering	25	M.S. Electrical Engineering	24
B.S. Mechanical Engineering	75	M.S. Mechanical Engineering	22
		M.S. Sustainable Engineering	1
		M.S. Water Resources	14
Total Degrees	328	Total Doctoral Degrees	2

Did You Know?

As of fall 2010,* 26% of all undergraduate engineering students are female (well above the national average of about 19%).

*denotes the most recent graduating class for which complete data is available

SENIOR SURVEY SAYS...

At the conclusion of each academic year, the College asks graduating seniors to provide insights into a number of academic, social, and personal areas. The responses play an important role in the way the College plans for the future. The results below offer a glimpse into the way the class of 2010* felt about their time spent at the College of Engineering.

Academics

- 96% of seniors agreed or strongly agreed that the University provides a rigorous academic experience inside the classroom
- 89% of seniors were satisfied or very satisfied with the courses in their major field
- 87% of seniors were satisfied or very satisfied with the overall quality of instruction they received
- 72% of seniors indicated that they planned to pursue advanced degrees

Student experience

- 88% of seniors were satisfied or very satisfied with the overall sense of community they experienced
- 85% of seniors said they frequently or occasionally worked on independent study projects
- 59% of seniors said they frequently or occasionally worked on a professor's research project

Faculty interactions

- 94% of seniors said they were frequently or occasionally encouraged to pursue graduate or professional study
- 90% of seniors said they were frequently or occasionally given an opportunity to work on a research project
- 92% of seniors said they were frequently or occasionally offered help in achieving their professional goals
- 95% of seniors said they were frequently or occasionally given the opportunity to apply classroom learning to 'real-life' issues

Spirituality

- 67% of seniors said their time at Villanova moderately or greatly contributed to their ethical and moral development
- 86% of seniors said their time at Villanova moderately or greatly contributed to their sense of personal responsibility
- 81% of seniors said their time at Villanova moderately or greatly engendered a desire for lifelong learning

Outcomes

- 98% of seniors said their general knowledge was stronger or much stronger
- 97% of seniors said their analytical and problem-solving skills were stronger or much stronger
- 97% of seniors said their knowledge of a particular field or discipline was stronger or much stronger
- 92% of seniors said their leadership abilities were stronger or much stronger
- 88% of seniors said their interpersonal skills were stronger or much stronger
- 93% of seniors said their preparedness for employment was stronger or much stronger
- 91% of seniors said their preparedness for graduate studies was stronger or much stronger
- 75% of seniors said their understanding of community problems was stronger or much stronger
- 72% of seniors said their understanding of national social problems was stronger or much stronger
- 77% of seniors said their understanding of global issues was stronger or much stronger

10 Easy Ways to Strengthen Your Ties to the College of Engineering

If you're an alumnus, you can help us shape the next generation of Villanova engineers. Consider these 10 easy ways to strengthen your ties to the College and your fellow Wildcats.

- **Join** the Villanova Engineering Alumni Society, which supports academic programs and offers networking opportunities for members. <http://www.villanova.edu/engineering/alumni/>
- **Connect** with the University's Career Center to make them aware of internship and career opportunities within your organization for new engineers – and to secure the best new engineering talent for your company.
- **Mentor** an undergraduate to share your insights as a seasoned professional and help a new engineer prepare for life after graduation.
- **Contribute** financially to the College of Engineering, which will support the College's goal of becoming the premier engineering program in the country.
- **Consider** the College of Engineering's faculty and dozens of state-of-the-art laboratories for your organization's real-world research needs. Or, sponsor an in-house co-op through the Multidisciplinary Design Lab, designed to give undergraduate students real-world research experience for industry.
- **Establish** a Villanova Corporate Alumni Partnership within your organization to bring together fellow alumni for timely updates from the College, professional development and networking opportunities, and the chance to build a Villanova identity within your company.
- **Visit** the College of Engineering's website for news and information about student programs and achievements; faculty research, recognition, and accomplishments; and special events.
- **Host** an information session for students at your company, or serve as a guest speaker for one of the student branches of professional engineering societies.
- **Share** information about opportunities for sponsored research or faculty fellowships available within your company.
- **Follow** the College's news and updates via Facebook (www.Facebook.com/VillanovaEngineering) and LinkedIn (search Villanova College of Engineering under "Groups").

Next steps...

- For more information about the College of Engineering, visit www.engineering.villanova.edu.
- For inquiries about alumni events or involvement, visit www.Villanova.edu.
- To make a financial contribution, contact Cynthia Rutenbar, Director of Major Giving (Cynthia.Rutenbar@Villanova.edu); Evan Zaletel, Major Gifts Officer (Evan.Zaletel@Villanova.edu); or Amanda Adair, Major Gifts Officer (Amanda.Adair@Villanova.edu).
- For inquiries about Villanova Corporate Alumni Partnerships or questions regarding corporate partnerships or research, contact Burton Lane, Director of External Relations (Burton.Lane@Villanova.edu).
- To serve as a student mentor or to connect with student organizations, contact Gayle Doyle, Administrator of Student Support Programs (Gayle.Doyle@Villanova.edu).



VILLANOVA UNIVERSITY

College of Engineering

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VILLANOVA, PA 19085

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www.engineering.villanova.edu

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OUR MISSION

Villanova University's College of Engineering is committed to an educational program that emphasizes technical excellence and a liberal education within the framework of the University's Augustinian and Catholic traditions. As a community of scholars, we seek to educate students to pursue both knowledge and wisdom, and to aspire to ethical and moral leadership within their chosen careers, their community, and the world. We value a spirit of community among all members of the College that respects academic freedom and inquiry, the discovery and cultivation of new knowledge, and continued innovation in all that we do.

ABOUT VILLANOVA UNIVERSITY

Since 1842, Villanova University's Augustinian Catholic intellectual tradition has been the cornerstone of an academic community in which students learn to think critically, act compassionately and succeed while serving others. There are more than 10,000 undergraduate, graduate and law students in the University's five colleges—the College of Liberal Arts and Sciences, the Villanova School of Business, the College of Engineering, the College of Nursing and the Villanova University School of Law. As students grow intellectually, Villanova prepares them to become ethical leaders who create positive change everywhere life takes them.

DEGREES

B.S. in Chemical Engineering
B.S. in Civil Engineering
B.S. in Computer Engineering
B.S. in Electrical Engineering
B.S. in Mechanical Engineering

Five-year bachelor's-master's degree program

M.S. in Chemical Engineering
M.S. in Civil Engineering
M.S. in Computer Engineering
M.S. in Electrical Engineering
M.S. in Mechanical Engineering
M.S. in Sustainable Engineering
M.S. in Water Resources and Environmental
Engineering

Ph.D. Program (part time or full time)

Certificate Programs

Visit VUengineering.com to learn more.

ACCREDITATION

All five undergraduate programs are accredited by the Accreditation Commission (EAC) of ABET (Accreditation Board for Engineering and Technology), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012.

RANKING

Once again, *US News & World Report* ranked Villanova's College of Engineering in the top 10 in the nation in the Best Undergraduate Engineering Programs category among schools that award primarily bachelor's and master's degrees.

