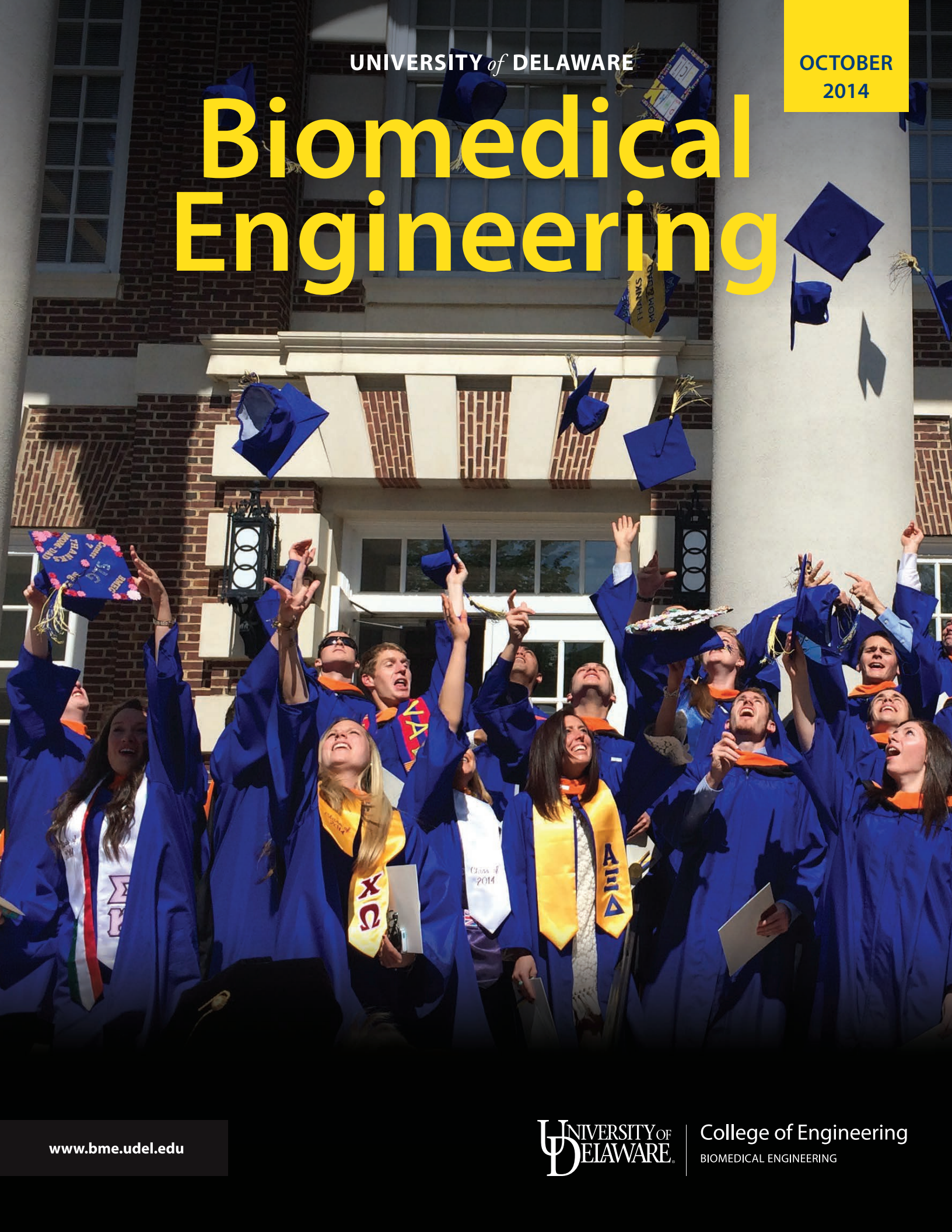


UNIVERSITY of DELAWARE

OCTOBER  
2014

# Biomedical Engineering



[www.bme.udel.edu](http://www.bme.udel.edu)

UNIVERSITY OF  
DELAWARE

College of Engineering  
BIOMEDICAL ENGINEERING

# Mission Statement

To deliver a high quality of education in applying quantitative engineering analysis and design to biology and medicine.

To conduct high impact research at the engineering-biology interface that reveals basic knowledge of disease mechanisms to improve human health, and that develops new technologies and therapies to improve the quality of life.



**DAWN ELLIOTT**

*Dear Friends and Colleagues,*

The University of Delaware's Biomedical Engineering (BME) program has had another wonderful year.

As last year's new faculty settle into their research space at Delaware Technology Park, we are excited to welcome Jason Gleghorn, Jeannie Stephens and Ryan Zurakowski to our program. Jason Gleghorn investigates the mechanisms that sculpt tissue form and exploits them to build complex tissue architectures for studying tissue repair and regenerative medicine. Jeannie Stephens will head our undergraduate program and plans to strengthen the program's connection with the local medical and industry communities, fostering project, internship and employment opportunities for our students. Ryan Zurakowski was recently tenured at UD and researches nonlinear control theory and applications, specifically in mathematical biology and medicine. We anticipate great things from them and from our current faculty.

Our undergraduate program is fully enrolled with over 200 students. This year, we graduated our first class with five students graduating in January followed by 39 more in May. With their help, we won the Dean's Cup challenge which goes to the department whose graduating seniors show the highest participation in donating back to UD. We look forward to seeing what our graduates will accomplish as they go on to jobs and graduate education. Led by Ryan Zurakowski, our graduate program is flourishing. Our graduate students continue to win recognition. We welcomed two new graduate students in January and three more this fall, bringing our total number of graduate students to 20. We look forward to another exciting year as we continue to build the BME program.

Warm regards,

**Dawn Elliott**

Professor and Director  
Biomedical Engineering

**JOIN UD BME'S  
LINKEDIN PAGE**

## BME welcomes three new faculty



**JASON GLEGHORN**

**JASON GLEGHORN** earned his doctoral degree in biomedical engineering from Cornell University. During his postdoctoral work at Cornell, he developed microfluidic systems to isolate rare circulating tumor cells from patient blood samples and to assay them for chemotherapeutic response. During his postdoctoral research at Princeton University, he used novel microfluidic and microfabrication techniques to study the physical mechanisms of lung branching morphogenesis. At UD, he plans to use his expertise in microfabrication, cell and developmental biology, and computational analysis to investigate the major mechanisms that sculpt tissue form and to exploit these mechanisms to build complex tissue architectures for studying tissue repair and regenerative medicine.



**JEANNIE STEPHENS**

**JEANNIE STEPHENS** received her doctoral degree in materials science and engineering from the University of Delaware in 2004. Since then, she has been a National Research Council fellow at the National Institute of Standards and Technology, a post doctoral fellow at Rice University, and a research scientist at DePuy Synthes (companies of Johnson & Johnson). Stephens first joined BME in September 2013 as temporary faculty and is now an assistant professor of instruction and associate director of BME's undergraduate program. In this role, she will strengthen the program's connection with the local medical community, both in clinical and industrial settings, in order to foster undergraduate design projects as well as internship and employment opportunities for our students.



**RYAN ZURAKOWSKI**

**RYAN ZURAKOWSKI** comes to us from UD's Electrical & Computer Engineering department, and he is heading our graduate program. We congratulate him on his recent promotion to associate professor with tenure. Zurakowski researches nonlinear control theory and applications, specifically in mathematical biology and medicine. He and his collaborators are working to develop mathematical descriptions of disease systems, and to analyze the dynamics using nonlinear control techniques in order to suggest novel therapeutic approaches. Currently he is focusing on HIV and its treatment.



## Congratulations to our first undergraduate class

**Saturday, May 31, 2014, marked the graduation of the biomedical engineering program's first undergraduate class. Earning bachelor's degrees in biomedical engineering, these students followed five additional students who completed early graduation in January 2014.** Following the University's graduation ceremony, the BME graduates gathered on The Green alongside other engineering graduates for the College of Engineering commencement ceremony. Dean Babatunde Ogunnaike, William L. Friend Chaired Professor of Chemical and Biomolecular Engineering, encouraged

the new alumni to stay in touch with UD and recognized faculty members who had been selected for special awards. Jill Higginson, associate professor of mechanical engineering, who was instrumental in launching UD's BME undergraduate program, was recognized with the college's 2014 Outstanding Junior Faculty Member award. During the ceremony, BME was awarded the College of Engineering Dean's Cup, an honor given to the department/program with the highest percentage of graduating seniors who donate to UD. An impressive 83 percent of this year's graduating BME class donated to the university this year thanks to the hard work of Dominic Campagnola and Madison DeFrank, graduating seniors who ran the BME give back campaign.

A total of 39 students received bachelor's degrees in BME during convocation, including the following five graduates who earned Honors degrees: Christian Aurup, Kevin Chang, Audrey Guyer, Stacy Hand and Lindsay Scheetz. This degree allows exceptionally talented and dedicated undergraduate students to pursue their academic interests in greater depth and breadth than is required for the regular bachelor's degree. Plans for our graduating BME students include jobs in industry and enrollment in medical and graduate degree programs. We are very proud of our first graduates and wish them the best of luck and success in their future endeavors.



THE DAY BEFORE COMMENCEMENT, A BME GRADUATION CELEBRATION EVENT WAS HELD FOR STUDENTS, PARENTS AND FACULTY.

# Manning Triplets Graduate

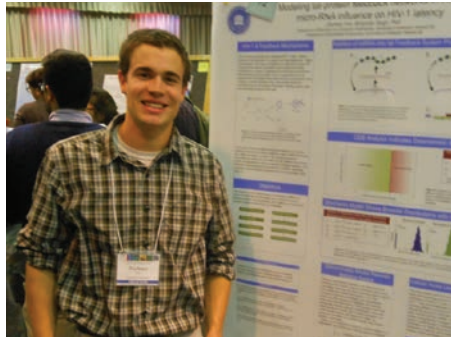


BME undergrad James Manning is one of the Manning triplets who graduated together from UD in May 2014. He graduated cum laude with a bachelor's degree in biomedical engineering and a minor in bioelectrical engineering. As Manning enters the workforce, he said he appreciates the support he received as one of the first students to graduate with the new biomedical engineering major. "The department pulled out the stops when

it came to accommodating us and giving us the tools we needed to be successful," he said. "It was an opportunity to apply what we have spent years learning, with the focus of designing and creating a solution to a problem. I wouldn't trade that experience for any other while at UD." Manning is now a product engineer in the thermoplastics division of Anholt Industries in Avondale, PA.

## Fox earns poster prize at Undergraduate Research Symposium

**ZACHARY FOX** was one of 19 undergraduate students from University of Delaware to present his research at the 16th annual Undergraduate Research Symposium in the Chemical and Biological Sciences. Fox received a second-place prize for his poster “Modeling tat-protein feedback networks in HIV-1: micro RNA influence on HIV-1 latency,” which detailed research completed in Abhyudai Singh’s lab. The competition

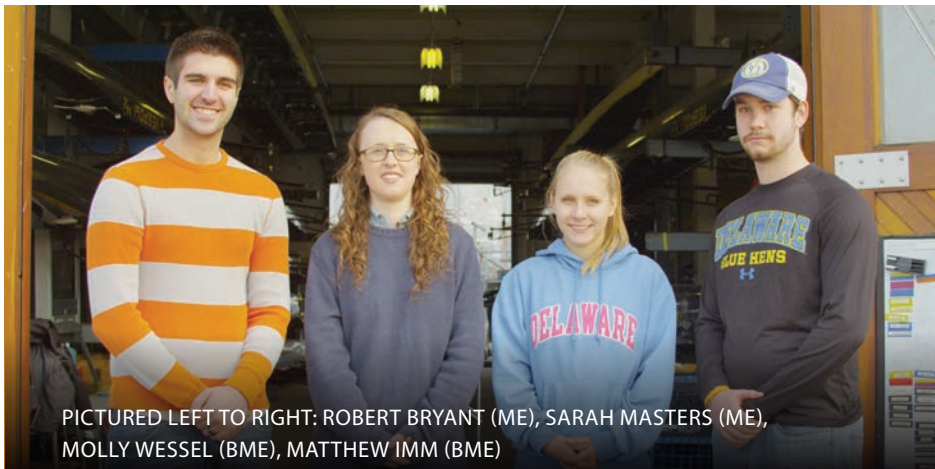


drawn nearly 200 students from 12 states. Fox is now a doctoral student at Colorado State University.

## Imm, Wessel present at Clinton Global Initiative

As part of their capstone senior design course, biomedical engineering majors **MATTHEW IMM** and **MOLLY WESSEL** were part of a team that planned, designed and developed an adaptive rowing device to allow those with quadriplegia, paraplegia, hemiplegia, multiple sclerosis and paresis to operate a crew boat. In recognition of this work, the team was invited to the 2014 Clinton Global Initiative University conference in March where they shared their ideas

with nearly 1,200 students from around the globe, and attended workshops and skill sessions, hoping to turn their academic project into a commercially viable technology. The team is working with UD’s Office of Economic Innovation and Partnerships (OEIP) to patent their design, and future plans include further testing with a wide range of individuals with disabilities and pursuing a licensing deal with a major rowing company.



PICTURED LEFT TO RIGHT: ROBERT BRYANT (ME), SARAH MASTERS (ME), MOLLY WESSEL (BME), MATTHEW IMM (BME)

## Student Awards

### DEPARTMENTAL AWARDS:

Director’s Award:

**NICK P. CAMPAGNOLA**

Distinguished Senior Award:

**KEVIN W. CHANG**

**STACY I. HAND**

**LINDSAY M. SCHEETZ**

Distinguished Junior Award:

**BIMAL B. AMIN**

**MARY T. DOOLIN**

**KYRA A. ISAACS**

Distinguished Sophomore Award:

**IAN M. BERKE**

Matthew Maguire

Celebration of Life Award:

**BYRON P. CRANE**

**MADISON B. DEFRANK**

### COLLEGE AWARDS:

Engineering Alumni Association  
Scholarship:

**JAMES P. THOMSON**

### UNIVERSITY AWARDS:

Barry M. Goldwater Scholarship:

**DANIEL M. CHARYTONOWICZ**

# Summer Scholars showcase

Twenty-one BME undergraduate students presented at the annual UD Undergraduate Research and Service Celebratory Symposium this August as part of the INBRE Summer Scholars program (Faculty advisers given in parentheses). The program's goal is to help students navigate college and seek direction for their future, as well as provide students real world experience. Roughly 390 students have participated in the program since 2002.

## LAUREN BAKER

"Movement Patterns Differ Between the Sexes from ACL Injury to 5 Years After Reconstruction" (Snyder-Mackler)

## IAN BERKE

"En Block Staining and Clearing Techniques for Visualizing Bone and Cartilage Cell Morphology" (Price)

## NILE BUNCE

"Analysis of Thermo-Reversible Gels Comprised of Biodegradable PHB-HHx Polymers" (Rabolt)

## DANIEL CHARYTONOWICZ

"Neural Mechanisms Surrounding Visual Attention" (Hoffman)

## MONIDEEPA CHATTERJEE

"The Effect of Delayed Mechanical Stimulation in an in vitro Microfracture Model" (Lu)

## KYLE DAVIS

"Effect of Stochastic Holin Expression on Bacteriophage Lambda Lysis Time" (Singh)

## MARY DOOLIN

"Evaluation of Multiple Training Paradigms When Using Biofeedback for Learning Partial Weight Bearing" (Higginson)

## QUENTIN DUBROFF

"Development of a Fluorescent Barcoding System for Cell Based Proteomic Libraries Using Yeast Surface Display" (Colby)

## BRITTANY FAY

"Nanoshell-mediated Photothermal Therapy for Multidrug Resistant Breast Cancer Therapy" (Day)

## BRETTA FYLSTRA

"Modifying a Fully Parameterized AFO Model with Adjustable ROM Ankle Joint" (Stanhope)

## JOHN GAGIANAS

"Nanoshell Mediated Photothermal Therapy Against Triple-Negative Breast Cancer" (Day)

## SAISRI GAJJALA

"Custom Harness Design for Body Weight Unloading During Treadmill Walking" (Stanhope)

## JIE MA

"Spontaneous Calcium Response of in situ Chondrocyte and Related Pathways" (Lu)

## THOMAS MCDOWELL

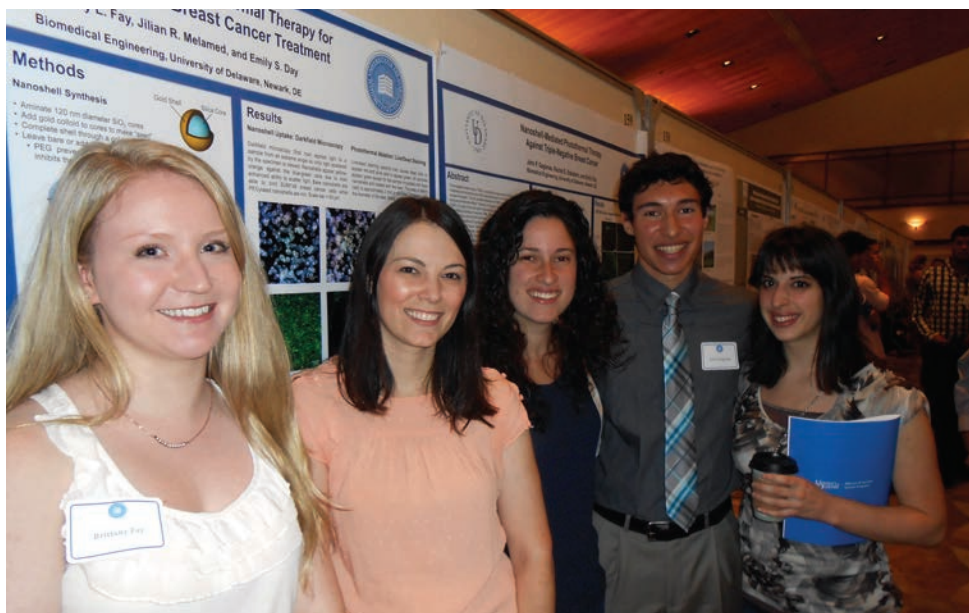
"Tribological Properties of Polyacrylamide/pHEMA Hybrid Hydrogels" (Burriss)

## PRANITA MURLIDHAR

"Reducing the Chance of At-Grip Failure in Tensile Tests of Bovine Meniscus" (Elliott)

## YVONNE NI

"Effects of Different Counterion Concentration and Electrochemical Deposition Parameters on the Synthesis of Dibromo-Substituted 3,4-Ethylendioxythiophene (EDOT-Br) Monomer Crystals" (Martin)





## Students on the move

### Charytonowics named 2014 Goldwater Scholar

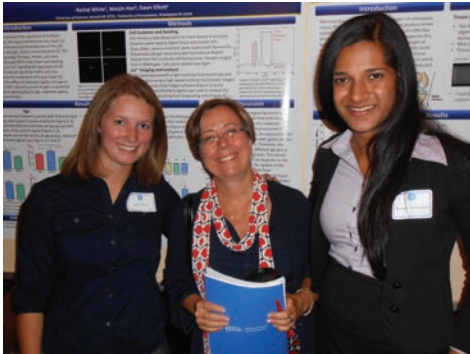
BME undergrad **DANIEL CHARYTONOWICS** was named 2014 Goldwater Scholar and earned a scholarship from the Barry M. Goldwater Scholarship and Excellence in Education Foundation, considered the premier undergraduate award of its kind. He was one of three UD students selected on the basis of academic merit from a field of more than 1,100 mathematics, science and engineering students across the United States. Presently advised by James Hoffman, professor in the Department of Psychology, Charytonowics researches the cognitive mechanisms of visual attention — in other words — how our brain collects, sorts and processes visual information.

### Senior design team invents teaching aid: SimuTrach

Three BME undergrads, **BRAD BIGGS, DEVON BOND AND NICK CAMPAGNOLA**, along with two mechanical engineering undergrads were members of an interdisciplinary senior design team that developed SimuTrach, a device that provides realistic training for the care of tracheostomy patients. The project received the first-place award in First Step, a program designed to promote innovation and entrepreneurship among undergraduates, and where additional funding and mentoring will facilitate taking the project to the next level. SimuTrach has also been adopted into OEIP's Spin In program, which matches entrepreneurs developing innovative early-stage technology with a team of UD business students to further develop both the technology and the marketing strategy.

### Wikoff receives Honors Enrichment Award to volunteer in Peru

**PETER WIKOFF**, a BME sophomore, received an Honors Enrichment Award to fund his trip to Peru where he volunteered with MEDLIFE, an organization that works to improve access to medicine, education and community development initiatives by partnering with low-income communities in Latin America. He spent 10 days near Cuzco, Peru, shadowing local doctors and dentists and helping them set up and man medical clinics to treat people in remote rural regions. At UD, Wikoff's interests in biomedical engineering lie in technologies such as artificial joints and artificial organs and in the pathology of disease and its prevention.



#### **MARIA NICHOLSON**

"Biofeedback Modality: Is Audio or Visual a More Effective Method?" (Higginson)

#### **ELISABETH SOULAS**

"A Novel Technique to Determine the Viscoelastic Properties of the Achilles Tendon and Their Relation to Muscle Strength" (Buchanan)

#### **KALEB TESSEMA**

"The Effects of Curcumin Nanoparticles and Cancer Drugs on Inflammatory Breast Cancer" (Kumar)

#### **AVERY WHITE**

"Identification of Early Through Late-Stage Changes in Murine Articular Chondrocyte Biology Following Joint Destabilizing Surgery" (Price)

#### **RACHEL WHITE**

"The Impact of Substrate Rigidity and Cellular Age on Calcium Signaling in Meniscus Fibrochondrocytes" (Elliott)

# Graduate student honors



**LAMONT CANNON** received the University Graduate Scholars Fellowship. He studies HIV modeling in Ryan Zurakowski's lab.



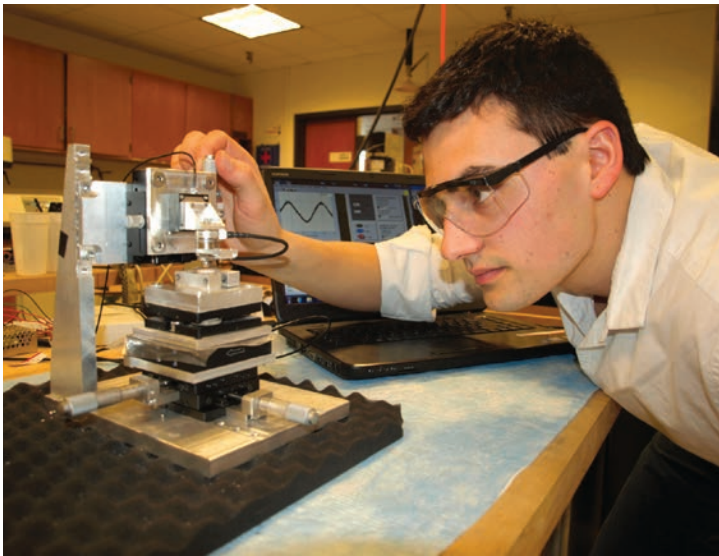
**HETTY NIE** was named a 2013 Gore Fellow and a 2013 IGERT Fellow. She researches single cell manipulation using engineered environments in John Slater's lab.



**MICHAEL DAVID** received the 2014 BME Graduate Teaching Assistance Award at the College of Engineering (COE) Recognition of Academic Honors & Achievements Ceremony.



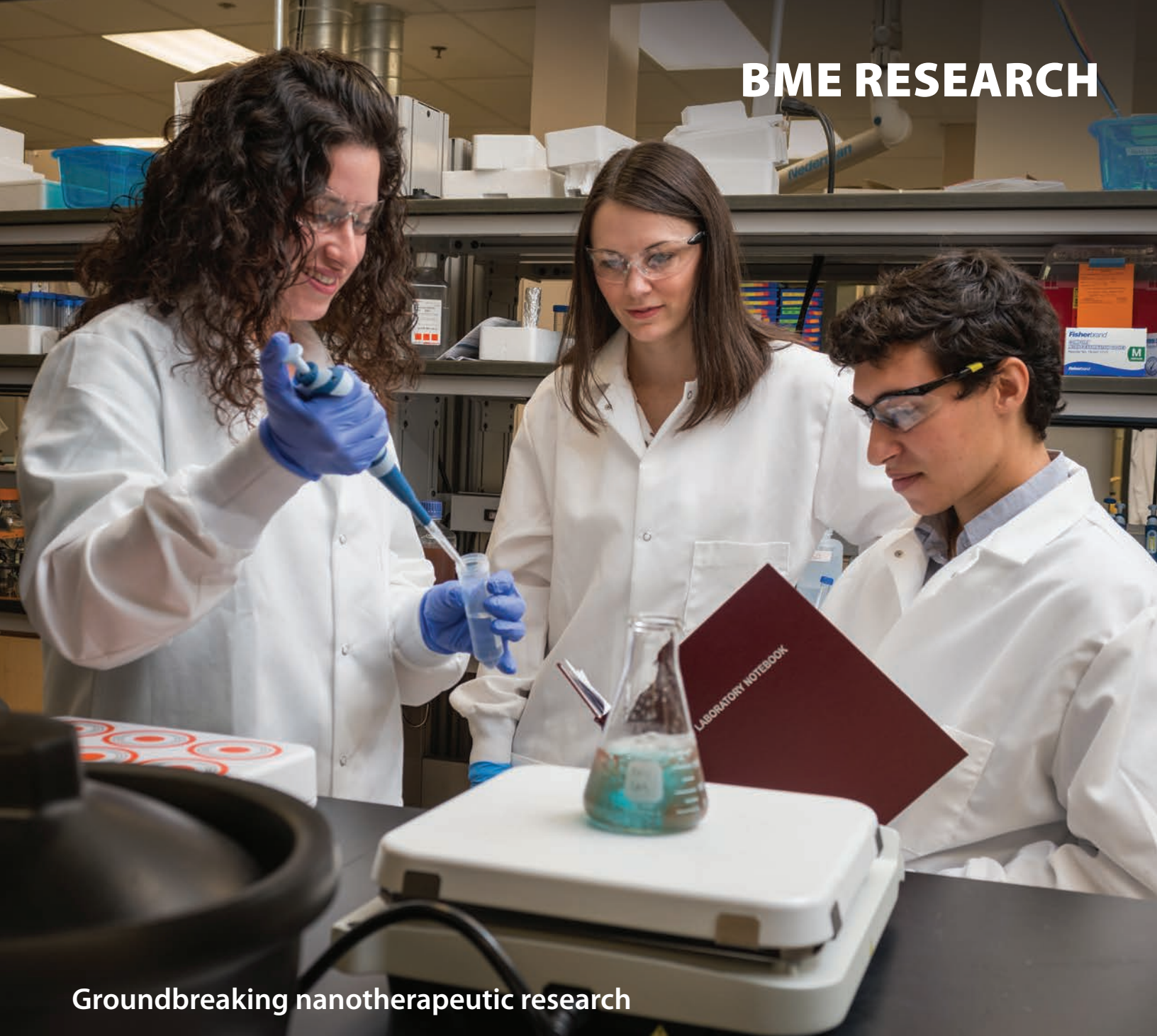
**ASHUTOSH KHANDHA** was recognized for his research on the forces in the knee after anterior cruciate ligament reconstruction surgery at the annual CBER biomechanics research symposium.



**AXEL MOORE** was one of four McNair Scholars awarded for his work on "A Simple Analytical Model for Cartilage Contacts" at the National McNair Scholars Research Competition and Graduate Fair hosted at UD. His research was also awarded at the annual Center for Biomechanical Engineering Research (CBER) biomechanics research symposium.



**JILIAN MELAMED** received the 2014 BME Graduate Teaching Assistance Award at the COE Recognition of Academic Honors & Achievements Ceremony.



## Groundbreaking nanotherapeutic research

**EMILY DAY** (pictured center) joined UD as an assistant professor of biomedical engineering in fall 2013. Her research focuses on engineering nanomaterials with unique physical and chemical properties. Through careful design of the nanoparticles' architecture and surface chemistry, Day studies the structure and function relationship between these nanomaterials and complex biological systems, and applies this knowledge to develop and implement advanced nanomaterials that solve key challenges in oncology.

During her post-doctoral work at Northwestern University, Day was part of a team that discovered that spherical nucleic acids (SNAs), tiny spherical gold nanoparticles densely coated with nucleic acids, have unique properties that allow them to pass through the blood-brain barrier and attack brain cancer. This discovery establishes SNAs as a promising new class of therapeutic gene regulation agents capable of treating disease through systemic injection. At UD, Day plans to continue exploring SNA behavior using

nanoparticle materials such as silica core gold shell nanoshells, which she believes may be useful in imaging, photo thermal therapy and triggered released treatments based on their ability to convert light energy into heat. Ultimately, Day aims to transition the technologies developed in her lab from concept to clinical application and to expand their use to diseases beyond cancer.



## Advancing osteoarthritis care

**CHRISTOPHER PRICE** joined UD's biomedical engineering program in fall 2013 as an assistant professor. He is the co-principal investigator on a Department of Defense grant to study the highly targeted delivery of bisphosphonates, a class of traditional osteoporosis drugs, to prevent osteoarthritis from developing after acute traumatic injury. The research team's preliminary work with animal studies revealed that the FDA-approved bisphosphonate zoledronic acid

(ZA) rescues post-traumatic osteoarthritis (PTOA), but adversely affects bone health. Price is studying if localized ZA injection can effectively prevent PTOA without hampering the bone's natural development — research that could significantly affect osteoarthritis treatment. Price has also received a National Institute of Arthritis and Musculoskeletal and Skin Diseases grant in collaboration with others to study the effects of articular cartilage damage in

osteoarthritis using spatiotemporal image correlation spectroscopy (STICS), a novel bioimaging technique. Changes in the fluid phase of cartilage are implicated in osteoarthritis so Price and his collaborators will use STICS to make direct real-time measurements of this phase. If successful, STICS will be the first bioimaging approach that provides direct real-time quantification of the fluid movement in cartilage and the changes of its solid matrix.

## Cell and tissue engineering

**JOHN SLATER** joined UD as an assistant professor of biomedical engineering in fall 2013. His lab focuses on implementing biomimetic materials for cell and tissue engineering applications. For cell engineering applications, Slater investigates how biophysical and biochemical cues coming from a cell's

microenvironment can be tuned to regulate a cell's fate. This approach is being used to produce more uniform cell populations of a chosen functional type in order to prime cells for cell-based therapeutic applications. For tissue engineering applications, Slater focuses on developing and implementing 3D

microfluidic systems that are embedded in synthetic tissue. His lab is developing techniques that use images of blood vessels in native tissue as templates for patterning the microfluidic systems using a laser. This technology is being used to fabricate micro-organs for drug screening applications.





## UDRF-funded Research

Three BME professors have received funding from the University of Delaware Research Foundation (UDRF), a private corporation chartered in 1955, that awards seed funding on a competitive basis to researchers early in their careers at UD. Each grant totals \$35,000, with UDRF contributing \$25,000 toward each grant, which is matched by \$5,000 from the Office of the Provost and \$5,000 from the researcher's college dean.

**EMILY DAY** will explore the potential of photothermally active spherical nucleic acids (SNAs) as a next-generation therapy for triple-negative breast cancer, an aggressive disease that grows quickly and metastasizes early.

**CHRISTOPHER PRICE** will apply optogenetic techniques, which use light to control cells engineered to express photoactivatable ion channels, in a novel study of bone cells (osteocytes).

**JOHN SLATER** will develop a methodology to fabricate highly vascularized microfluidic systems embedded in synthetic matrices to mimic the architecture and transport properties of native tissue. The synthetic model will be implemented for high throughput drug screening applications to lower the cost associated with new drug development.

# Grants



**COLE GALLOWAY**, professor in physical therapy, has received a three-year grant from the National Science Foundation to determine the connection in mobility-impaired children between mobile robot training and developmental changes in socialization.



**ANJA NOHE**, associate professor of biological sciences, has received a five-year grant from the National Institutes of Health to research a specific peptide that she has developed that appears promising for attacking osteoporosis on two fronts, by reducing the loss of bone that occurs with the disease and by simultaneously creating new bone.



**IOANNIS POULAKAKIS**, assistant professor of mechanical engineering, has received a prestigious Faculty Early Career Development Award from the National Science Foundation to develop planning strategies for animal-inspired robots.



**DAWN ELLIOTT**, professor and director of biomedical engineering, has received a grant from the National Institutes of Health to explore how tissue engineering research can provide new insights into the structure-function relationships of native tissue. Collaborators include Randy Duncan, professor in biological sciences, and Robert Mauck, associate professor in orthopedic surgery and bioengineering at the University of Pennsylvania.



**DAVID BURRIS**, associate professor of mechanical engineering, has received a grant from the National Science Foundation to perform a controlled study of interfacial friction from the atomic scale to the practical scale. The results will be used to develop a testable model of frictional scaling, a model that is needed to inform materials design and surface engineering efforts for friction control applications.



**STUART BINDER-MACLEOD**, associate vice provost for clinical and translational research at UD, will lead a new program called Delaware-CTR ACCEL that has received \$25 million to support the growth of clinical and translational research over the next five years. UD's partner institutions in this program are Christiana Care Health System, Nemours/A.I. duPont Hospital for Children (Nemours) and the Medical University of South Carolina.

## Faculty Accomplishments

**TERRY PAPOUTSAKIS**, Eugene du Pont Professor of Chemical and Biomolecular Engineering, has been selected to receive the Daniel I.C. Wang Award for excellence in biochemical engineering from the American Institute of Chemical Engineers Society for Biological Engineering. He also was recognized at the 2013 DBI Research Symposium.

**DAWN ELLIOTT**, biomedical engineering program director, has been elected treasurer of the Council of Chairs of Bioengineering and Biomedical Engineering, an organization devoted to promoting excellence in undergraduate bioengineering and biomedical engineering programs across the country. Elliott also was elected to the executive committee of the International Society for the Study of Lumbar Spine, a professional society that brings together individuals conducting research and clinical studies focused on the lumbar spine.

**THOMAS H. EPPS, III**, the Thomas and Kipp Gutshall Professor of Chemical and Biomolecular Engineering, was named a 2014 Young Investigator by Sigma Xi, an honor society of research scientists and engineers. He was selected for "excellence in research in the fields of physical sciences and engineering, including mathematics or life and social sciences."



**TERRY PAPOUTSAKIS**



**THOMAS H. EPPS, III**



**DAWN ELLIOTT**



**MILLICENT SULLIVAN**

**MILLICENT SULLIVAN**, associate professor of chemical and biomolecular engineering, and **THOMAS EPPS** published a Nature Communication paper demonstrating that routine procedures in handling and processing nanocarrier solutions can have a significant influence on the size and shape of nanocarriers used for targeted drug delivery and thus can change their targeting abilities.

**STEVEN STANHOPE**, associate vice provost for research, has been appointed principal investigator and Cathy Wu, the Edward G. Jefferson Chair of Bioinformatics and Computational Biology, has been named program coordinator of the Delaware IDeA Network of Biomedical Research Excellence (INBRE). This statewide program is building Delaware's biomedical research capability by developing research in the areas of cancer, cardiovascular health and the neurosciences, providing key research resources and enhancing the biomedical science and technology knowledge of the state's workforce.





**STEVEN STANOPE**



**JOHN RABOLT**



**ABRAHAM LENHOFF**



**RYAN ZURAKOWSKI**



**LUCAS LU**



**BABATUNDE A. OGUNNAIKE**

**RYAN ZURAKOWSKI** co-authored a paper in *Nature Medicine* that provides evidence for a particular T-cell type that may help researchers better understand why HIV can persist despite treatment. Over time this cell type plays an increasingly significant role in sustaining HIV infection in patients that have remained on therapy.

**JOHN RABOLT**, the Karl W. and Renate Boër Professor of Materials Science and Engineering, was elected to the National Academy of Inventors for groundbreaking infrared technology developed in his laboratory called planar array infrared (PA-IR) spectroscopy.

**LUCAS LU**, assistant professor of mechanical engineering, received the Rising Star Award from the Biomedical Engineering Society for his lecture on a new drug for the prevention of osteoarthritis after joint injuries at the 2014 BMES Cellular and Molecular Bioengineering Conference.

**ABRAHAM LENHOFF**, Allan P. Colburn Professor of Chemical and Biomolecular Engineering, received the 2014 Francis Alison Faculty Award, the University's highest competitive faculty honor, in recognition of his scholarship, teaching and mentoring contributions throughout his career at UD.

**BABATUNDE A. OGUNNAIKE**, dean of engineering, was named a 2014 MAC Eminent Chemical Engineer by The American Institute of Chemical Engineers. The award recognizes outstanding chemical engineers for their role in fostering a diverse pool of talent in engineering and related disciplines.



## Advisory Council Members

**BRUCE C. ROBERTSON**, PhD ChE89 (Chair)  
UD Research Foundation board member;  
Managing director, H.I.G. Bioventures

**MICHAEL J. AXE, MD**  
Adjunct professor, Physical Therapy,  
University of Delaware; Board-certified  
orthopaedic surgeon; and partner, First  
State Orthopaedics

**JOHN V. FLYNN, JR.**, PhD ChE64  
Retired CEO, Healthcare Resource  
Solutions

**JOHN T. (JACK) KRAMER**, ChE82  
UD Research Foundation board member;  
Global technology leader, W.L. Gore and  
Associates

**MICHELE S. MARCOLONGO**, PhD ME86  
Senior associate vice provost for  
translational research, Drexel University

**LINDA J. MYRICK**, ChE77  
Biomarkets program director, Air Liquide

**HELEN STIMSON**  
Alfred Learner College of Business and  
Economics Advisory Council; UD past  
parent; vice president & general manager,  
consumables & supplies division, CAG,  
Agilent Technologies, Inc.

## Setting direction

The Biomedical Engineering External Advisory Council, which includes distinguished alumni and friends representing a cross-section of biomedical engineering talents, held its annual meeting in November 2013.

During their full-day gathering, the council met with the provost, the College of Engineering dean, the executive committee, the other engineering chairs and more than 20 biomedical engineering joint and affiliated faculty to hear about program activities. They also toured the department's new lab space in the Delaware Technology Park and met with undergraduate and graduate students to gather their perspective and hear about their experiences within the program.

The council's main priorities are to advise on the program's future direction, priorities and growth strategies and to help identify opportunities to promote the program among biomedical industries and engineering alumni.



**YOU CAN MAKE A SIGNIFICANT IMPACT BY SUPPORTING BIOMEDICAL ENGINEERING.**  
For information on how you can help advance the biomedical engineering program, please contact **BARBARA MAYLATH**, director of development, at (302) 831-7273 or [bmaylath@udel.edu](mailto:bmaylath@udel.edu).

# Biomedical Engineering Faculty

**BIODEVICES, BIOCOMPUTING AND BIOIMAGING** include biomedical instrumentation and sensors, applications of nanotechnology to biomedicine, human-computer interaction systems, modeling and analysis of biomedical data, biomedical text mining, biomedical signal and image processing and medical imaging modalities (including CT, MRI and ultrasound).

**BIOMECHANICS** applies experimental and computational approaches to explore biomechanical function across multiple scales, including the molecule, cell, tissue, organ and whole body.

**BIOMOLECULAR ENGINEERING, CELLULAR ENGINEERING AND SYSTEMS BIOLOGY** study, model and modify biomolecules, cells and the regulatory networks that control genetic, biochemical, cellular and physiological functions.

**NEUROENGINEERING AND REHABILITATION ENGINEERING** explore the neural control of posture and movement, brain-machine and other neural interfaces, biomimetics, motor learning and robotic training for rehabilitation, decision-making and artificial intelligence and neuromuscular system modeling.

**TISSUE ENGINEERING, BIOMATERIALS AND DRUG DELIVERY** examine the application of biologically inspired and biologically produced materials for the delivery of therapeutic molecules, the understanding of cell biology and mechanotransduction, the repair of damaged tissues and the creation of functional substitutes.

*BIOL=Biological; BME=Biomedical Engineering; CBE=Chemical & Biomolecular Engineering; CIS=Computer & Information Sciences; ECE=Electrical & Computer Engineering; KAAP=Kinesiology & Applied Physiology; ME=Mechanical Engineering; MLS=Medical Laboratory Sciences; MSE=Materials Science & Engineering; NEM=Nemours/Al DuPont; PT=Physical Therapy*

		Biodevices, Biocomputing and Bioimaging	Biomechanics	Biomolecular Engineering, Cellular Engineering & Systems Biology	Neuro-Engineering & Rehabilitation Engineering	Tissue Engineering, Biomaterials & Drug Delivery
<b>PRIMARY/VOTING FACULTY</b>						
Buchanan, Thomas	ME	•	•		•	
Day, Emily	BME			•		•
Elliott, Dawn	BME	•	•			
Gleghorn, Jason	BME	•	•	•		•
Higginson, Jill	ME	•	•		•	
Jia, Xinqiao	MSE		•			•
Mirotznik, Mark	ECE	•				
Price, Christopher	BME		•			
Singh, Abhyudai	ECE	•		•		
Singh, Anita	BME					
Slater, John	BME		•	•		•
Stephens, Jeannie	BME					
Ryan Zurakowski	BME			•		
<b>JOINT/AFFILIATED/SECONDARY FACULTY</b>						
Akins, Robert	NEM					•
Arce, Gonzalo	ECE	•				
Attoh-Okine, Nii	CIV	•				
Barner, Kenneth	ECE	•			•	
Beris, Antony	CBE	•				
Binder-MacLeod, Stuart	PT				•	
Braun, Richard	MATH		•	•		
Buckley, Jennifer	ME		•			
Burris, David	ME		•			•
Chen, Wilfred	CBE			•		
Colby, David	CBE			•		
Cortes, Daniel	BME	•	•			
Driscoll, Tobin	MATH	•				
Duncan, Randall	BIOL			•		•
Epps, Thomas	CBE					•
Fok, Pak-Wing	MATH	•		•		
Forbes, Chad	PSYCH	•		•	•	
Galloway, Cole	PT	•	•		•	
Kambhamettu, Chandra	CIS	•				
Kiick, Kristi	MSE			•		•
Kirn-Safran, Catherine	BIOL			•		•
Kloxin, April	CBE					•
Kloxin, Chris	MSE				•	•
Kumar, Arun	MLS			•		•
Lee, Kelvin	CBE			•		
Lee, Samuel	PT				•	
Lenhoff, Abraham	CBE		•	•		
Lu, Xin (Lucas)	ME		•	•		•
Manal, Kurt	ME		•		•	
Martin, David	MSE	•			•	•
McCulloch, Michael	NEM		•			
Nohe, Anja	BIOL	•		•		
Ogunnaike, Babatunde	CBE			•		
Ou, Yvonne	MATH		•			•
Papoutsakis, Eleftherios	CBE			•		•
Pochan, Darrin	MSE					•
Poulakakis, Ioannis	ME		•		•	
Pradhan-Bhatt, Swati	BIOL			•		•
Rabolt, John	MSE					•
Reisman, Darcy	PT				•	
Sabanayagam, Chandran	DBI		•			
Santare, Michael	ME		•			
Schleiniger, Gilberto	MATH		•	•	•	
Shatkay, Hagit	CIS	•				
Silbernagel, Karin	PT	•	•			
Snyder-Mackler, Lynn	PT		•			
Stanhope, Steven	KAP		•		•	
Sullivan, Millicent	CBE			•		•
Taufer, Michela	CIS	•				
Wang, Liyun	ME	•	•	•		•
Wu, Cathy	CIS			•		



## College of Engineering

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