

# VILLANOVA

2009 – 2010 ANNUAL REVIEW

## ENGINEERING



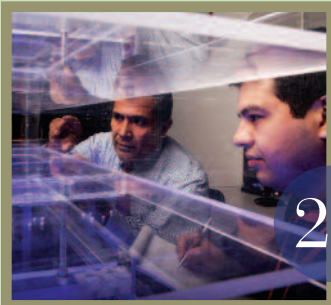
VILLANOVA  
UNIVERSITY

C O N T E N T S



2

Each of the academic departments has revised its undergraduate curriculum to allow for more flexibility and opportunities to deepen studies in emerging areas.



20

There have never been more opportunities for students to work alongside faculty on sponsored research projects.



26

The College continues to broaden its service-learning initiatives both around the world and closer to home.

**Message from the Dean** 1

**Teaching**

Chemical Engineering 2  
Civil & Environmental Engineering 4  
Electrical & Computer Engineering 6  
Mechanical Engineering 8

**Undergraduate Research** 10

**Student Accomplishments** 11

**Faculty Accomplishments** 12

**Research**

Center for Advanced Communications 14  
Center for Nonlinear Dynamics & Control 16  
Villanova Center for the Advancement of Sustainability in Engineering 18  
Research Areas 20

**College Notes 2009-2010** 22

**Graduate Studies** 24

**Service**

STEM Outreach 25  
Service-learning Opportunities 27

**Donors & Partners** 29

**College of Engineering by the Numbers** 31

**Connect with the College of Engineering** Inside Back Cover

Drosdick Endowed Dean of the College of Engineering  
**Dr. Gary A. Gabriele**

Director of External Relations  
**Burton H. Lane**

Editor  
**Carly Keeny**

Contributor  
**Tracy Simon**

Designer  
**Peter Volz Design**

**Photo Credits:**

Principal Photography:

**Aurora Imaging Company, LLC**  
**Crane Photography, Inc.**

Additional photos provided by:

**William Angiolillo CE '12**  
**Steven Brady**  
**Commonwealth Media Services**  
**Jordan Ermilio, Assistant Professor**  
**Dr. Amy Fleischer, Associate Professor**  
**Lauren Havener CE '11**  
**Barbara Johnston Photography**  
**John Welsh Photography**

**Questions or Comments**

Send to [carly.keeny@villanova.edu](mailto:carly.keeny@villanova.edu)

**Address Updates**

Send to [marylou.glenn@villanova.edu](mailto:marylou.glenn@villanova.edu)

**News & Events**

Visit [www.engineering.villanova.edu](http://www.engineering.villanova.edu)



**Ongoing Updates**

Become a fan of the College of Engineering on **Facebook** at [www.facebook.com/VillanovaEngineering](http://www.facebook.com/VillanovaEngineering)

**On the Cover:**

Clockwise from top: Villanova students in the Philippines; graduate student Kevin Flynn conducting research through VCASE; and freshman engineering students conducting a mini-project as part of the new First-Year Curriculum.



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



**Mixed Sources**  
Product group from well-managed forests, controlled sources and recycled wood or fiber  
[www.fsc.org](http://www.fsc.org) Cert no. SW-COC-003047  
© 1996 Forest Stewardship Council



**“The love of knowledge and truth should invite us to continue learning. The love of others should compel us to teach.”**

— St. Augustine, from *Answers to the Eight Questions of Dulcitus*

The sentiment above may be more than 1,500 years old, but it would be difficult to overstate its ongoing relevance, especially within the College of Engineering, where our faculty members have been living this Augustinian ideal for more than 100 years.

Although times and technologies change, our faculty's commitment to combining their own ongoing engineering scholarship, active research, and expertise development with a passion for teaching has been constant. Because our faculty members are both teachers and scholars, our students benefit from a better classroom experience. Here, future engineers learn from leaders in their fields who demonstrate the value of lifelong learning.

In the classroom, students experience the advantages of our teacher/scholar model from the moment they enter the Center for Engineering Education and Research for the first time. For example, the hands-on mini-projects that comprise our new First-Year Curriculum mirror problems our faculty members are investigating through their own active research projects.

The teacher/scholar model also creates more opportunities for undergraduate students to work alongside faculty on real-world research projects. With three centers of research, including the newly launched Villanova Center for the Advancement of Sustainability in Engineering, and another eight research areas organized around specific topics, there have never been more opportunities for our students to apply what they've learned in the classroom.

Finally, our faculty sparks a parallel desire to share knowledge with others among our students, whether they are mentoring the next generation of engineers through our growing number of STEM outreach programs or developing much-needed water, energy, or communications solutions alongside villagers in developing countries. Like our teacher/scholar faculty, Villanova Engineers understand the value of sharing what they know to help others improve their lives.

Our 2009-2010 Annual Review is full of examples of the many ways our teacher/scholar model is making a difference in the daily lives of our students. For ongoing updates about our students, faculty, and alumni, please follow us on Facebook at [www.Facebook.com/VillanovaEngineering](http://www.Facebook.com/VillanovaEngineering).

Sincerely,

A handwritten signature in black ink, reading "Gary A. Gabriele". The signature is fluid and cursive, with a prominent loop at the end.

Gary A. Gabriele, Ph.D.

*Drosdick Endowed Dean of the College of Engineering*

# CHEMICAL ENGINEERING

## UNDERGRADUATE + GRADUATE

### Dr. Randy Weinstein

*Professor and Chair,  
Department of Chemical Engineering*



**The Department of Chemical Engineering continued to update both its undergraduate and graduate curriculum to not only provide students with more electivity and the opportunity to deepen**

**their studies in important emerging areas, but also to solidify their foundation in key fundamentals associated with chemical engineering as a discipline and a profession.**

**The ChE Department also continued to modernize its facilities, courses, and research offerings with a new alternative energy elective, the addition of a significant amount of new laboratory equipment, and a growing offering of research opportunities in sustainable engineering areas.**

- More than half of the ChE Department's faculty participated in curriculum development for the College's new First-Year Curriculum. Hands-on mini-projects involving chemical engineering included The Artificial Kidney, Electric Car Design, and Aerodynamics of Vehicles: Reducing Drag, Saving Energy.
- The department finalized details of its upper level curriculum to provide a "throughout the curriculum" approach where key topics are spread throughout required courses. Now, ethics, lifelong learning, safety, statistics, hands-on experiences, societal impacts, and teamwork are woven throughout all course components.
- Undergraduates may now choose to focus their undergraduate studies in one of three emerging areas: bioengineering and pharmaceuticals; advanced materials and nanotechnology; and sustainability and alternative energy. Graduate courses and research opportunities were also enhanced in these three hot areas where chemical engineers contribute significantly.
- The ChE Department added a suite of new laboratory equipment, including three new gas chromatographs; a liquid chromatography unit; a gas chromatography-mass spectrometry system; a freeze drier; a UV-Vis spectrophotometer; a digital scanning calorimeter; a lab scale pyrolyzer; a chemisorption surface area analyzer; a new computer controlled pumps experiment; and several smaller-scale pieces of equipment.
- A group of nine undergraduate and graduate students, along with several ChE faculty members, attended the American Institute of Chemical Engineers (AIChE) national conference in Nashville, Tenn., in November. While there, student teams participated in the conference's research showcase.
- Ten new full-time graduate students enrolled during 2009-2010 – an all time high for the department.
- Distance education graduate courses continue to be enhanced, with 2010 marking the first time a master's student in chemical engineering obtained his degree in distance mode.
- Graduate students Adam Hoffman ChE '09 and Justin Yeash ChE '09 were awarded an Honorable Mention for their design and development of an on-campus biodiesel production facility at the AIChE National Conference research showcase.

*Kevin Brodwater (right), a graduate student in chemical engineering, is studying alternative energy with a focus on hydrogen generation.*



## RESEARCH INITIATIVES

## BIORENEWABLE RESOURCES UTILIZATION

**Dr. Justinus Satrio**, Assistant Professor, focuses his research on converting lignocellulosic biomass to energy, chemicals, and fuels. Although an abundant and inexpensive renewable resource that does not compete with the production of food crops, the complex nature of lignocellulosic biomass poses several major challenges to using it in sustainable ways. More specifically, Dr. Satrio is studying thermochemical-based processes for converting biomass into a liquid, known as bio-crude oil (BCO), which is easier to handle, transport, and use. Similar to petroleum crudes, BCO can be used as feedstock to produce energy, fuel, and useful chemical products.

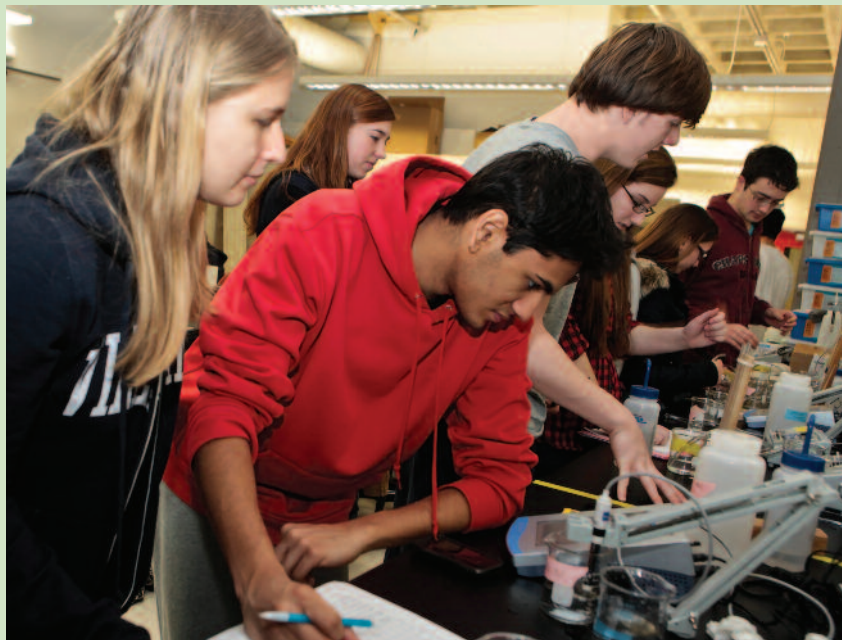


## CARBON SEQUESTRATION

**Dr. Dorothy Skaf**, Associate Professor, is exploring sustainable energy issues in two research projects. The first involves generating hydrogen from the glycerol byproduct that accounts for about 10 percent of the initial mass of oil in typical

biodiesel production. If optimized, this technique could improve the overall energy efficiency of biodiesel by generating additional value from a waste stream.

The second initiative focuses on reducing carbon dioxide in the atmosphere by converting it back into valuable chemicals. She is looking at using nanomaterials with photochemistry to provide the energy input to the reaction.



Freshman students investigate strategies to improve dialysis through the First-Year Curriculum's Artificial Kidney mini-project.

## FACULTY

- Dr. Justinus Satrio, Assistant Professor, became the department's newest faculty member over the summer. He will advance education and research in the sustainable area of biomass conversion.
- Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering, was named director of the College's new master of science degree program in sustainable engineering.
- Dr. Randy Weinstein also won the 2010 Lindback Distinguished Teaching Award, established to honor excellence in undergraduate teaching.
- Dr. William Kelly, Associate Professor, co-developed and taught The Global Pharmaceutical Industry, a new course on current technical, regulatory, and business challenges in the pharmaceutical industry, with Dr. Jonathan Doh from the Villanova School of Business.
- Dr. Michael Smith, Assistant Professor, served as chairman of the Catalysis Club of Philadelphia and led planning for its 2010 Spring Symposium, which was co-sponsored by the ChE Department and took place on campus in May.

# CIVIL + ENVIRONMENTAL ENGINEERING

## Dr. Ronald Chadderton, PE

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



**The Department of Civil and Environmental Engineering's newly revised curriculum now provides students with more freedom in their selection of basic science courses and technical**

**electives. It also offers a holistic approach to covering the technical, social, and ethical topics embedded in the study and practice of engineering, with these subjects distributed throughout the four-year curriculum. The department also continued to secure industry and government-sponsored research opportunities, through which faculty work side-by-side with undergraduate and graduate students.**

**In addition, CEE faculty and students expanded their commitment to the community and one another through new service projects and student professional organizations.**

## UNDERGRADUATE + GRADUATE

- CEE faculty participated in developing the new First-Year Curriculum. Hands-on projects involving the department include the Load/Deflection Character of a SMARTBEAM and Application of Acoustic Technologies for Predicting Structural Failure.
- Participation by CEE students in study abroad programs increased to 13 students in 2009-2010. Six studied abroad for a semester and seven for the summer in five different countries.
- Adrienne Donaghue CE '11 received a 2010 Udall Scholarship and represented Villanova University at the Fall 2009 Undergraduate Research at the Capitol Day in Harrisburg, Pa.
- Twenty undergraduate students were inducted into Chi Epsilon, the Civil Engineering Honor Society.
- The fifth Stanley K. Ciesielski Award was presented at CEE Day 2010 to Alexandra Terpeluk CE '10 and Nick Tumolo CE '10, who were recognized for their superior scholarship and service to the department. CEE Day was sponsored by the Stanley K. Ciesielski and William B. Fergusson Memorial Funds.
- Matthew Bandelt CE '10 and Jessica Shaw CE '10 (with a double major in physics) earned National Science Foundation Graduate Research Fellowships to support their post-graduate studies.
- Sixteen CEE students took part in the College's 11th annual trip to Amigos de Jesús orphanage in Honduras, where they designed and implemented a water filtration system (the first project of its kind in trip history). The team also constructed a basketball court for the children who live there. Dr. Andrea Welker, PE and Associate Professor, and Dr. Bridget Wadzuk CE '00, Assistant Professor, led the trip.
- Three new student organizations were established in 2009-2010: NovaCANE (Villanova Community Action by New Engineers) and student chapters of the American Concrete Institute and the Institution of Transportation Engineers.



The Structural Engineering Teaching and Research Laboratory (SETRL) is home to undergraduate, graduate, and industry-sponsored research. Freshmen engineering students also experience SETRL through the new First-Year Curriculum.

## FACULTY

- Dr. Brian Chaplin, Assistant Professor, joined the CEE Department in July and will focus on environmental engineering and the development of novel technologies for water reuse. He will also establish an Environmental Chemistry and Analytical Laboratory.
- Dr. Bridget Wadzuk received the College's 2010 Farrell Award, which recognizes an engineering faculty member who has demonstrated personal concern for students and exceptional dedication to the College.
- Dr. Robert Traver, PE, WRE, MSCE '82, Professor, was appointed director of the Villanova Center for the Advancement of Sustainability in Engineering (VCASE). He remains the director of the Villanova Urban Stormwater Partnership (VUSP).
- Dr. David Dinehart, Professor, was nominated for the Villanova University Outstanding Faculty Research Award.
- Dr. Shawn Gross, Associate Professor, was a semi-finalist for the 2010 Lindback Distinguished Teaching Award, established to honor excellence in teaching at the undergraduate level.



Water research is an area growing in both capabilities and strength within the CEE Department.

## RESEARCH INITIATIVES

### GIRDER-SLAB TECHNOLOGIES STUDY

With a three-year, \$120,000 research grant from Girder-Slab Technologies LLC, **Dr. David Dinehart**, **Dr. Shawn Gross**, and **Dr. Joseph Yost**, PE and Associate Professor, are conducting full-scale and component tests on the company's Girder-Slab System, an advanced technology that utilizes precast concrete slabs and steel girders to form a monolithic slab assembly. Testing takes place in the Structural Engineering Teaching and Research Laboratory with help from two graduate students (one of whom began research on the project during his undergraduate studies). The goal of the research is to expand the use of the system beyond its current market.



### DECORATIVE CONCRETE OVERLAY

**Dr. Leslie McCarthy**, PE and Assistant Professor, and **Dr. Aleksandra Radlinska**, Assistant Professor, along with one graduate and one undergraduate student, are studying the feasibility of using decorative concrete overlay (DCO) to restore and protect transportation infrastructure such as bridge piers and parapet walls, retaining walls, sidewalks, and highway barriers. Initial research has shown that DCO is durable and exhibits strong bonding and temperature resistance properties. Chloride ponding and submersion tests have indicated that some DCO designs can successfully withstand a marine saltwater environment. Findings of

the research will be published in proceedings from the upcoming ASCE GeoHuman conference in China and the ASCE TD&I Congress in Chicago.



# ELECTRICAL + COMPUTER ENGINEERING

## UNDERGRADUATE + GRADUATE

### Dr. Pritpal Singh

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



**The Department of Electrical and Computer Engineering continued to expand not only its undergraduate and graduate curriculum offerings, but also opportunities for students to**

**positively impact communities around the world. New collaborations with other Villanova colleges opened doors for new research projects and opportunities for new interdisciplinary experiences. The department successfully continued to pursue significant research funding opportunities through the competitive grant process and from industry partners.**

**The ECE Department also continued to demonstrate leadership as alternative energy sources and “greener” technology needs emerge as driving forces behind the ongoing evolution of electrical and computer engineering through teaching, research, and service initiatives.**

- ECE faculty contributed to the launch of the new First-Year Curriculum. Hands-on mini-projects involving electrical or computer engineering included Robotics and MATLAB programming, The Load/Deflection Character of a SMARTBEAM, Application of Acoustic Technologies for Predicting Structural Failure, and Electric Car Design.
- Incoming freshman enrollment in the ECE Department increased by approximately 50 percent.
- The ECE Department approved a new required course in Electric Energy Systems for inclusion in its undergraduate electrical engineering curriculum.
- New international ECE senior design projects were initiated this year in Nicaragua, the Philippines, and Bali. Students worked with local communities to design and build sustainable water systems, renewable energy systems, and much-needed building facilities.
- Undergraduate and graduate ECE students, along with members of the faculty, collaborated in unique ways with their counterparts in the College of Nursing and the Villanova School of Business to help improve the delivery of health care and water resources in communities in the Philippines and Nicaragua.
- “ECE Green Technology” was the theme of the 23rd annual ECE Day, held in November. Sponsors included Lockheed Martin Corporation, Ablaze Development Corporation, The Art of Leadership, Caramanico Maguire Associates Inc., Rumsey Electric Company, Serac Solutions, and Exelon.
- Pawan Setlur became the ECE Department’s second Ph.D. graduate and received the Graduate Student Award at graduation.
- The ECE Department approved the development of a new studio classroom, which will combine two existing laboratories into a new format that enhances collaboration and cooperative learning.

*Like their peers in other major disciplines, ECE students have many opportunities to apply what they’ve learned in the classroom to research projects conducted in the department’s laboratories.*







Freshmen students were exposed to electrical and computer engineering through a number of mini-projects within the new First Year Curriculum, including Robotics and MATLAB programming, shown here.

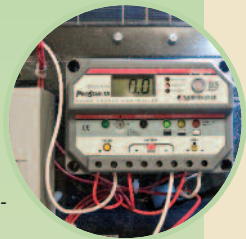
## FACULTY

- Dr. Robert Caverly, Professor, developed a prototype electronic circuit to support projects within the Lockheed Martin Advanced Technology Laboratories.
- Dr. Moeness Amin, Professor and Director of the Center for Advanced Communications, published a book entitled *Through the Wall Radar Imaging*.
- Dr. Bijan Mobasseri, Professor, received a three-year, \$285,000 grant from the Office of Naval Research to develop algorithms that create authentication signatures for sonar communication.
- Edmond Dougherty BEE'69 GS'86, Assistant Professor and founder of Ablaze Development Corporation, is collaborating with the College and M5 Industries, owned by *Myth-busters'* Jamie Hyneman, to develop blast-protection structures for the military. They are funded by a \$70,000 Small Business Technology Transfer Phase 1 Contract from the Office of Naval Research.
- Dr. Rosalind Wynne, Assistant Professor, developed and delivered curriculum and hands-on projects for the inaugural Health Education and Enrichment in Arithmetic, Technology, and Science (HE<sup>2</sup>ARTS) program, designed to improve middle school students' interest and abilities in STEM subjects, at Immaculate Heart of Mary School in Brooklyn, N.Y. She was joined by Dr. James Peyton Jones, Professor and Director of the Center for Nonlinear Dynamics and Control, and Frank Mercede, Assistant Professor.

## RESEARCH INITIATIVES

### SOLAR SUITCASE

**Dr. Pritpal Singh**, Professor and Chair of the ECE Department, initiated collaboration with WE CARE Solar, an organization dedicated to reducing maternal mortality rates in developing countries by providing solar power-based reliable electricity, mobile communication, and blood bank refrigeration to hospital workers via its portable "Solar Suitcase" photovoltaic system. ECE students and faculty will work with **Dr. Laura Stachel**, founder of WE CARE Solar, to optimize the Solar Suitcase's current design and develop designs for medical equipment that complement the system, such as solar power-based sterile autoclaves and oxygen delivery equipment.



### HEALTH CARE IN NICARAGUA

A cohort of undergraduate and graduate ECE students began work with **Dr. Pritpal Singh** and **Dr. Sarvesh Kulkarni**, Associate Professor, to develop low-cost cell phone-based text messaging technology that will enhance the delivery of health care between rural health care posts on the outskirts of Waslala, Nicaragua, and established clinics with trained health care providers located in the center of the village. The group, which also includes student and faculty collaborators from the College of Nursing and the Villanova School of Business, received a \$44,625 grant from the National Collegiate Inventors and Innovators Alliance (NCIIA) to support these efforts.



# MECHANICAL ENGINEERING

## UNDERGRADUATE + GRADUATE

### Dr. C. Nataraj

*Professor and Chair,  
Department of Mechanical Engineering*



**In 2009-2010, the Department of Mechanical Engineering offered its undergraduate students a new level of flexibility and the opportunity to focus their studies in a specialized area of mechanical**

**engineering through its newly revised undergraduate curriculum. The ME Department's graduate studies program also continued to thrive, with a strengthened commitment to distance-learning and growing numbers of Ph.D. candidates. In addition, the department maintained its research momentum, with a research expenditure that exceeded \$1.2 million in sponsored projects.**

**Students and faculty also worked together to continue the College's commitment to service abroad, while adding to department-sponsored STEM outreach initiatives to help attract more students to engineering.**

- ME Department faculty participated in the launch of the new First-Year Curriculum. Hands-on mini-projects involving mechanical engineering included Robotics and MATLAB Programming, The Load/Deflection Character of a SMARTBEAM, Application of Acoustic Technologies for Predicting Structural Failure, The Artificial Kidney, and Aerodynamics of Vehicles: Reducing Drag, Saving Energy.
- The undergraduate curriculum was revised to increase flexibility and allow students to pursue deeper studies in specialized areas such as dynamic systems, thermal systems, and materials and mechanics. This flexibility also makes it easier for undergraduate students to pursue minors outside engineering.
- The ME Department secured more than \$30,000 in grants from the Naval Air Development Corporation, Air Products Foundation, and the Villanova Engineering Alumni Society to support more senior capstone projects.
- Graduate distance education opportunities continued to grow, with approximately eight courses offered every semester.
- Nineteen Ph.D. candidates are being advised by ME faculty – the largest number of candidates of all disciplines within the College.
- ME students and faculty continued their commitment to STEM outreach, hosting the department's first Girls in ME Day and the Philadelphia region's first-ever Marine Advanced Technology Education (MATE) competition (part of a larger international competition).
- An international partnership with the Indian Institute of Technology (IIT) placed IIT students on research teams with Villanova mechanical engineering students to work on various dynamic systems and control research projects.
- ME students and faculty continued their service in Latin America over Spring Break. Through Water for Waslala in Nicaragua and a service trip to Panama, engineering teams designed and built systems to deliver reliable, clean drinking water to local villages.



Mechanical engineering was included in five of the six mini-projects for the new First-Year Curriculum. Aerodynamics of Vehicles: Reducing Drag, Saving Energy is shown here.



The College opened a new laboratory for nano-bio-mechanical characterization of materials in the fall of 2009.

## FACULTY

- James O'Brien, Assistant Professor, received the The Lawrence C. Gallen, O.S.A. Faculty Service Award, which recognizes a faculty member who has exemplified outstanding service to the Villanova community.
- Dr. Kei-Peng Jen, Associate Professor, was selected by Boeing to participate in its highly competitive Welliver Faculty Fellowship program.
- Led by Dr. C. Nataraj, Professor and Chair of the Department of Mechanical Engineering, a group of ME faculty developed the curriculum for the SeaPerch competition, a national underwater robotics competition geared toward middle and high school students.
- Dr. Amy Fleischer, Associate Professor, led planning efforts for the College's first-ever Girls in ME Day, designed to attract female students to the mechanical engineering field.
- Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and The James R. Birlle Professor of Energy Technology, and Dr. C. Nataraj were invited to give keynote speeches at international conferences.

## RESEARCH INITIATIVES

### MICRO-SCALE HEAT TRANSFER

**Dr. Aaron Wemhoff**, Assistant Professor, and graduate student Geoffrey Haas are performing molecular dynamics (MD) simulations to investigate the thermo-physical phenomena associated with a nanodroplet impinging upon a surface. The discovered nanoscale phenomena include droplet acceleration toward the surface, the ordering of molecules on the surface, and the local temperature rise on the surface at the impact location. An applied temperature difference between the droplet and surface allows for either pinpointed cooling or droplet-based manufacturing applications. Nanodroplet-assisted cooling may grow in interest as the size of transistors continues to shrink to the order of nanometers. Droplet-based manufacturing could allow for the creation of new nanoscale devices. Dr. Wemhoff is also applying MD simulations to investigate the thermal conductivity in graphene nanofibers. The National Science Foundation is supporting this project with a three-year, \$360,000 grant that also funds related experimental work by **Dr. Amy Fleischer**, Associate Professor.



### CONTROL DESIGN FOR MULTIAGENT COORDINATED MOTION

With a two-year, \$120,000 grant from the Office of Naval Research, **Dr. Sergey Nersesov**, Assistant Professor, is developing cooperative control algorithms for multiagent systems and implementing them on experimental platforms such as mobile robots and surface vessels. The results of this research will yield a better understanding of the behavior of multiagent systems and the development of tools to control their evolution. This research has the potential to improve system performance, reliability, safety, and cost in various applications associated with distributed robotics, power grids, military operations, space missions, highway systems, mobile sensor networks, homeland security tasks, social and biological networks, and more.



The newly revised undergraduate mechanical engineering curriculum allows for deeper studies in specialized areas.

# UNDERGRADUATE RESEARCH

**A cornerstone of the Villanova engineering experience, undergraduate research continues to grow in both opportunity and interest. In 2009-2010, undergraduate students from every major discipline participated in faculty-led research projects, which exposed new engineers to world-class research facilities, cutting-edge research projects funded by federal or state agencies and corporate partners, and opportunities to work alongside M.S. and Ph.D. researchers.**

**One of the newest and fastest growing avenues for engineering undergraduate research is through the Villanova Summer Undergraduate Research Fellows program (VSURF), which offers students the opportunity to spend the summer working alongside faculty experts.**

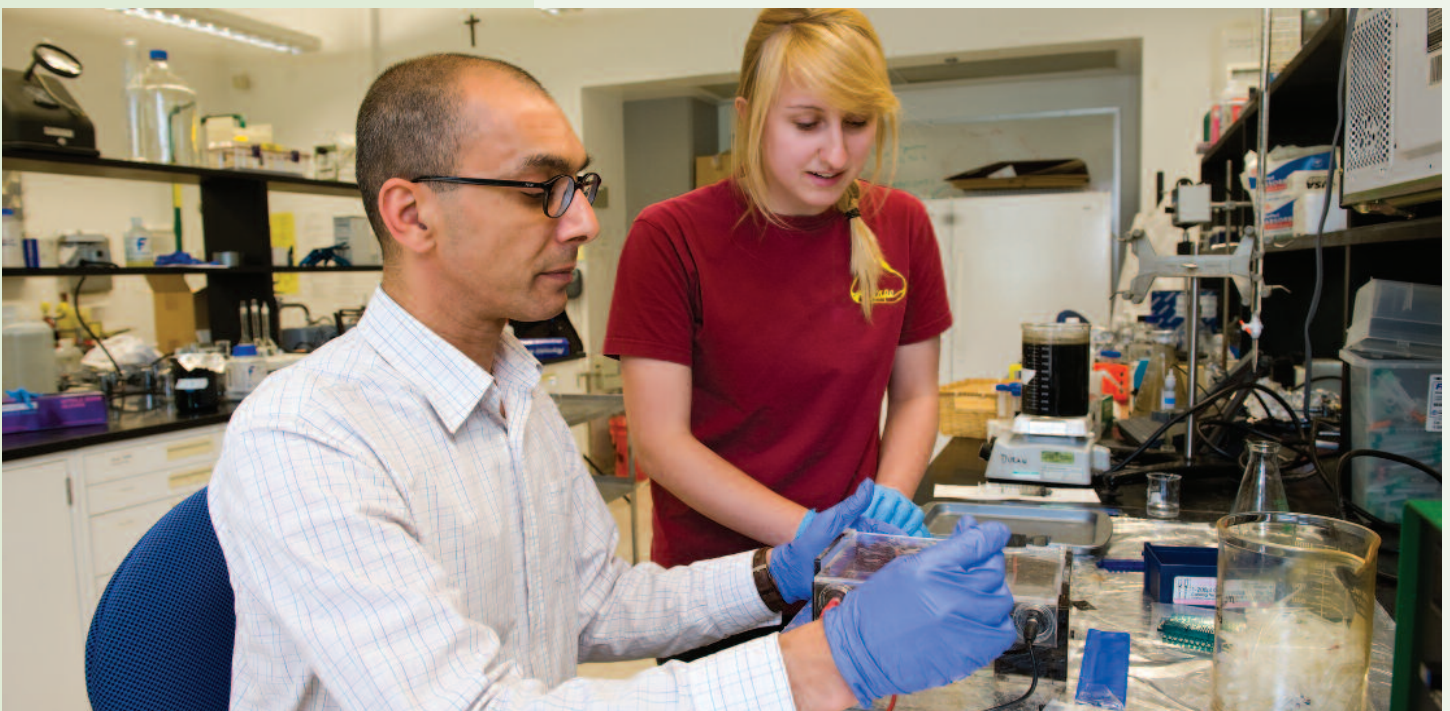
**VSURF sponsors – Villanova’s Office of Academic Affairs, the College of Engineering, and the College of Liberal Arts & Sciences – supply the funding for student stipends and cover the cost of room and board for the summer. The College of Engineering has provided \$40,000 for each of the two summers VSURF has been active.**

In the spring of 2010, nine undergraduate engineering students (or about 21 percent of all students selected) were named Fellows for the summer. Participants and projects included:

- **Kathleen Bommer ME '11** – “Ice Formation in Zebrafish Embryos During Cryopreservation,” mentored by Dr. Jens Karlsson, Associate Professor of Mechanical Engineering
- **Kristopher Doll ME '11** – “Finite Element Modeling of Hydroxyapatite Composites for Bone Implants,” mentored by Dr. Ani Ural, Assistant Professor of Mechanical Engineering
- **Scott Harris CE '11** – “Alkali Activated Fly Ash Concrete,” mentored by Dr. Aleksandra Radlinska, Assistant Professor of Civil and Environmental Engineering
- **Shahriar Khan EE '11** – “Integrated Circuit Design for Radio Frequency Control Applications,” mentored by Dr. Robert Caverly, Professor of Electrical and Computer Engineering
- **Anderson Lebbad ME '11** – “Unmanned Vehicle for the Development of Vision-based Modeling Methods,” mentored by Dr. Garrett Clayton, Assistant Professor of Mechanical Engineering
- **Thomas Motto ME '11** – “Co-operative Robot Swarms in a Dynamic Environment,” mentored by Dr. C. Nataraj, Professor and Chair of the Department of Mechanical Engineering
- **Mark Reimlinger, EE '12** – “Microstructured Optical Fibers for Urban Sensing,” mentored by Dr. Rosalind Wynne, Assistant Professor of Electrical and Computer Engineering
- **Joseph Shook CE '12** – “Alkali Activated Green Concrete,” mentored by Dr. Aleksandra Radlinska
- **Krista Sullivan CE '12** – “Evaluation of Internal Composite (FRP) Reinforcements for Use in Infrastructure Elements Subjected to Axial Loads,” mentored by Dr. Shawn Gross, Associate Professor of Civil and Environmental Engineering

The program culminates annually with a research poster presentation event, during which VSURF fellows share their results with faculty, students, alumni, and industry partners.

Many other summer research undergraduate assistants are sponsored by individual faculty through grants and contracts. Summer research internships are often the first research experience for undergraduate students, and consequently, introduce graduate studies as an option after graduation.



*Lauren Glose CE '11 is one of many undergraduate students who work alongside faculty members like Dr. Metin Duran, Associate Professor of Civil and Environmental Engineering, on real-world research projects.*

# STUDENT ACCOMPLISHMENTS



## Formula SAE Team Drives Off with New Record

Villanova's Formula SAE Team, VU-02, set a new record in the fuel economy event at the international Formula SAE student design competition at Michigan International Speedway in May. Their car used only .502 gallons of 93 octane gas to compete in a 22km (13.66 miles) endurance race.

## Students Produce Biodiesel Fuel

Graduate and undergraduate students from the Department of Chemical Engineering are helping the University get more mileage out of its cooking oil through a project originally started under the advisement of Dr. Kenneth Muske, the Mr. and Mrs. Robert F. Moritz, Sr. Chair in Systems Engineering and Professor of Chemical Engineering. The team designed and built a production facility for converting the waste cooking oil from Dining Services into biodiesel fuel, which is now powering diesel-run lawn mowers and a street sweeper on campus.



## CE Student Represents Villanova at Statewide Conference

**Adrienne Donaghue CE '11** represented Villanova University at the Undergraduate Research Poster Conference at the Capitol, a statewide event held in Harrisburg in October. Donaghue was one of 39 college students who participated. Her project was titled "Quantitative PCR to Assess Pathogens in Goose Creek."

## CE Students Take National Championship

A team of graduate civil and environmental engineering students won first prize at the 2010 Student Structural Design Competition, sponsored nationally by the Structural Engineering Institute of the American Society of Civil Engineers, for their design of a girls dormitory for Amigos de Jesús orphanage in Honduras. Team members included Colin Doyle, Timothy Harrington, Nicholas Martignetti, Brian Mellen, and Richard Runyen.

## Prestigious Graduate Fellowships Awarded

- **Matthew Bandelt CE '10** received a Graduate Research Fellowship from the National Science Foundation to support his pursuit of a Ph.D. in structural engineering.
- **Jessica Shaw CE '10** (with a double major in physics) also received an NSF Graduate Research Fellowship and plans to pursue a Ph.D. in electrical engineering at UCLA. She was also awarded a Department of Energy National Nuclear Security Administration Stewardship Science Graduate Fellowship to support her post-graduate studies.
- **Kent Grosh ME '10**, a Villanova Presidential scholar, was awarded one of two Fulbright English Teaching Assistantships in Nepal. In addition to his teaching assignment, Grosh plans to share his love of math and science through after-school tutoring.

## RECOGNITION CEREMONY AWARDS

**Erik J. Sheets:** The Robert E. White Chemical Engineering Award

**David R. Rounce:** The Civil and Environmental Engineering Faculty Award

**Danielle N. Bisconti:** The Computer Engineering Outstanding Student Award

**Francis L. DeFanti:** The Electrical Engineering Outstanding Student Award

**Kent M. Grosh:** The Mechanical Engineering Outstanding Achievement Award and The Robert D. Lynch Award (given by the Engineering Alumni Society)

**Ronald J. Warzoha ME '08:** College of Engineering Outstanding Graduate Student Award

# FACULTY ACCOMPLISHMENTS



**Dr. Randy Weinstein**, Professor and Chair of the Department of Chemical Engineering, was awarded the The Christian R. and Mary F. Lindback Award for Outstanding Teaching, which is given by the University each year at commencement to honor a faculty member for excellence in undergraduate teaching.



**James O'Brien**, Assistant Professor of Mechanical Engineering, received the The Lawrence C. Gallen, O.S.A. Faculty Service Award, which recognizes a faculty member who has exemplified outstanding service to the Villanova community.

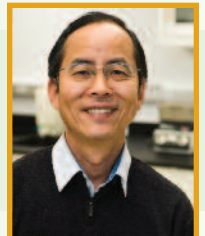


**Dr. Moeness Amin**, Professor and Director of the Center for Advanced Communications, achieved the distinct honor of delivering a Plenary Talk at this year's International Conference on Acoustics, Speech, and Signal Processing, the world's largest and most comprehensive technical conference on signal processing and its applications to communications, radar, acoustics, biomedicine, and satellite navigation.

**Dr. C. Nataraj**, Professor and Chair of the Department of Mechanical Engineering, was one of two keynote speakers at the Second Conference on Dynamics, Vibration and Control, held in Chengdu-Jiuzhaigou, Sichuan, China in August 2009.



**Dr. Gary A. Gabriele**, Drosdick Endowed Dean of the College of Engineering, was elected to the Board of Directors of the American Society for Engineering Education's Engineering Research Council as Vice-Chair/Chairperson-Elect for the term 2010-2012.



Boeing, the world's largest aerospace company, selected **Dr. Kei-Peng Jen**, Associate Professor of Mechanical Engineering, to participate in its highly competitive Welliver Faculty Fellowship program this summer.

**Dr. Alfonso Ortega**, Associate Dean for Graduate Studies and Research and The James R. Birlle Professor of Energy Technology, was the only external speaker invited to participate in Cisco Systems Inc.'s annual internal thermal symposium in October 2009.



**Dr. Bridget Wadzuk CE '00**, Assistant Professor of Civil and Environmental Engineering, received the College's 2010 Farrell Award, which recognizes an engineering faculty member who has demonstrated personal concern for students and exceptional dedication to the College.



**Dr. Robert Traver PE, WRE, MSCE '82**, Professor and Director of Villanova's Urban Stormwater Partnership and the Villanova Center for the Advancement of Sustainability in Engineering, advocated for enforceable regulations that promote sustainable stormwater control measures at the EPA's "listening session" in the spring.

## EDITORIAL BOARD APPOINTMENTS



Beginning in January 2010, **Dr. Alfonso Ortega**, Associate Dean for Graduate Studies and Research and The James R. Birlle Professor of Energy Technology, became an associate editor of the American Society of Mechanical Engineering's *Journal of Heat Transfer*.



**Dr. C. Nataraj**, Professor and Chair of the Department of Mechanical Engineering, was invited to serve a three-year term as the Associate Editor, America Region, of *Advances in Vibration Engineering*, an international journal that is published quarterly and presents the latest research in the area of vibration.



**Dr. Aleksandra Radlinska**, Assistant Professor of Civil and Environmental Engineering, is lending her expertise in construction materials to her newest role: associate editor for the American Society of Civil Engineers' *Journal of Materials in Civil Engineering*.



## College Faculty Author 14 Scholarly Papers for ASEE's Annual Conference and Expo

In June, College of Engineering faculty made a big impression on their peers at the American Society for Engineering Education's annual conference and expo, held in June in Louisville, Ken.

Faculty members from all four major disciplines authored a combined 14 scholarly conference papers for the proceedings. Topics included (but were not limited to):

- outcomes from the inaugural year of the new First-Year Curriculum, as well an in-depth look at some of the hands-on mini-projects involved; (students participating in the Artificial Kidney project are shown at left)
- the benefits of implementing hands-on activities for teaching mechanical engineering and geology courses;
- strategies for implementing ethics training throughout a four-year curriculum;
- developing the next generation aerospace workforce;
- implementing tools like reflective learning into the classroom, and more.

## FACULTY SCHOLARSHIP

Books Published	2
Journal Articles Published	43
Chapters in Scholarly Books	9
Book Reviews	3
Conference Proceedings Published	105
Conference Papers Published	77
Other Publications	34
Grant Applications	124
Papers Presented	77
Service on Editorial Boards/ Professional Leadership Positions	66

## PROMOTION

**Dr. C. Michael Kelly** was promoted to Professor Emeritus.

## NEW FACULTY



**Justinus Satrio, Ph.D.,**  
*Assistant Professor, Chemical Engineering*

- Development of process technologies to convert biomass into energy, chemicals, and fuels; catalytic and non-catalytic thermochemical processes to convert biomass into bio-crude oil
- B.S., M.S., and Ph.D. in Chemical Engineering, Iowa State University



**Brian Chaplin, Ph.D.,**  
*Assistant Professor, Civil and Environmental Engineering*

- Remediation of recalcitrant contaminants and pathogens in drinking water and wastewater, development of novel electrochemical and catalytic technologies for water treatment and reuse
- B.S., Geological Engineering, University of Minnesota
- M.S., Civil Engineering, University of Minnesota
- Ph.D., Environmental Engineering, University of Illinois at Urbana-Champaign

# CENTER FOR ADVANCED COMMUNICATIONS (CAC)

## Dr. Moeness Amin

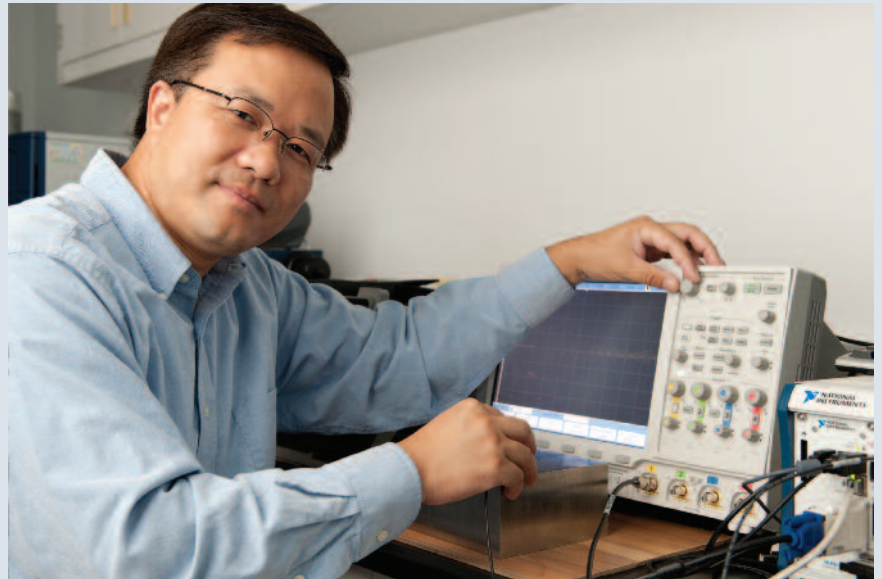
Director,  
Center for Advanced Communications and  
Professor, Electrical and Computer Engineering



Home to internationally-renowned researchers and laboratory facilities, the Center for Advanced Communications (CAC) provides an

integrated environment for university, industry, and government partners to conduct leading-edge research and development in the areas of wireless and digital communications, high resolution imaging, ultrasound and acoustics, antenna design, radio frequency identification, satellite navigation, and more.

In 2009-2010, CAC members were recognized as international leaders in their fields; received new funding from the National Science Foundation, the Office of Naval Research, and the U.S. Army; and hosted experts from around the world who chose the CAC to further their own research.



Dr. Yimin Zhang, Director of the CAC's Wireless Communications and Positioning Laboratory and its Radio Frequency Identification Laboratory, uses a digital oscilloscope, which shows a signal waveform received by the equipment shown at right.

## CAC HIGHLIGHTS

- The CAC secured more than \$1.6 million in new funding for seven projects. Eleven additional research projects, funded by more than \$2.7 million, remained active throughout 2009-2010.
- Dr. Moeness Amin, Professor and Director, was selected to give the Plenary Talk at the International Conference on Acoustics, Speech, and Signal Processing, the world's largest technical conference on signal processing and its applications. His presentation, "Recent Advances in Radar Imaging of Building Interiors," drew 2,000 attendees.
- The CAC secured \$1.2 million in funding from the National Science Foundation for advanced antenna and acoustic research (see Research Initiatives).
- The Institute of Electrical and Electronics Engineers Signal Processing Society presented its 2010 Best Paper Award to Dr. Moeness Amin for his work entitled, "Imaging Through Unknown Walls Using Different Standoff Distances."
- The CAC marked 15 years of continued funding from the Office of Naval Research (ONR) with a \$257,500 grant to fund two-year research for improving target detection in urban structures. The Naval Underwater Warfare Center awarded Dr. Bijan Mobasseri, Professor of Electrical and Computer Engineering, \$285,000 for sonar identification and authentication research.
- Dr. Yimin Zhang, Director of the Wireless Communications and Positioning Laboratory, received ChinaCom '09's Best Paper Award for "Distributed Beamforming in Multi-User Cooperative Wireless Networks," co-authored by Dr. Moeness Amin and Dr. Xin Li, post-doctoral fellow.
- CAC members introduced the Application of Acoustic Technologies for Prediction of Structural Failure hands-on mini-project for the new undergraduate First-Year Curriculum.
- CAC members were invited to speak at six international universities and at a NATO meeting in Paris. The center hosted 13 academic visitors from across the United States and four international universities. In addition, a memorandum of understanding was signed with both the University of Wollongong in Australia and the University of Montenegro.



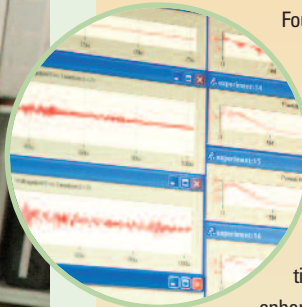


Dr. Ramazan Demirli, Director of the CAC's Acoustics and Ultrasound Lab, conducts research in support of the Center's recently awarded PFI grant from the National Science Foundation (see Research Initiatives).

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

## RESEARCH INITIATIVES

### ACOUSTIC AND ULTRASOUND TECHNOLOGY



Through a two-year, \$600,000 National Science Foundation (NSF) Partnerships for Innovation grant, the CAC is collaborating with academic, industry, and government partners to advance research and development in acoustic and ultrasound technologies that will directly impact the medical community. Specifically, the research is focused on developing solutions that will improve the diagnostics of abnormalities found in human tissues and organs by enhancing the ability to detect, localize, and classify aberrations in ultrasound signals and images. The research can also be applied to machine monitoring and non-destructive evaluations. If fractures and cracks in equipment can be better detected, then better decisions can be made with regard to safety and failure prediction.

### ANTENNA RESEARCH LAB EXPANSION

A second two-year, \$568,000 Major Research Instrumentation grant from the National Science Foundation is supporting the expansion of measurement capabilities at the CAC's Antenna Research Lab. Now, the lab will house research studies and data collections involving extremely high frequencies to perform tests for antennas on large objects, and extremely low frequencies for research into wireless communications, GPS, radar imaging, and radio frequency identification. Dr. Ahmad Hoorfar, Director of the Antenna Research Laboratory, oversees the expansion, which will help attract more research opportunities that will further distinguish the CAC and provide unique, hands-on experiences for its students.



### 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
- Acoustics and Ultrasound Lab**  
Director: Dr. Ramazan Demirli, CAC Research Assistant Professor
- Radio Frequency Identification Laboratory**  
Director: Dr. Yimin Zhang, CAC Research Professor

# CENTER FOR NONLINEAR DYNAMICS & CONTROL (CENDAC)

## Dr. James Peyton Jones

Director,  
Center for Nonlinear Dynamics & Control  
and Professor of Electrical and Computer Engineering



The Center for Nonlinear Dynamics & Control (CENDAC) is distinguished by its strong interdisciplinary research teams, close collaboration with sponsors, and by its expertise in non-linear dynamic systems

theory and application. These strengths reflect the needs of today's highly integrated and multi-domain systems and enable challenging real-world problems to be addressed across a broad range of application areas. The Center also has a strong educational mission, providing master's degree and doctoral students with cutting-edge research opportunities, as well as a coordinated sequence of graduate Control Systems courses.

*Right: Dr. Hashem Ashrafioun, Professor of Mechanical Engineering, conducts analyses of brain waves captured by Brain Computer Interface LLC's MindScope system, which attaches to a subject's head and collects real data (i.e. blinks, concentration, meditation, etc.) that is then fed into a computer for analysis.*



## CENDAC HIGHLIGHTS

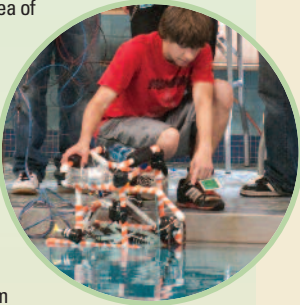
- Funding for the center's 36 research projects grew in 2009-2010, exceeding \$2.2 million (\$984,500 in new grants; \$1,263,000 in continuing grants).
- New grants were awarded by the Office of Naval Research, the National Collegiate Inventors and Innovators Alliance, the Turbo Research Foundation, the BriarHill Foundation, ExxonMobil, Cummins Inc., and Brain Computer Interface LLC. Center members also won the first-ever repeat award from the MathWorks Inc. curriculum development program.
- The number of CENDAC Ph.D. students increased to eight, and 21 master of science students pursued thesis work within the center. More than 20 undergraduate students participated in funded research.
- Center members published more than 40 journal and conference articles, as well as four book chapters. Twenty papers were presented at conferences.
- Faculty members restructured CENDAC's organization into eight specific laboratories connected by a common set of research skills to foster additional interdisciplinary opportunities and research collaboration.
- CENDAC faculty developed and delivered new graduate courses in System Identification and Nonlinear Dynamics. They also introduced the new robotics-based mini-project which now forms part of the undergraduate First-Year Curriculum.
- Center members maintained an active role in K-12 outreach, hosting the Philadelphia region's first Marine Advanced Technology Education (MATE) underwater robotics competition, developing learning modules to accompany the SeaPerch program, and providing teacher training in robotics for school teachers from Brooklyn, N.Y.



## RESEARCH INITIATIVES

### NAVAL RESEARCH AWARD FOR AUTONOMOUS SYSTEMS RESEARCH AND EDUCATION

The Office of Naval Research awarded \$1.9 million to CENDAC for a number of projects in the area of autonomous systems, which will be conducted by several CENDAC professors, their students, and post-doctoral researchers. Research projects focus on two topics: control and autonomy (primarily of unmanned vehicles for the U.S Navy) and machinery power and prognostics. The educational component of the funding will focus on developing curriculum material for the annual SeaPerch competition for middle and high school students; for hosting MATE, an underwater robotics competition for high school students; and for educational workshops in the area of autonomous systems to be delivered to Navy engineers.



### ACQUISITION AND ANALYSES OF BRAIN WAVES

With funding from Brain Computer Interface LLC (BCI), an early-stage neuroscience diagnostics and biomarker technology company, Dr. Hashem Ashrafiun, Professor of Mechanical Engineering, is developing analysis algorithms and refining data acquisition software for human brain wave data using BCI's novel MindScope™ system and MATLAB. The MindScope system will be used to monitor brain health in patients with mild traumatic brain injury, post-traumatic stress disorder, Alzheimer's disease, mild cognitive impairment, and sleep and circadian disorders. Dr. Ashrafiun is conducting algorithm and software development for signal processing, and spectral, wavelet, and nonlinear dynamic analyses. Once perfected, BCI hopes to use the MindScope system to predict diagnoses of these brain injuries or diseases.



*Dr. Garrett Clayton, Assistant Professor, conducts research in the Image-based Controls Lab that is focused on using images to calibrate, model, and control dynamic systems. The system pictured is an atomic force microscope, which can be used for extremely high resolution surface imaging.*

- #### 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, Assistant Professor of Mechanical Engineering
  - 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 Optimization
  - Nonlinear System Control
  - Nonlinear System Prognostics and 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

# 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



**Launched in fall 2009, the Villanova Center for the Advancement of Sustainability in Engineering (VCASE) seeks to protect and restore the environment for the future through a systems-based integration of sustainability principles in engineering practice.**

**VCASE houses multi-disciplinary research and teaching in biomass, renewable and distributed energy, environmental and watershed sustainability, and infrastructure materials and transportation systems. Research projects leverage Villanova's campus infrastructure, which serves as a living laboratory where faculty and students conduct real-world experimental studies. VCASE faculty also look for opportunities to host industry and community outreach activities, collaborate across Villanova's other colleges, and build partnerships with other universities, engineering firms, and manufacturing organizations.**

## VCASE HIGHLIGHTS

- Dr. Robert Traver, Professor of Civil and Environmental Engineering, was named director of VCASE. In this role, he has also joined his second National Research Council National Academies Panel, convened to review work of the White House Council on Environmental Quality related to water resources.
- Faculty within the environmental sustainability focus area constructed new stormwater research areas across campus, including the Fedigan Hall and West Campus rain gardens, bio swales, rain barrels, and reconstruction of the campus wetlands, as well as a new evapotranspiration research area.
- VCASE hosted its first on-campus lecture during the spring semester, when speakers from the Delaware Valley Regional Planning Commission spoke on transportation sustainability.
- VCASE hosted three symposia in 2009-2010 in the areas of watershed sustainability, renewable energy, and bio-energy.
- Faculty members within VCASE's environmental sustainability focus area gave eight presentations at two national conferences.
- As the University's Facilities Department continues to steward the evolution of campus, VCASE faculty will serve in an advisory role for implementing new campus features (for example, green infrastructure stormwater components of the Campus Master Plan and elements to enhance the pedestrian experience).
- VCASE researchers also support the mission of the Villanova Urban Stormwater Partnership, which brings together representatives from academia, industry, and government to discuss the latest issues around and best management practices for addressing urban stormwater issues.



Right: Graduate student Evgeny Nemirovsky, who is pursuing a master's degree in water resources, conducts research experiments through VCASE's on-campus research sites.

# IN ENGINEERING (VCASE)



*Dominik Schneider, an MSCE student, discusses features of the green roof at the Center for Engineering Education and Research with Dr. Bridget Wadzuk CE '00, Assistant Professor of Civil and Environmental Engineering, and Dr. John Komlos, Visiting Assistant Professor.*

## VCASE FACULTY RESEARCHERS (Partial List)

- Dr. Brian Chaplin, Assistant Professor of Civil and Environmental Engineering
- Dr. Metin Duran, Associate Professor of Civil and Environmental Engineering
- Dr. Amy Fleischer, Associate Professor of Mechanical Engineering
- Dr. Gerard Jones, Associate Dean for Academic Affairs and Professor of Mechanical Engineering
- Dr. John Komlos, Visiting Assistant Professor, Civil and Environmental Engineering
- William Lorenz, Adjunct Professor, Chemical Engineering
- 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. Birlle 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 Radlinska, Assistant Professor of Civil and Environmental Engineering
- Dr. Bridget Wadzuk CE '00, Assistant 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

## VCASE Focus Areas

- Biomass resources and conversion technologies
- Renewable and distributed energy
- Environmental sustainability
- Infrastructure materials and transportation systems
- Villanova Urban Stormwater Partnership

## On-campus Research Sites

- Stormwater wetlands
- Bio-infiltration and bio-retention basins
- Infiltration trench
- Green roof
- Geothermal wells
- Rain gardens and rain barrels
- Pervious concrete and porous asphalt
- Solar panels

## RESEARCH INITIATIVES

### PERVIOUS CONCRETE/POROUS ASPHALT COMPARISON

Just behind Mendel Hall, Dr. Andrea Welker, Associate Professor of Civil and Environmental Engineering, explores how pervious concrete and porous asphalt – both alternatives to conventional paving materials – can reduce negative stormwater runoff effects. As rain infiltrates through the surfaces, Dr. Welker monitors each to determine how well the stormwater control measures are reducing the volume and improving the quality of runoff. As part of this work she is comparing differences in temperature, pH, suspended and dissolved solids, chlorides, particulate metals, hydrocarbons, and other variables with chemical analyses conducted in her laboratory.



### “FOG” CONVERSION

Dr. Metin Duran, Associate Professor of Civil and Environmental Engineering, and the Environmental Microbiology and Biotechnology research group work closely with the Philadelphia Water Department to develop engineering solutions that convert wastewater byproducts into renewable energy sources. Most recently, the team explored the anaerobic co-digestion of fats, oils, and grease (FOG) present in wastewater (commonly referred to as “scum”). When combined with naturally occurring microbes and placed in an engineered system designed to optimize the digestion and conversion process, the result is methane gas, which the Philadelphia Water Department ultimately hopes to harness for its planned co-generation plant. Results indicate that if pursued in full-scale, scum conversion would lead to a 1.5MW capacity co-generator, which would be enough energy for 600 to 800 households.



## RESEARCH AREAS

**In addition to three centers of research and the laboratories they house, the College of Engineering also offers capabilities in eight other research areas. Within each area, teams of faculty and students investigate real-world problems in nearly 25 additional laboratories located throughout the Center for Engineering Education and Research, Tolentine Hall, White Hall, and the Chemical Engineering Building.**



*Dr. Amy Fleischer, Associate Professor of Mechanical Engineering, directs Novatherm, Villanova's Thermal Management Laboratory.*

“The value of our growing research program at the College of Engineering is not only found in the solutions our faculty and students explore for industry, government, and other partners, but also in the new learning opportunities it affords our undergraduate and graduate students,” says Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and The James R. Birle Professor of Energy Technology.

In many cases, these research areas offer unique interdisciplinary opportunities, as well as opportunities for faculty and students within a specific engineering discipline to establish new innovative research collaborations.

In support of these research areas, the College of Engineering recently launched a new web page dedicated to

- communicating the capabilities of each area and its labs,
- sharing information about new research funding secured or projects undertaken, and
- providing an outlet for faculty and students to share the results of their research or recently published journal articles.

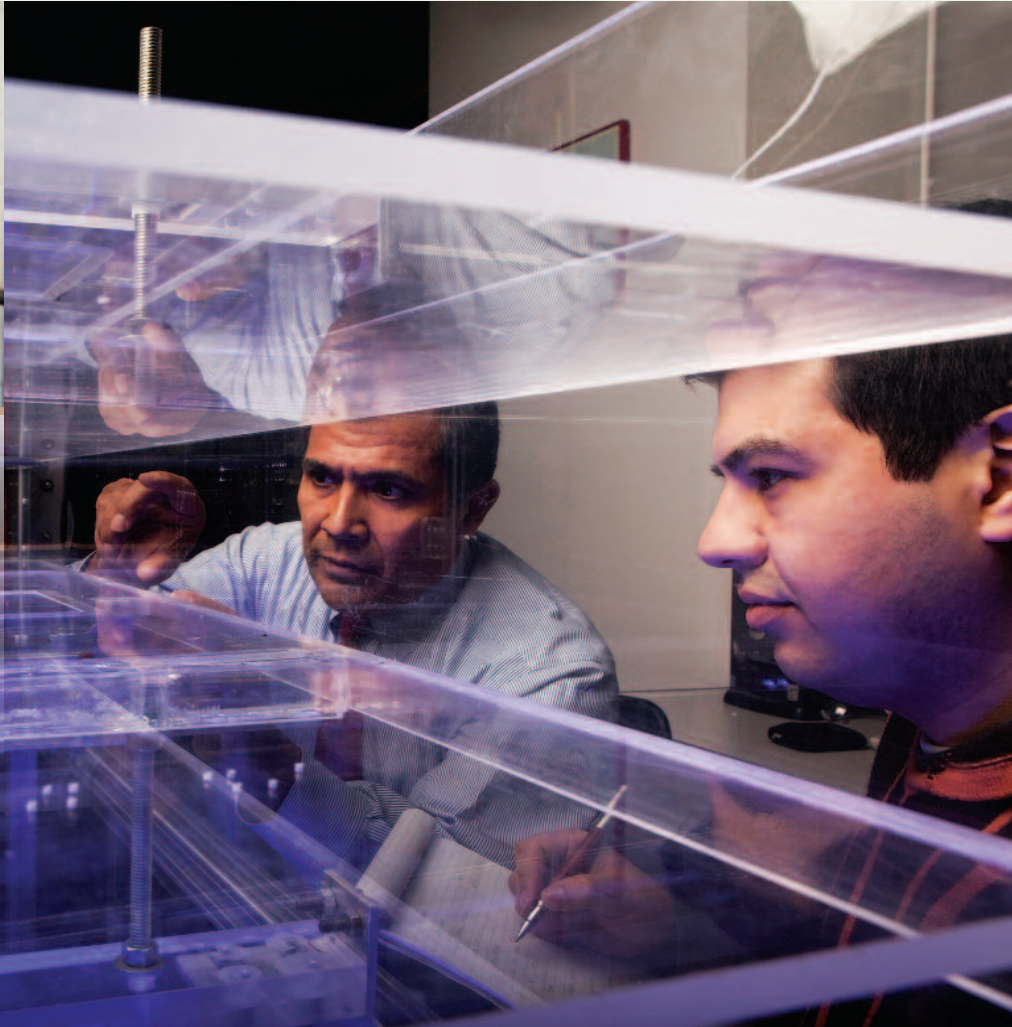
It also allows visitors to meet the teams who work within each area or laboratory.

More information about the research capabilities and the faculty members involved in each area can be found at [www.engineering.villanova.edu/research](http://www.engineering.villanova.edu/research). Content within each area or laboratory's web page will be refreshed on an ongoing basis to serve as a resource for students, faculty, alumni, and industry and government partners.

*Below: Dr. Alfonso Ortega directs the Laboratory for Advanced Thermal and Fluid Systems, which is dedicated to experimental investigations integrated with computational fluid dynamics and heat transfer modeling in advanced thermal and fluid systems.*



*Bridget Nyland ChE '11 and Dylan Casey ChE '12 help convert waste cooking oil into biodiesel fuel.*



## Cellular and Molecular Bioengineering Research Group

- **Biochemical Engineering and Bioprocessing Laboratory**, led by Dr. William J. Kelly, Associate Professor of Chemical Engineering
- **Biomaterials and Drug Delivery Research Laboratory**, led by Dr. Noelle Comolli, Assistant Professor of Chemical Engineering
- **Biothermal Sciences Laboratory**, led by Dr. Jens Karlsson, Associate Professor of Mechanical Engineering
- **Cellular Biomechanics and Sports Science Laboratory**, led by Dr. Qianhong Wu, Assistant Professor of Mechanical Engineering
- **Computational Biomechanics and Solid Mechanics Laboratory**, led by Dr. Ani Ural, Assistant Professor of Mechanical Engineering
- **Environmental Microbiology and Biotechnology Laboratory**, led by Dr. Metin Duran, Associate Professor of Civil and Environmental Engineering
- **Laboratory for Lightwave Devices**, led by Dr. Rosalind Wynne, Assistant Professor of Electrical and Computer Engineering
- **Nano-Bio-Mechanical Characterization Laboratory**, led by Dr. Gang Feng, Assistant Professor of Mechanical Engineering

## Chemical Engineering

- **Villanova Biodiesel Research and Production Facility**, led by Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering

## Computer Engineering

- **Computer-Aided/VLSI Design**, led by Dr. Maggie Wang, Assistant Professor of Electrical and Computer Engineering and Dr. Sarvesh Kulkarni, Associate Professor of Electrical and Computer Engineering

[www.engineering.villanova.edu/research](http://www.engineering.villanova.edu/research)

## STRUCTURAL ENGINEERING TEACHING AND RESEARCH LABORATORY (SETRL)

SETRL is led by Dr. Joseph Yost PE, Associate Professor of Civil and Environmental Engineering, and is among the most comprehensive teaching and research laboratories in structural engineering in the region.

Among the current research projects underway in the center are:

- Structural Behavior of Rod Web Joists
- Concrete Durability Tests
- Gypsum and Wood Viscoelastic Polymer Connections
- Continuous Concrete Beams Reinforced with Glass Fiber Reinforced Polymer
- Ductile Joist Studies
- Flexural Performance of Composite Concrete Flooring



## Electronics, Photonics, and MEMs Devices

- **Microwave and Microelectronic Systems**, led by Dr. Robert Caverly, Professor of Electrical and Computer Engineering
- **Laboratory for Lightwave Devices**, led by Dr. Rosalind Wynne, Assistant Professor of Electrical and Computer Engineering

## Nanotechnology, Materials, and Manufacturing

- **Laboratory for Materials of Mechanics Processing**, led by Dr. Sridhar Santhanam, Professor of Mechanical Engineering
- **Multiscale System Analysis Laboratory**, led by Dr. Aaron Wemhoff, Assistant Professor of Mechanical Engineering
- **Supercritical Fluids Laboratory**, led by Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering
- **Nanomaterials and Surface Science Laboratory**, led by Dr. Randy Weinstein, Professor and Chair of the Department of Chemical Engineering
- **Nano-Bio-Mechanical Characterization Laboratory**, led by Dr. Gang Feng, Assistant Professor of Mechanical Engineering
- **NovaTherm: The Villanova Thermal Management Laboratory**, led by Dr. Amy Fleischer, Associate Professor of Mechanical Engineering

## Thermal and Fluid Sciences

- **Cellular Biomechanics and Sports Science Laboratory**, led by Dr. Qianhong Wu, Assistant Professor of Mechanical Engineering
- **Laboratory for Advanced Thermal and Fluid Systems**, led by Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and The James R. Birle Professor of Energy Technology
- **Multiscale System Analysis Laboratory**, led by Dr. Aaron Wemhoff, Assistant Professor of Mechanical Engineering
- **NovaTherm: The Villanova Thermal Management Laboratory**, led by Dr. Amy Fleischer, Associate Professor of Mechanical Engineering
- **Thermal and Flow Management of Multiscale Systems**, led by Dr. Gerard Jones, Associate Dean for Academic Affairs and Professor of Mechanical Engineering

## VILLANOVA URBAN STORMWATER PARTNERSHIP (VUSP)

VUSP is led by Dr. Robert Traver PE, WRE, MSCE '82, Professor and Director of the Villanova Center for the Advancement of Sustainability in Engineering and involves collaboration among faculty members and students with members of the private and public sector, as well as other academic institutions.

VUSP maintains a series of best management practice sites on campus, which serve as living research areas, including:

- Stormwater wetlands
- Bio-infiltration areas
- Infiltration trenches
- Green roof
- Pervious concrete
- Porous asphalt
- Solar panels



## New First-Year Curriculum a Success



The College of Engineering launched its new hands-on First-Year Curriculum in fall of 2009 to help engineering students identify their intended major discipline earlier in their college careers.

The program starts with a lecture-based core course, which instructs students on the fundamentals of engineering and is accompanied by a series of “micro-projects,” which illustrate classroom lessons and allow students to apply what they’ve learned. These micro-projects also prepare students for the next phase of the curriculum – the “mini-projects.”

Students then select two interdisciplinary mini-projects and work together in teams to solve engineering problems. At the conclusion of each project, students present their findings

to College faculty, staff, and graduate students.

In the 2009-2010 academic year, students chose from the following mini-project options:

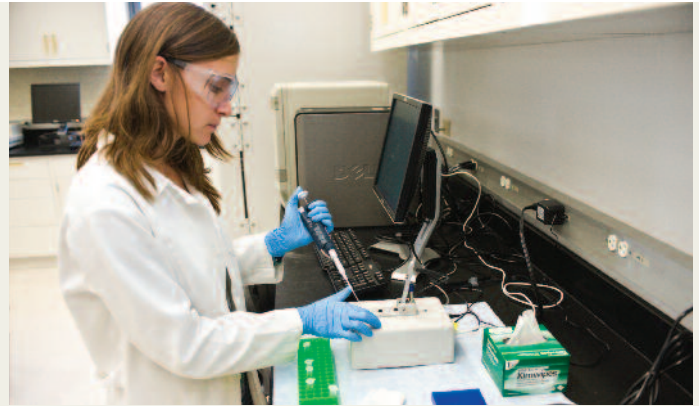
- Robotics and MATLAB Programming
- The Load/Deflection Character of a SMARTBEAM
- Application of Acoustic Technologies for Predicting Structural Failure
- Electric Car Design
- The Artificial Kidney: Improving Dialysis
- Aerodynamics of Vehicles: Reducing Drag, Saving Energy

By mid-second semester, having completed the core course and two mini-projects, students declare their intended major discipline and spend the final seven weeks of the semester focusing on their chosen area of concentration. For more information visit [www.engineering.villanova.edu](http://www.engineering.villanova.edu).

## Three New Labs Opened

The Center for Engineering Education and Research opened three new labs in the fall of 2009:

- In the Biothermal Sciences Lab, students investigate multi-scale thermal and transport phenomena in biological systems with state-of-the-art facilities for research into cell and tissue culture, cryopreservation, advanced biological microscopy, ultra-high-speed imaging, and bioMEMS fabrication.



- The Core Genomics Lab, an interdisciplinary facility for molecular and cellular bioengineering research and teaching, boasts state-of-the-art genomics instrumentation funded by a National Science Foundation Major Research Instrumentation grant.
- The Materials Science Laboratory, which supports research and education on advanced materials and nanomaterials, is equipped with fabrication, processing, and characterization facilities, including ultrahigh temperature furnaces, plasma-etching and ion-milling instruments, a diamond saw, automatic grinding and polishing machines, and optical microscopes.

## New Research Website Goes Live

For updates on the College’s expanding research capabilities, visit [www.engineering.villanova.edu/research](http://www.engineering.villanova.edu/research).

The site features each of the College’s centers of research and additional research areas, as well as projects currently underway within the College’s laboratories. It will be updated on an ongoing basis as a resource for students, faculty, alumni, and potential funding partners or research collaborators.

## College Receives \$100K KISK Grant



The College of Engineering was one of only 10 schools to secure a \$100,000 Keystone Innovation Starter Kit (KISK) grant from Pennsylvania’s Department of Community and Economic Development in 2010. This grant will be used to increase teaching and

research capabilities in the area of sustainable energy and renewable energy technology research.

KISK grants help Pennsylvania’s higher education institutions attract nationally-recognized talent in science and technology. The College used this award to hire Dr. Justinus Satrio, Assistant Professor of Chemical Engineering, whose work will focus on the field of bio-mass energy technology development. He will also develop a state-of-the-art laboratory to study the best methods for converting biomass into energy and useful chemicals.

At a press conference hosted by Governor Edward G. Rendell in



June, Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and The James R. Birle Professor of Energy Technology, was invited to speak about the impact this type of funding can have on Pennsylvania's academic, business, and industry communities.

The College previously received a KISK grant from the 2008 awards program, which facilitated the addition of Dr. Gang Feng, Assistant Professor of Mechanical Engineering, to the faculty. The grant also allowed Dr. Feng to build a laboratory with a state-of-the-art nanomechanical testing system.

### Franklin Institute Award Winner Honored



The College of Engineering honored Dr. D. Brian Spalding, the recipient of the 2010 Benjamin Franklin Medal in Mechanical Engineering and pioneer of Computational Fluid Dynamics (CFD) applications, at a daylong symposium during Franklin Institute Awards Week in April.

The program featured an all-star lineup of CFD experts who discussed the history of CFD and research updates on a wide range of its applications for aeronautics, planetary sciences, cardiovascular systems, and more.

The Franklin Institute Awards have been given annually for more than 185 years, honoring leading scientists and engineers, some of whom also later become Nobel Laureates.

To watch the day's presentations, please visit [www.engineering.villanova.edu/newsevents/videos.htm](http://www.engineering.villanova.edu/newsevents/videos.htm).

### College Ranked in the Top 10 for Fifth Consecutive Year

For the fifth consecutive year, *U.S. News & World Report's* annual "America's Best Colleges" rankings has named the College of Engineering to the top 10 "Best Undergraduate Engineering Programs" in the country. This year, the College took the #9 spot. For this report, the ranking lists undergraduate programs accredited by ABET, formerly known as the Accreditation Board for Engineering and Technology, according to the strength of their academic reputation.

### VUSP Hosts PA Urban Stormwater Symposium

The Villanova Urban Stormwater Partnership hosted the Pennsylvania Urban Stormwater Symposium in October 2009 to offer the latest expertise in sustainable stormwater management strategies for members of the engineering; water resource; regional, state, and local government; land development; watershed; and conservation communities. The symposium offered a diverse mix of speakers, who covered topics such as green infrastructure, drainage issues, and geology, as well as a workshop session and a tour of best management practices at research sites throughout the Villanova campus.

In addition, the Department of Civil and Environmental Engineering is helping VUSP build on the success of its on-campus best management practice sites for stormwater runoff with a \$30,000 grant from the Pennsylvania Department of Environmental Protection.

## IN MEMORIAM

(JUNE 2009-AUGUST 2010)

### Dr. Kenneth Muske

*the Mr. and Mrs. Robert F. Moritz, Sr. Chair in Systems Engineering and Professor of Chemical Engineering*



(Left to right) Dr. Gary A. Gabriele, Drosdick Endowed Dean of the College of Engineering; Dr. Kenneth Muske; Dr. Robert F. Moritz; Diane Moritz; and University President Rev. Peter M. Donohue, O.S.A.

The College of Engineering lost a dynamic member of its family this spring with the passing of Dr. Kenneth Muske, who taught chemical engineering at Villanova for 13 years and served as the Mr. and Mrs. Robert F. Moritz, Sr. Chair in Systems Engineering.

"Ken was a valued member of the College of Engineering, a friend to many of us, and one of our most accomplished teachers and scholars. He will be missed not only by the Villanova family, but also by the global systems engineering community, of which he was a prominent member," says Dr. Gary Gabriele, Drosdick Endowed Dean of the College of Engineering. The College of Engineering honored Dr. Muske with a memorial service in May.

### Joseph Hicks

*Professor of Electrical Engineering*

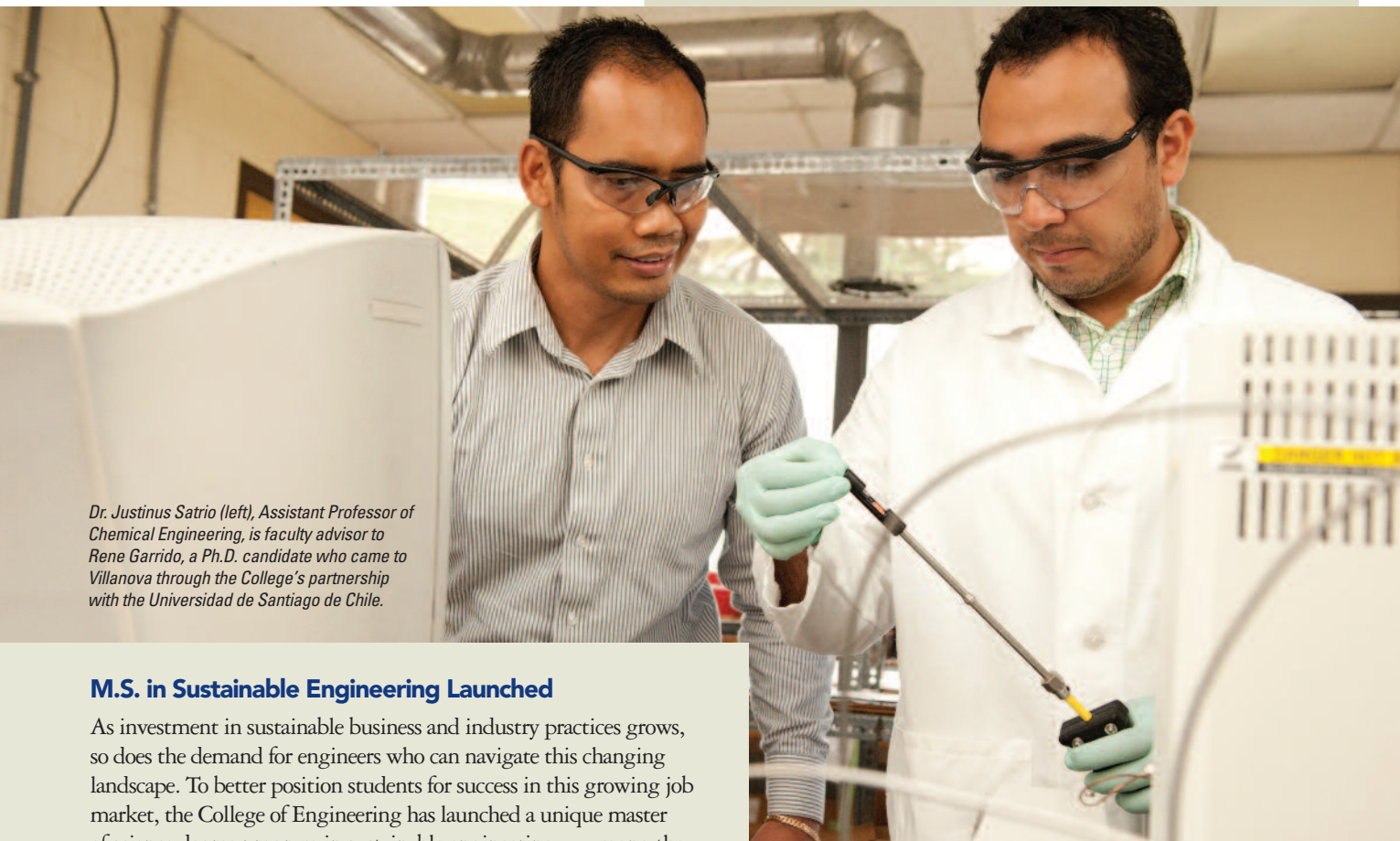
The Villanova engineering community also honors the memory of Professor Joseph Hicks, who passed away in December. Professor Hicks taught electrical engineering at the College for 36 years.

In 1996, Robert Merkert, Sr., EE '59 and his wife Margaret endowed an annual scholarship in Hicks' name as a tribute to a favorite professor. The Professor Joseph J. Hicks University Scholarship Endowed by Margaret C. and Robert J. Merkert, Sr., provides a partial tuition award to a current or incoming student majoring in electrical engineering who demonstrates financial need and is in good academic standing.

### John Dressler, ECE '10

"John Dressler was one of my best students. He was a consistent performer at or near the top of his class in every test, laboratory exercise, and home assignment. He was one of the few students who displayed a level of maturity and professional integrity far beyond his years. In many ways, he was an ideal student – responsible, hard-working, motivated, and bright. I was a witness to all those qualities again when I was supervising his senior design project, but which, he unfortunately could not continue due to his illness. John will be dearly missed, not just by his family and friends, but by the faculty at Villanova University as well."

— Dr. Sarvesh Kulkarni,  
*Associate Professor of Electrical and Computer Engineering*



*Dr. Justinus Satrio (left), Assistant Professor of Chemical Engineering, is faculty advisor to Rene Garrido, a Ph.D. candidate who came to Villanova through the College's partnership with the Universidad de Santiago de Chile.*

### **M.S. in Sustainable Engineering Launched**

As investment in sustainable business and industry practices grows, so does the demand for engineers who can navigate this changing landscape. To better position students for success in this growing job market, the College of Engineering has launched a unique master of science degree program in sustainable engineering — among the first in the country.

Through this multidisciplinary degree program, students establish a foundation of sustainability in engineering design and practice, policy, economics, societal implications, and ethics. From there, they choose a specialized track of study, such as alternative and renewable energy technology, watershed sustainability, environmental sustainability, or sustainable infrastructure and built environment.

The program was designed with flexibility in mind, especially for those who are currently working engineers. Students may attend full-time or part-time, choose to incorporate a thesis option, pursue a full degree or a graduate certificate, and take classes online or on campus. This flexibility also benefits employers who may choose to send their employees to the courses that make the most sense for their businesses. For more information, visit [www.vuengineering.com](http://www.vuengineering.com).

### **Villanova-USACH Partnership for Global Faculty Kicked Off**

In the spring of 2009, the College of Engineering signed a memorandum of understanding with Universidad de Santiago de Chile (USACH), which established a faculty and student exchange, as well as a partnership for collaborative research. Through this arrangement, Villanova will help USACH train the next generation of its engineering faculty.

In summer 2010, the first two USACH Ph.D. candidates arrived to take part in the Transition to the Doctorate Program, which provides

accelerated English language training and cultural immersion to ease the students' transition from Chile to the U.S.

This fall, they began their doctoral studies under the guidance of College faculty. Rene Garrido is working on biofuel studies with Dr. Justinus Satrio, Assistant Professor of Chemical Engineering. Sergio Yanez is working in the Structural Engineering Teaching and Research Laboratory (SETRL) under the direction of Dr. David Dinehart, Professor of Civil and Environmental Engineering. Through this unique partnership, USACH provides a first-year stipend, and Villanova provides tuition for the students. At the completion of their doctoral studies, the students will return to Chile and join the USACH faculty.

### **MOU with the National Minority STEM Fellowship Program Signed**

The College of Engineering has signed a Memorandum of Understanding with the National Minority STEM Fellowship Program, overseen by the Educational Advancement Alliance, Inc. and sponsored by the U.S. Department of Energy. Through this partnership, Villanova will be one of the institutions of choice for high-ranking students from historically black colleges and universities who are going on to graduate school. The STEM Fellowship Program will provide a two-year stipend, and Villanova will provide the tuition credits so that the students receive full graduate fellowships. The first student accepted into the program under this new agreement began his studies this semester.

College of Engineering faculty and students can always be found out in the community, inspiring the next generation of engineers. In support of a national endeavor to help the American workforce continue to compete globally, the College continues to serve as a regional leader in STEM outreach by developing and facilitating programs designed to improve high school and middle school students' interest and abilities in science, technology, engineering, and math subjects.



Carina Blair (right) of Wilmington, Del., spent three weeks on Villanova's campus as part of LEAD Engineering. Sean Dunn ME '11 served as a mentor.



LEAD Engineering students visited the Fairmount Water Works in Philadelphia.



The College hosted the Philadelphia area's first-ever Marine Advanced Technology Education (MATE) regional competition in May.

## "LEADing" High School Students to a Love of Engineering

This summer, 30 top high school students from around the country and Puerto Rico arrived on Villanova's campus for a three-week crash course in a variety of engineering disciplines as part of LEAD Engineering, a national program that raises high school students' awareness about engineering majors.

The College served as one of only five schools across the country selected to host this prestigious program. Other schools included the University of California-Berkeley, the University of Michigan, Georgia Tech, and the University of Virginia.

Faculty developed the LEAD curriculum through the lens of Villanova Engineering – which blends technical excellence with liberal arts, leadership development, and the belief that engineering can advance the greater good.

Sustainability in engineering, the theme for this year's program, took center stage throughout the curriculum, which included lectures and hands-on lessons from each major discipline. Between classes, participants worked in groups on one of five research projects, which included:

- Exploring ways to reduce the use of air-conditioning, water, and electricity to cut costs
- Working with turbines and wind power
- Developing solar-powered flashlights
- Building a green roof
- Working with concrete to reduce rain runoff

Students presented their findings on the final day of the program.

In addition to class work, students visited sites such as Google's New York offices and the Fairmount Water Works. Students also learned techniques for writing effective resumes and personal statements, which will be useful as they plan for college.

The College of Engineering will stay on as host of LEAD Engineering in 2011.



Nnaoma Oji of New Brighton, Minn., takes measurements at the historic Fairmount Water Works in Philadelphia.

## Marine Advanced Technology Education (MATE) Competition

The School District of Philadelphia partnered with the College of Engineering in May to host the region's first-ever Marine Advanced Technology Education (MATE) competition, through which 34 teams of middle and high school students from the tri-state area, Maryland, and South Carolina competed using underwater remote operated vehicles (ROVs) each team had built.

Teams put their ROVs to the test in Villanova's Olympic-size swimming pool and were judged on engineering design, a presentation of their work, and the ability of their ROVs to complete complex tasks (in alignment with age ability). The competition was led by Dr. C. Nataraj, Professor and Chair of the Department of Mechanical Engineering; James O'Brien, Assistant Professor of Mechanical Engineering; and 50 volunteers from the College. Winners from MATE's 19 regional competitions went on to compete in Hawaii in the next phase of the competition in June.

## Girls in Mechanical Engineering Day

Approximately 80 Girl Scout Juniors and Cadettes in grades 5 through 8 visited Villanova's campus for a day of hands-on engineering activities in March. Led by Dr. Amy Fleischer, Associate Professor of Mechanical Engineering, the girls earned a "fun patch" in engineering by completing four activities:



Katie Fleischer

- Working with solar power and building solar-powered robots
- Learning about water distribution in developing countries and building pumping systems
- Investigating biomedical engineering and designing prosthetic legs out of packaging materials
- Designing aerodynamic vehicles and testing them on a three-story zipline

Dr. Fleischer's team included Assistant Professors Dr. Ani Ural, Dr. Aaron Wemhoff, and James O'Brien; Visiting Assistant Professor Dr. LeRoy Alaways; and more than a dozen engineering students. The day's activities were sponsored by the Air Products Foundation.

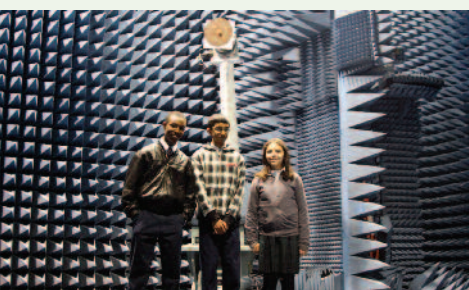
## HE<sup>2</sup>ARTS at Immaculate Heart of Mary

During a visit to her hometown of Brooklyn, N.Y. last year, Dr. Rosalind Wynne, Assistant Professor of Electrical and Computer Engineering, met a parent who was concerned about the limitation presented by her child's disinterest in math and science. In response, Dr. Wynne tapped her colleagues in the ECE Department to support a new program at the child's school, Immaculate Heart of Mary, called Health Education and Enrichment in Arithmetic, Technology, and Science (HE<sup>2</sup>ARTS).

Dr. James Peyton Jones, Professor of Electrical and Computer Engineering and Director of the Center for Nonlinear Dynamics and Control, and Frank Mercede, Assistant Professor of Electrical and Computer Engineering, joined Dr. Wynne in Brooklyn where they presented a

series of hands-on experiments in electronic devices and fiber optics for students in grades 4 through 8 and conducted teacher-training workshops on integrating educational software into the school's curriculum. Additional support came from across the College of Engineering and the University, which provided laptops, funding for resources, materials preparation, and student prizes.

In April, Dr. Wynne hosted the students for a daylong visit with the College of Engineering, where they toured the Center for Engineering Education and Research, met engineering faculty, participated in engineering demonstrations, and caught a glimpse into college life.



Students from Immaculate Heart of Mary School in Brooklyn, N.Y., visited the College in

## NovaCANE

NovaCANE (Villanova Community Action by New Engineers), a new student organization established last fall, inspires young minds to consider a future in engineering. Founded by Dr. David Dinehart, Professor of Civil and Environmental Engineering, and a group of structural engineering graduate students and civil engineering upperclassmen, NovaCANE partnered with St. Martin of Tours School in Philadelphia to start an Engineering Club for 6th graders.

NovaCANE representatives presented monthly structural engineering topics and hands-on activities for nearly 30 club members. Topics included stability design, brittle and ductile material behavior, connections, impact and earthquake loads, and bridge design. Activities included building newspaper crosses, gum drop domes, Popsicle stick bridges, making concrete cylinders, and more.

The students visited Villanova in May for a year-end celebration. NovaCANE is currently working with the school again with plans to build similar partnerships with additional schools and grade levels for other engineering major disciplines.

## Flagship STEM Outreach Initiatives

- **VESTED** (Villanova Engineering, Science, and Technology Enrichment and Development) 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.
- **BEST** (Boosting Engineering Science and Technology) **Robotics** is a national competition for middle and high school teams around the country. Villanova partners with the School District of Philadelphia to host the regional competition, which draws more than 300 students. Villanova Engineering students run the major kick-off event on campus in September, mentor students during the design and construction phase, and run the final competition in late October.

For more information about STEM outreach at the College of Engineering, please visit [www.villanova.edu/engineering/service](http://www.villanova.edu/engineering/service).

## A GLOBAL COMMITMENT

In 2009-2010, the College of Engineering's students and faculty continued their commitment to a long-standing tradition of providing engineering solutions for communities in need. Spring Break service trips were expanded to include more students, a new service site in Latin America, and new design projects to implement.

This commitment has also expanded to incorporate meaningful partnerships with the Villanova School of Business (VSB) and the College of Nursing that have the potential to impact entrepreneurial businesses and health care in Asia and Latin America.

### Spring Break 2010

This spring, more than 40 students and faculty members fanned out to Latin America to provide much-needed engineering services to improve water supplies for local communities.

In Waslala, Nicaragua, students from a variety of disciplines designed and built gravity flow water systems designed to connect clean water from springs located above local villages to the communities below.

Students who participated in the 11th annual trip to Amigos de Jesús children's home in Poses Verdes, Honduras, designed and installed a water filtration system for the children and staff who live there. They also built a basketball court.



Sean Lukasiewicz, CE '10 in Honduras



Barbi Braaten ChE '13 in Panama

### Service Spin-Off: Micro-Hydro in Nicaragua

While working to improve reliable, clean water distribution in Waslala during a previous spring break, a group of engineering students noted that the communities they were working in lacked power. Upon returning to Villanova, they formed an interdisciplinary team with students and faculty from VSB to create a sustainable template that provides power to rural communities wherever there is a water source. The team is working with a local partner in Nicaragua to build the system and will move into the implementation phase this fall.

In Panama, students designed a water supply intake dam and provided distribution design services for water distribution to local communities served by Father Wally Kasuboski and his Capuchan Mission.

### Sustainable Vision Grants: the Philippines and Nicaragua

With nearly \$100,000 in Sustainable Vision Grant funding from the National Collegiate Inventors and Innovators Alliance, College of Engineering students and faculty – along with counterparts from the College of Nursing and VSB – are forging ahead with two projects that have the potential to improve health care in Nicaragua and water and energy resources in the Philippines.

#### • Waslala, Nicaragua



Benjamin Lawrence ME '12; Rory Kotter ME '11; Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research; James O'Brien, Assistant Professor of Mechanical Engineering; Melissa Vergo ME '11; and Kristen Fournier, Nursing '10

Together with the College of Nursing and VSB, engineering students and faculty are working to develop a mobile solution that can help bridge the gap in the quality of health care provided to 35,000 residents of 85 rural communities that surround Waslala, Nicaragua. Their goal

is to create a low-cost telecommunication solution based on text messaging that would allow local health workers in rural clinics to transmit patient data via coded text messages to trained health staff who work in the Waslala hospital several hours away. Then, the trained hospital staff can text back treatment directions or diagnoses for the rural clinic staff to address.

#### • The Philippines

In support of the Save the Ifugao Rice Terraces Movement Organization (SITMo) in the Philippines, students and faculty from the College of Engineering and VSB are providing services that will not only improve local energy and water resources, but also stimulate the local economy. For example, one team is



Roland Dimog, SITMo project manager; Patrick McDonald, construction consultant; Brenda McEvoy ME '10; Thomas Meehan VSB '10; John Gunn ME '10; Karla Abello VSB '10; Jessica Jonovski VSB '10; and Gisela Camba VSB '10

collaborating with a community group in the village of Maggok to revamp their micro-hydroelectric utility and will collaborate with local manufacturers and project partners to design and implement the system. A second team is providing engineering services for a local cooperative for the design of a lemongrass distillation process to extract essential oils. Their goal is to help these local entrepreneurs improve boiling and combustion efficiency to reduce energy consumption.



View of the Ifugao Mountains in the Philippines

## Engineers Without Borders

The Villanova Chapter of Engineers Without Borders, a non-profit national organization that partners engineers with developing countries or other communities in need, is one of the largest and fastest growing engineering clubs on campus.

Its mission takes members around the world to put their engineering skills to use for global neighbors. For example, previous trips have included the design and implementation of water distribution solutions to communities in Kenya and Thailand.

EWB also works closer to home. For example, last year, the team provided residential construction services to Habitat for Humanity in Wyoming. Other U.S.-based projects have included a playground installation in post-Katrina New Orleans and design improvements to the ramps used for the Special Olympics held on Villanova's campus each year.

For more information, visit [www.engineering.villanova.edu](http://www.engineering.villanova.edu)

There are a number of ways you can support the College's growing service-learning program. To discuss, please call Jordan Ermilio, PE, Assistant Professor of Mechanical Engineering and Special Projects Coordinator, at 610-519-6859. For more information about service-learning opportunities, visit [www.Engineering.Villanova.edu](http://www.Engineering.Villanova.edu).

## SERVICE LEARNING AT A GLANCE

### Sustainable Vision Grant, Philippines, August 2009 (since 2007)

*Project:* Renewable Energy and Entrepreneurship  
*Students:* 6  
*Faculty Advisors:* Dr. Pritpal Singh, Professor and Chair of the Department of Electrical and Computer Engineering; Jordan Ermilio, Assistant Professor of Mechanical Engineering and Special Projects Coordinator; and James Klingler, Assistant Professor of Management & Operations for the Villanova School of Business (VSB)

### Micro-Hydro, Nicaragua, October 2009

*Project:* Renewable Energy and Rural Electrification Project, Waslala  
*Students:* 10  
*Faculty Advisors:* Professor Ermilio and Debra Arvanites, Associate Dean, Assessment and Accreditation and Assistant Professor of Management & Operations for VSB

### Sustainable Vision Grant, Philippines, December 2009 (Since 2007)

*Project:* Renewable Energy & Entrepreneurship  
*Students:* 12  
*Faculty Advisors:* Professor Ermilio

### Amigos de Jesús, Honduras, March 2010 (Since 2000)

*Project:* Engineering Design and Construction Services for a School/Orphanage  
*Students:* 16  
*Faculty Advisors:* Dr. Andrea Welker, PE, Associate Professor of Civil and Environmental Engineering and Dr. Bridget Wadzuk CE '00, Assistant Professor of Civil and Environmental Engineering

### Water for Waslala, Nicaragua, March 2010 (Since 2003)

*Project:* Water Supply Distribution Design  
*Students:* 9  
*Faculty Advisors:* Dr. Gary Gabriele, Drosdick Endowed Dean of the College of Engineering; Dr. Alfonso Ortega, Associate Dean for Graduate Studies and Research and The James R. Birlle Professor of Energy Technology; and James O'Brien, Assistant Professor of Mechanical Engineering

### Chepo/Bayano Mission, Panama, March 2010

*Project:* Engineering Design and Construction Services  
*Students:* 11  
*Faculty Advisors:* Dr. Gerard Jones, Associate Dean for Academic Affairs and Professor of Mechanical Engineering and Dr. Edward Glynn PE, Assistant Professor of Civil and Environmental Engineering

### Sustainable Vision Grant, Nicaragua, May 2010

*Project:* Renewable Energy/Rural Electrification & Telecommunication Systems for Improving Rural Health Care  
*Students:* 10  
*Faculty Advisors:* Dr. Singh; Professor Ermilio; Dr. Sarvesh Kulkarni, Associate Professor of Electrical and Computer Engineering; Professor Klingler (VSB); Dr. Ruth McDermott Levy, Assistant Professor in the College of Nursing; and Dr. Elizabeth Keech, Assistant Professor in the College of Nursing

### Engineers without Borders/Habitat for Humanity, Wyoming, 2010

*Project:* Residential Construction  
*Students:* 16  
*Faculty Advisor:* Dr. Wadzuk

### Sustainable Vision Grant, Philippines, August 2010 (Since 2007)

*Project:* Renewable Energy & Entrepreneurship  
*Students:* 8  
*Faculty Advisors:* Professors Ermilio and Arvanites

The College of Engineering gratefully acknowledges the donors on these pages for their contributions to the College during the 2009-2010 fiscal year.

## Endowment Gifts

Endowment gifts create a lasting legacy in support of the College of Engineering or a department, program, professorship, or scholarship. Endowed funds may be named for the donors or in honor or memory of someone, such as parents or a cherished professor. These gifts are fundamental to the health of the University and the College of Engineering by reducing dependence on tuition revenues, providing a predictable source of income, enabling the development of innovative programs, and attracting exceptional students and faculty. **To learn more about creating an endowed fund, contact Cynthia Rutenbar, Director of Development for the College of Engineering, at 610-519-6973.**

### Robert S. Ayerle, MD

The Rosanna S. and Robert S. Ayerle, MD, Endowed Scholarship

### Mr. and Mrs. Robert J. Bettacchi

The Robert J. and Karen Z. Bettacchi Endowed University Scholarship

### Mr. and Mrs. Robert G. Catalanello

The Brenda H. and Robert G. Catalanello '86 Endowed Scholarship for Engineering

### Mr. and Mrs. William G. Christman

The Christman Family Scholarship in Science or Engineering

### Ryan W. Cunningham

The Patrick J. Cunningham Jr. and Susan Ward '80 Endowed Lecture Series in Engineering

### Dr. Richard T. Dewling and Dolores M. Dewling

The Dewling Family Endowed Scholarship for Graduate Environmental Engineering Study for Women

### Estate of James A. Drobile

The James A. Drobile Dean's Scholarship in Chemical Engineering

### Jack and Gloria Drosdick

The Drosdick Endowed Dean of the College of Engineering

### Mr. and Mrs. Robert J. Fitzmyer

The Robert J. Fitzmyer '50 Endowment for Engineering Faculty Development

### Jones Foundation

John P. Jones III '72 Villanova Multidisciplinary Design Laboratory Fund

### Mr. and Mrs. Carl R. Maio

The Carl R. Maio '49 and Mary Catherine Maio Endowed Scholarship for Engineering

### Robert J. and Margaret C. Merkert

Professor Joseph J. Hicks University Scholarship Endowed by Margaret C. and Robert J. Merkert, Sr.

### Mr. William J. Pratt, Jr.

To establish a fund in support of Electrical and Computer Engineering

### A. Anthony Scarpa Trust

A. Anthony Scarpa '49 Endowed Engineering Scholarship

## Restricted Annual Gifts to the College

Gifts restricted to the College of Engineering directly impact the College's students and faculty by supporting the innovative teaching, research, and service opportunities that define the "Villanova Engineer." (This list does not include gifts made to other programs at Villanova University).

### Gifts of \$10,000 and above

Air Products & Chemicals, Inc.  
Mr. and Mrs. Edward G. Barry  
The Boeing Company  
Mr. Anthony J. Cavanna  
The Hamilton Family Foundation  
Dr. and Mrs. William J. Leighton  
Lockheed Martin Corporation  
Mr. and Mrs. William K. Lorenz  
Mr. and Mrs. John Y. K. Peng  
Rolls Royce North America, Inc.  
Mr. and Mrs. Karl F. Schmidt  
Mr. and Mrs. Paul J. Varello

### Gifts up to \$9,999

Advanced GeoServices  
AMEC Earth & Environmental, Inc.  
Brian Anderson Memorial Fund  
Robert T. Armistead P.E.  
Dr. and Mrs. Jean-Pierre Arnoux  
Dr. and Mrs. Richard G. Belatti, Jr.  
George G. and Nancy Bitto  
Mrs. Eileen A. Byrne  
Mr. and Mrs. Nicholas A. Calio  
Mr. and Mrs. Joseph B. Callaghan  
CH2M Hill  
Nick and Jean DiMarino  
Down to Earth Design Foundation  
John F. and Patricia R. Hartner  
Joseph S. Iandiorio, Esq.  
Dr. and Mrs. Joseph J. Krackeler  
Mr. Richard J. Loftus  
Mr. and Mrs. James K. Logue  
Capt. and Mrs. John F. Manning, Jr., USN (ret.)  
Mr. Stephen A. McCormick  
Mr. Thomas J. Meaney  
Mr. Anthony J. Melone  
Michael Baker Corporation  
Momenee & Associates, Inc.  
Donald J. Murray, Engineering Class of 1962  
NTM Engineering  
Mr. & Mrs. William E. O'Connor  
Mr. Andrew P. O'Reilly  
Patricia Kind Family Foundation  
Adelene and Roland Perkins  
Eugene A. Petracca, Jr. P.E.  
Mr. Joseph K. Posillico  
Mr. and Mrs. Venu Manohar S. Rao  
Mr. James P. Regan  
Mr. and Mrs. Ralph V. Robb  
Norman J. and Maryellen Shachoy  
Mr. Joseph J. Simpson, Jr.  
Turner Construction Company  
Van Note-Harvey Associates, PC  
Villanova Engineering Alumni Society  
Mr. and Mrs. Joseph D. West

Mr. Gerald A. White  
Mr. and Mrs. Edward J. Wroble

### Gifts up to \$2,499

ASCO Valve  
Bally Ribbon Mills  
Mr. Nicholas Dispenziere, Jr.  
Exelon Corporation  
Paul R. and Kathleen H. Flood  
Herbert, Rowland Grubic, Inc.  
Dr. Thomas W. Higgins  
Mr. and Mrs. Joseph G. Lamack, III  
Langan Engineering & Environmental Services  
Mr. Robert C. Legnini  
Mr. Gabriel J. Luhowy  
Mr. Robert C. McIntire  
Mr. John I. Menzies, Jr.  
O'Brien & Gere  
Mr. and Mrs. Arthur P. Ryan III  
Mr. Donald E. Schmitt, Sr.  
Mr. Gerald M. Sexton  
Cas and Grace Skrzypczak  
Mr. James J. White IV  
Mr. J. Kenny Wieber  
Mr. William L. Williams  
CDR John A. Witkowski

### Gifts up to \$999

Mr. John J. Duffy  
Johnson & Johnson  
Mr. Jeff Kiley  
Mr. Leon E. Maes  
Ms. Patricia A. O'Loughlin  
Mr. Joseph W. Price, Jr., Esq.  
Mr. Stanley L. Reggie  
Mr. and Mrs. John Rudd  
Capt. Richard J. Schleicher, USN  
Dr. and Mrs. James J. Schuster  
Mr. Manuel Torres

### Gifts up to \$499

Mr. Richard B. Adler  
Mr. Peter F. Allard  
Mr. Andres J. Andraca  
Mr. Karl Autenrieth  
Mr. Dennis Biddick  
Mr. Theodore W. Boris  
Mr. Nicholas F. Borrelli  
Mrs. Donna L. Boscia  
Mr. Lynn D. Brown  
Mr. John A. Brunner  
Mrs. Rachel A. Buck  
Mr. Edward P. Byrne, Jr.  
Mr. Joseph M. Callaghan  
Mrs. Bernadine R. Cataldo  
Mr. George Charette, III

Mr. Alan M. Cocchetto  
 Mr. Geoffrey K. Collier  
 Mr. Robert L. Conover  
 Mr. John J. Coscia  
 Mr. John K. Coyle  
 Mr. Todd F. Coyle  
 Mr. Jason V. D'Antona  
 Mr. Steven A. Dreiss  
 Mr. Martin J. Dugal  
 Mr. Joseph D. Echelmeier  
 Mr. Thomas M. Egan  
 Mr. Thomas H. Ellis  
 Mrs. Ellen M. Epps  
 Mr. Garrard V. Esposito  
 Mr. John J. Filliman  
 Mr. John E. Foerst  
 Robert A. and Christine T. Frank  
 Mr. Mark J. Friday  
 Mr. and Mrs. Andrew M. Gabriel  
 Mrs. Mary Pat Garrahan-Masters  
 Mr. Francis P. Gehring  
 Mr. William P. Gilman  
 Dr. Edward F. and Margaret A. Glynn  
 Mr. Gerard A. Goulet  
 Mr. Kevin M. Haney  
 Mr. John N. Happ  
 Mr. William P. Harshaw  
 Ms. Elizabeth A. Hartnett  
 Dr. Donald E. Hawk  
 Mr. Ronald W. Hayes  
 Mr. and Mrs. Charles V. Hildenbrand, Jr.  
 Mr. Evan T. Hollenshade  
 Mr. Franklin W. Houder  
 Mr. Sebastian W. Houle  
 Mr. Brad Hurrell  
 Steven and Alyssa Hylinski  
 Mr. Jamie F. Iudica  
 Mr. Juan J. Jones  
 Mr. Patrick J. Kearns  
 CDR George J. Keller  
 Mr. Justin T. Kestner  
 Mr. Charles J. Killelea, III  
 Mr. Ross P. Kisciras  
 Mr. Joseph J. Kosinski  
 Mr. Michael F. Kozempel  
 Ms. Monika M. Kozlowska  
 Mr. Wayne C. Krachun  
 Mr. Robert F. Larkin  
 Mr. Francis P. Laska  
 Ms. Gloriajean V. Lipovsky  
 Ms. Jaimie V. Lively  
 Mr. Raymond C. Lonick  
 Mr. Matthew D. Loper  
 Mr. Joseph T. Loth  
 Mr. Adam F. Lupisella  
 Deacon Thomas J. Malinoski  
 Mr. Bernard I. Mattingly, Jr.  
 Mr. James P. May  
 Dr. and Mrs. Edward V. McAssey  
 Mr. Edward B. McConnell  
 Mrs. Cindy M. McCutcheon  
 Mr. Thomas G. McHale  
 Mrs. Noreen M. McInnes  
 Mr. William F. Meyer  
 Mr. John J. Miller, Jr.  
 Ms. Lindsay A. Musselman  
 Mr. Ralph J. Nevel  
 Mr. James M. O'Brien  
 Mr. Samuel D. Onuska  
 Mr. and Mrs. Thomas K. Otte  
 Mr. Louis F. Pandolfe  
 Mr. Michael J. Paparo  
 Mr. Joseph A. Paschall  
 Mr. Vu L. Pham  
 Mr. John P. Pierotti  
 Mr. Joseph L. Piscitelli  
 Mr. Thomas J. Plavcan  
 Mr. Robert P. Restrepo  
 Mrs. Carol A. Reynolds  
 Mr. Henry E. Rice  
 Dr. Joseph D. Roarty  
 Dr. Anthony W. Salem  
 Mr. Patrick J. Salemo  
 Mr. Matthew J. Schetelich  
 Michael A. and Marie S. Schiavone  
 Mr. John J. Schwartz  
 Captain Leonard P. Scullion  
 Mr. Kevin D. Sear  
 Michael L. and Laura Seibert  
 Mr. Jeffrey G. Setesak  
 Mr. Peter J. Sevcik  
 Mr. Terence G. Sheridan  
 Ms. Christine M. Slocumb  
 Mr. J. Richard Spence  
 Mr. John B. Starkey  
 Mr. John A. Stefanik  
 Mr. David A. Stein  
 Dr. Imre A. Szalai  
 Mr. Kenneth G. Teague, Jr.  
 Mrs. Mary A. Thomas  
 Mr. Paul Tubito  
 Mr. William H. Vaseliou  
 Ms. Padma S. Vemuri  
 Ms. Rebecca L. Vernot  
 Mr. Francis V. Villani  
 Mrs. Cheryl A. Villari  
 Mr. Vincent D. Wagner  
 Mr. William B. Wagner  
 Mrs. Lauren R. Walter  
 Mr. David A. Watson  
 Wayne Sporting Goods Co., Inc.  
 Mr. Kevin Wehmann  
 Ms. Joan K. Wiley  
 Mr. Benjamin H. Wilt  
 LTC Gregory and Patricia Wojtkun (ret.)  
 Mr. Paul J. Yaroschak  
 Mr. Hugh Q. Young

## Organizational Partnerships

Organizational and corporate partners make a measurable 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.**

## 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 also 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.html](http://www.villanova.edu/advance/development/makeagift.html).

Or call **1-800-486-5244** to make a gift using your credit card (M-F, 9 a.m. to 5 p.m.)

**Planned Gifts:** Alumni and friends often make their most significant gifts to the University through planned gifts. Various arrangements are possible, including bequests, gifts of property (real estate, art, jewelry, etc.), and donations from life insurance or retirement plans. One also may create "life income" arrangements, in which the donor(s) or other designee(s) receives an income stream and the University receives the remainder, such as through a charitable gift annuity or charitable remainder trust. **Other types of planned gifts are possible as well. For more information, contact Cathleen Parsons-Nikolic, Associate Vice President, Development Operations, at 610-519-7973.**



## RETENTION

- Incoming class of 2008\* returning to the College as sophomores: 89%

## PERSISTENCE FIGURES FOR THE CLASS OF 2009\*

GRADUATED IN 4 YEARS	78%
GRADUATED IN 5 YEARS	72%
GRADUATED IN 6 YEARS	70%



## ACCORDING TO THE CLASS OF 2008\*

### Spiritual and personal growth:

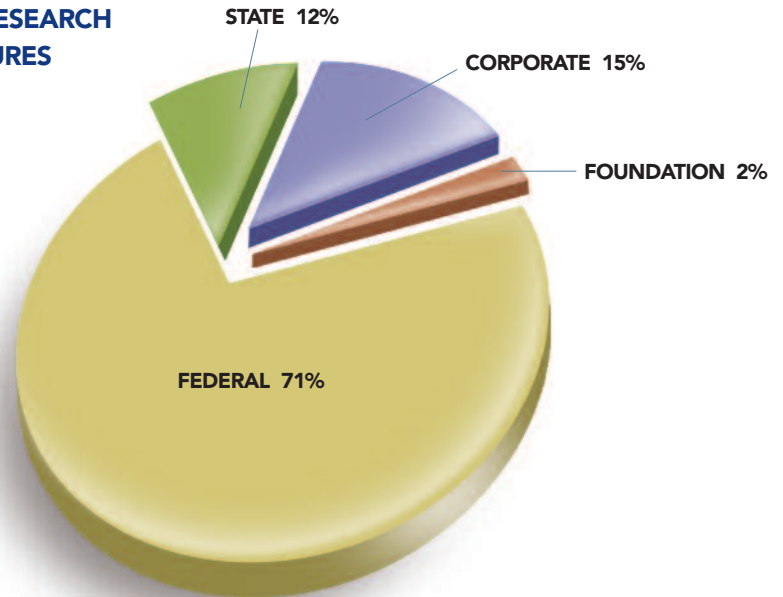
- 85% of seniors felt their time at Villanova greatly or moderately contributed to their interest in lifelong learning.
- 86% of seniors indicated Villanova contributed greatly or moderately to their growth in personal responsibility.
- 76% of seniors felt their time at Villanova greatly or moderately influenced their ethical and moral growth.

## RESEARCH EXPENDITURES FOR FISCAL YEAR 2009-2010

(Total active grant funding for 2009-2010 was \$9.8 million)

### ANNUAL RESEARCH EXPENDITURES

\$3.9 M Total



## CAREER CHOICE COLLEGE OF ENGINEERING, CLASS OF 2009\*

EMPLOYED FULL-TIME	73%
FULL-TIME GRAD SCHOOL	23%
PART-TIME EMPLOYMENT OR GRAD SCHOOL	1%
<b>TOTAL</b>	<b>97%</b>

## DEGREES CONFERRED AT MAY 2010\* COMMENCEMENT

<b>Total Bachelor's of Science Degrees</b>	<b>206</b>	<b>Total Master's Degrees</b>	<b>36</b>
B.S. Chemical Engineering	52	M.S. Chemical Engineering	4
B.S. Civil Engineering	56	M.S. Civil Engineering	11
B.S. Computer Engineering	13	M.S. Computer Engineering	3
B.S. Electrical Engineering	18	M.S. Electrical Engineering	4
B.S. Mechanical Engineering	67	M.S. Mechanical Engineering	10
		M.S. Transportation Engineering	1
		M.S. Water Resources	3
<b>Total Degrees</b>	<b>243</b>	<b>Total Doctoral Degrees</b>	<b>1</b>

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



## COLLEGE OF ENGINEERING SENIOR SURVEY

*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 2008\* felt about their time spent at the College of Engineering.*

### Upon graduation, compared with when they entered the College,

- 95% of seniors said their ability to think critically was stronger or much stronger.
- 98% of seniors said their knowledge of a particular field or discipline was stronger or much stronger.
- 98% of seniors said their analytical and problem-solving skills were stronger or much stronger.
- 97% of seniors said their general knowledge of other subject matter was stronger or much stronger.
- 86% of seniors said their leadership abilities were stronger or much stronger.

### Interaction with faculty:

- 88% of seniors said they frequently or occasionally had the opportunity to apply classroom learning to “real-life” issues.
- 88% of seniors said they frequently or occasionally had the opportunity to work on a research project with a faculty member.
- 88% of seniors said they were frequently or occasionally offered help in achieving a professional goal by a faculty member.
- 92% of seniors said faculty members frequently or occasionally offered encouragement to pursue graduate/professional studies.

### Satisfaction with coursework:

- 84% of seniors felt satisfied or very satisfied with the relevance of coursework to their future plans.
- 91% of seniors felt satisfied or very satisfied with the courses available in their major field.

### Outside the classroom (since entering as freshmen):

- 72% of seniors joined a club or organization related to their major.
- 13% of seniors presented research at a conference.
- 10% of seniors participated in a study-abroad program.
- 61% of seniors frequently or occasionally performed volunteer work.
- 9% of seniors frequently or occasionally worked on a local, state, or national political campaign.

# 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.
- **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](http://www.Facebook.com/VillanovaEngineering)) and LinkedIn (coming soon!).

### Next steps...

- For more information about the College of Engineering, visit [www.engineering.villanova.edu](http://www.engineering.villanova.edu).
- For inquiries about alumni events or involvement, visit [www.Villanova.edu](http://www.Villanova.edu).
- To make a financial contribution, contact Cynthia Rutenbar, Director of Major Giving ([Cynthia.Rutenbar@Villanova.edu](mailto:Cynthia.Rutenbar@Villanova.edu)), Lisa Kailian, Major Gifts Officer ([Lisa.Kailian@Villanova.edu](mailto:Lisa.Kailian@Villanova.edu)) or Evan Zaletel, Major Gifts Officer ([Evan.Zaletel@Villanova.edu](mailto:Evan.Zaletel@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](mailto: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](mailto:Gayle.Doyle@Villanova.edu)).



# VILLANOVA UNIVERSITY

## COLLEGE OF ENGINEERING

800 LANCASTER AVENUE  
VILLANOVA, PA 19085

610.519.4940

610.519.5859 Fax

[www.engineering.villanova.edu](http://www.engineering.villanova.edu)

Nonprofit organization  
U. S. POSTAGE  
**PAID**  
VILLANOVA UNIVERSITY

### 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

Villanova University is the oldest and largest Roman Catholic university in the Commonwealth of Pennsylvania. Founded by the Augustinian Order in 1842 and located on a picturesque 254-acre campus, it comprises the College of Liberal Arts & Sciences, the Villanova School of Business, the College of Engineering, the College of Nursing, and the School of Law. With its rigorous, well-rounded curricula and its commitment to the Augustinian ideals of pursuit of knowledge and service to others, Villanova is recognized as a premier institution of higher education. **For more than a decade, Villanova University has been ranked No. 1 in the North region** (North – Masters) by *US News & World Report*.

### 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 Transportation Engineering
- M.S. in Water Resources and Environmental Engineering

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

Certificate Programs

**Visit [VUengineering.com](http://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.

