

CrossLink

BIOMEDICAL ENGINEERING at the UNIVERSITY of FLORIDA // **FALL 2019**

UF



BREAKING BARRIERS

Defining Leadership and Fostering Change

Transforming ENGINEERING EDUCATION TO BETTER RECRUIT, EDUCATE AND EMPOWER

INTRODUCING THE NEW DEPARTMENT OF ENGINEERING EDUCATION

The field of Engineering is unique due to its wide breadth of subject areas that incorporate an extensive study of fundamentals as well as a vast body of experiential learning.

Here at the University of Florida's Herbert Wertheim College of Engineering, we are proud to fully establish the **Department of Engineering Education** starting fall 2019.

Faculty in the department will teach general engineering courses, including a first-year design class, courses for a graduate certificate in Engineering Education, and conduct fundamental and applied research in Engineering Education.



WHAT WE TEACH

**Preparing all UF
students for success
in the 21st century**

We aim to create the digitally literate workforce necessary for society's future.



HOW WE TEACH

**Improving the student
experience**

We are using our own campus, community and state to serve as real-time living laboratories for the development of new technologies. This includes the development of the iClassroom, a 21st century educational sandbox.



WHO WE TEACH

**Responding to the
changing needs of
society**

We are working to meet the demand for engineers by recruiting from a wider array of demographics and ages, providing them with skills and information as their careers require them



LETTER FROM THE CHAIR

Dear UF BME Friends & Family,

Welcome to the 6th issue of CrossLink, the annual magazine of the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida.

In this issue, we want to celebrate the innovative work being conducted by our women faculty and students and to highlight the importance of a diverse community.

At a time when the opportunity could not be greater, women are vastly underrepresented in the workforce, particularly engineering careers. Our mission is to create an environment welcoming to all.

The department's goal is to continue to increase the recruitment, retention and graduation of students from underrepresented minority groups, and provide support for their inclusion and success in the academic environment.

Changing culture is hard and without support from the top, almost impossible. Read about Dean Cammy Abernathy's vision on page **8**.

Strategic hiring initiatives have enhanced the learning environment for students. Since 2013, we have recruited eight female faculty, increased women and underrepresented minorities in our students and hired 12 female personnel. In 2018 the department created the diversity and inclusion committee to continue to strengthen these engagements. You can read more about the fantastic leadership activities on pages **16 & 17**.

Although there is still much to accomplish and our journey is ongoing, I would like to share with you some best practices based on our experience thus far.

DIVERSITY BEST PRACTICES

1. Make diversity and inclusion a regular part of the conversation - leaders should emphasize the need for respect of all team members and the role everyone plays
2. Highlight the importance of a diverse team and support with data
3. When practical, put women and underrepresented minorities in positions that have an impact - empower and support them
4. Create a diversity officer and diversity organization - provide them with a meaningful budget
5. Encourage and stress the need for balance and attention to mental and physical health
6. Recruit with the intent of recruiting a partner and family
7. Give people "permission" to struggle and to seek help - remind them that this is normal
8. Organize events focused on professional development, diversity and mental health
9. Restrict meetings and seminars to regular working hours to allow for family needs



We hope this issue contributes to the discussion of the challenges we face to achieve equity in the workplace. At UF BME we honor our values by ensuring a diverse and inclusive department.

Sincerely,

CSchmidt

Christine E. Schmidt
Professor, J. Crayton Pruitt Family Chair
and Department Chair

CrossLink

A publication of the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida

**DEAN, HERBERT WERTHEIM
COLLEGE OF ENGINEERING**
Cammy Abernathy

DEPARTMENT CHAIR
Christine E. Schmidt

EDITORS
Candi Crimmins
Sommer Green

EDITORIAL CONTRIBUTORS
Laura E. Mize
Olivia Lanier

**CONTRIBUTING
PHOTOGRAPHERS**
Jim Jernigan's Studio
Adler Garfield

**COVER ILLUSTRATION
& DESIGN**
Liquid Creative

UF UNIVERSITY of FLORIDA

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NEWS + NOTABLES



Dr. Aysegul Gunduz received Presidential Early Career Award for Scientists and Engineers (PECASE)



The PECASE, established in 1996, is the highest honor bestowed by the U.S. government to outstanding scientists and engineers who are at the beginning of their independent research careers and are showing exceptional promise for leadership in science and technology.

The National Science Foundation (NSF) nominated Gunduz to receive the PECASE for her work on developing smarter therapeutic deep brain stimulation that can adapt to the current pathological state of the brain in humans with neuropsychiatric disorders.



Dr. Blanka Sharma received National Science Foundation (NSF) CAREER Award

For her research advancing the exploration of biomaterials to understand and direct immune cell responses in tumors.

Dr. Christine E. Schmidt

- Elected Fellow, International Academy of Medical and Biological Engineering (IAMBE)
- Elected Fellow, National Academy of Inventors (NAI)
- Received Clemson Award for Applied Research



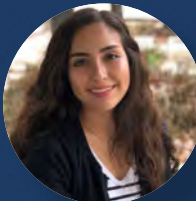
Five UF BME students named NSF Graduate Research Fellows



L. Savannah Dewberry
Ph.D. Student
Dr. Kevin Otto's Lab



Michelle Dill
Ph.D. Student
Dr. Christopher Batch's Lab



Natalia Fabela
Ph.D. Student
Drs. Benjamin Keselowsky & Gregory Hudalla's Lab



Jacob Griffith
Ph.D. Student
Incoming Student



Kalyn Kearney
Ph.D. Student
Dr. Jennifer Nichols' Lab

Major Faculty Awards + Recognitions

- **Dr. Mingzhou Ding** appointed Specialty Chief Editor, Brain Imaging and Stimulation, Frontiers in Human Neuroscience and received UF Herbert Wertheim College of Engineering Doctoral Dissertation Advisor Award
- **Drs. Ruogu Fang, Daniel Ferris** and **Parisa Rashidi** elevated to Senior Members of the IEEE
- **Dr. Ruogu Fang** received NSF Information Integration and Informatics (III) Core Award, collaborative UF CTSI Pilot Award for Precision Medicine, and a collaborative UFII-SEED Award
- **Dr. Aysegul Gunduz** promoted to associate professor with tenure, **Dr. Kevin Otto** promoted to professor and **Dr. Cherie Stabler** promoted to professor (Fall 2018), **Dr. Gregory Hudalla** promoted to associate professor with tenure (Fall 2019)
- **Dr. Aysegul Gunduz** received the UF Research Foundation Professorship, Graduate Education Diversity Champion Award from UF Office of Graduate Diversity Initiatives and invited to serve on the Emerging Imaging Technologies for Neuroscience (EITN) Study Section
- **Dr. Gregory Hudalla** received Early Career Award from University of Wisconsin-Madison Engineering
- **Drs. Benjamin Keselowsky** and **Gregory Hudalla** (Anchor Biologics) won 1st place Cade Prize from Cade Museum for Creativity & Invention
- **Dr. Walter Lee Murfee** elected president of the Microcirculatory Society
- **Dr. Jennifer Nichols** received UF CTSI's KL2 Multidisciplinary Scholars Program Award, accepted to the Training in Grantsmanship for Rehabilitation Research (TIGRR) Workshop and participated as a mentee in the United States Bone and Joint Initiative/Bone and Joint Canada Young Investigator Initiative (YII) Grant Mentoring and Career Development Program
- **Drs. Kevin Otto, Cherie Stabler** and **Blanka Sharma** received UF Term Professorships
- **Dr. Parisa Rashidi** awarded National Institute of Biomedical Imaging and Bioengineering (NIBIB) Trailblazer R21 Award and UF Excellence Award for Assistant Professors
- **Dr. Cherie Stabler** elected to the Society of Biomaterials Member at-Large and received UF Herbert Wertheim College of Engineering Teacher/Scholar of the Year
- **Dr. Hans van Oostrom** named inaugural chair, Department of Engineering Education at UF

Key Research Advances + Innovation

- **Dr. Wesley Bolch** awarded \$3.2M collaborative NIH NIBIB grant, "MIRDcalc: A Community Tool for Deriving and Reporting Patient Organ Doses in Nuclear Medicine, Computed Tomography and Hybrid Imaging"
- **Dr. Daniel Ferris** awarded \$800K NSF grant, "NCS-FO: Electrocortical Processes in Real World Locomotion"
- **Dr. Daniel Ferris** is Co-Investigator on \$5.4M award from the NIH National Institute of Aging, "Multimodal Imaging of Brain Activity to Investigate Walking and Mobility Decline in Older Adults"
- **Dr. Gregory Hudalla** awarded \$1.8M NIH grant, "Glycosylation as a Structural Determinant in Peptide Fibrillation"
- **Dr. Kevin Otto** is Co-Investigator on \$5M NIH award from the National Institute of Allergy and Infectious Diseases, "A 3D Tissue Map of the Human Lymphatic System"
- **Dr. Cherie Stabler** awarded \$5.1M NIH grant, "Engineering a Human Microphysiological System for the Characterization of Islet-Immune Interactions"
- **Dr. Cherie Stabler** awarded \$1M JDRF grant, "Engineered Bioactive Hydrogel Macrodevices for Islet Transplantation"

Select Student Awards

- **Alexis Brake, Jonathan Charles, Fiona Cheung, Maximillian Diaz, Leyda Marrero, Tran Ngo, Yan Carlos Pacheco, Guo Qian, Alexia Poulos** and **Julia Withrow** selected as University Scholars
- **Stephanie Cernera** received NINDS T32 Fellowship in Movement Disorders & Neurorestoration and awarded De Luca Foundation Research Scholarship
- **Tamara Ordenez Diaz** selected for the 2019 NextProf Pathfinder Workshop
- **Shaheen Farhadi** received STAR Award from the Society for Biomaterials
- **Margaret Fettis, Angela Jimenez, Olivia Liseth, Rani Mahmoudi**, and **Enrico Opri** received College Attributes of a Gator Engineer Awards
- **Zhenhong Hu** received UF Outstanding International Student Award
- **Olivia Lanier** awarded UF Association for Academic Women NSF Emerging STEM Scholar Award
- **Sarah Long** and **Kyle See** awarded NIH CTSI TL1 Predoctoral Fellowships
- **Marco Melgar** and **Max Rozenblum** won presentation awards at the Annual Biomedical Research Conference for Minority Students
- **Yasniary Morales** received Association of Cuban-American Engineers Scholarship

Distinguished Leadership Seminar Series

2018-2019 SPEAKERS



JOSEPH M. DESIMONE, PH.D.
CEO & Co-Founder, Carbon Inc, Chancellor's Eminent Professor of Chemistry, University of North Carolina at Chapel Hill, William R. Kenan, Jr., Distinguished Professor, Chemical and Biomolecular Engineering, North Carolina State University
Digital Light Synthesis for Large-Scale Additive Manufacturing: Convergence of Software, Hardware and Molecular Science



SUSAN S. MARGULIES, PH.D.
Wallace H. Coulter Chair, Georgia Research Alliance Eminent Scholar in Injury Biomechanics, Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology and Emory University
Pediatric Concussion Biomechanics: What We Need To Know



MARJOLEIN C.H. VAN DER MEULEN, PH.D.
James M. and Marsha McCormick Director and Swanson Professor, Nancy E. and Peter C. Meinig School of Biomedical Engineering, Cornell University
Mechanobiology of Musculoskeletal Tissue



LEONARD PINCHUK, PH.D.
Founder and Chief Scientific Officer, InnFocus, Inc., a Santen Company, Distinguished Research Professor, Biomedical Engineering, University of Miami, President and CEO, Innovia, LLC
The Key Biomaterials that Led to Interventional Cardiology and Interventional Glaucoma



THOMAS C. SKALAK, PH.D.
Senior Advisor, Clara Wu and Joe Tsai Foundation, Vice President for Research Emeritus, University of Virginia
Biomedical Engineering for Life in a Rapidly Changing World

2019-2020 SPEAKER



JENNIFER H. ELISSEEFF, PH.D.
Morton Goldberg Professor, Wilmer Eye Institute and Biomedical Engineering, Departments of Materials Science and Engineering, Chemical and Biological Engineering, Director, Translational Tissue Engineering Center, Johns Hopkins University

U.S. News & World Report's 2020 Rankings

UF
#7
National
Public
Universities

UF BME
#15
Graduate
Program Among
Public Universities

UF BME
#16
Undergraduate
Program Among
Public Universities

BREAKING BARRIERS

Defining Leadership and Fostering Change

By Laura E. Mize

When Dean Cammy Abernathy, Ph.D., hired Christine Schmidt, Ph.D., to lead the J. Crayton Pruitt Family Department of Biomedical Engineering in 2013, the new chair became the department's third female faculty member at the time. There were 14 men.

Abernathy's selection was strategic. Schmidt's research expertise in tissue engineering and her role in helping to establish biomedical engineering at the University of Texas, Austin made her an ideal candidate for developing the department. And as a woman, she fit well into the dean's plan to diversify the college, from the top down.

Abernathy is especially fond of hiring or promoting highly qualified female and underrepresented minority candidates into key leadership positions, and asking them to make diversity a priority.

"Nothing happens in a college unless the department chairs make it happen," she said. Abernathy also emphasizes the importance of accountability in diverse hiring, of developing a college "climate" that's welcoming to women and helps them succeed, and of including diversity metrics in rankings such as those published by U.S. News & World Report.

Employing these and other methods has indeed increased the number of female faculty members within UF's Herbert Wertheim College of Engineering. In 2018, women made up 22 percent of the faculty, up from 10 percent when Abernathy became dean in 2009. Currently, 30 percent of faculty hired each year are women. Before Abernathy, that number was lower than 10 percent.

But, there's more work ahead. Her ambitions for greater inclusion of women in the faculty keep her working, still. Abernathy's goal for the proportion of female faculty in the college is simple: She wants it to be 50-50.

Enticing Women to Stay

While Abernathy has been working at the college level, Schmidt has been busy creating an atmosphere meant to support all the faculty in the J. Crayton Pruitt Family Department of Biomedical Engineering — with the belief that it will be especially helpful for women.

She recognizes that having more women faculty requires a greater effort than just hiring women. The department's representation of women among its faculty has improved to 10

in 25. Schmidt aims to make sure the women she has hired want to stay. Taking a "holistic view of our faculty," one that encourages health and happiness in all areas of each employee's life — not just in professional life — is critical, said Schmidt, who also serves as current president of the American Institute for Medical and Biological Engineering.

"Our faculty are people with families, and if they're successful in their home lives and their personal lives, they're going to be much more successful at work," she noted. Family-friendly practices are helpful for men, too, but "definitely much more imperative for my female faculty," Schmidt said.

Such practices include mostly restricting meetings to normal working hours in deference to childcare responsibilities, encouraging regular vacations and hosting workshops on work-life balance. In one-on-one meetings with faculty, discussions may turn to schedule or childcare difficulties. "Some of the time we're just talking about things like nannies and daycares," Schmidt said, noting that she is open about her own experiences juggling work and home life.



Dr. Aysegul Gunduz



Dr. Cammy Abernathy



Dr. Christine Schmidt



Dr. Cherie Stabler

To further develop the growing climate of diversity and inclusion, Schmidt has established the new position of diversity officer within the department. Aysegul Gunduz, Ph.D., an associate professor, has taken on the role.

Gunduz also is a past president of the Association of Academic Women at UF, and is involved with the department's Diversity and Inclusion Initiative. She believes that biomedical engineering, as one of the youngest engineering fields, has an opportunity that other fields with an already-established "glass ceiling" don't.

"This is a great chance for us to allow everyone to grow without any preconceived ideas about what a biomedical engineer should look like," she noted. "So, we need female representation to attract others. The downside to being a young field is that the general public might not know what a biomedical engineer does. Hence, it is our responsibility to educate the public, so that young women can form a more accurate picture of biomedical engineers in their minds."

Personalized Student Recruiting

Attracting and retaining female graduate students takes work, too. Professor Cherie Stabler, Ph.D., recently ended her four-year term as the department's associate chair for graduate education. In that role, she promoted what she calls "personalized recruiting."

Often, prospective students, "especially women and underrepresented minorities, feel as if they don't belong,

or they feel as if they're not good enough to go to graduate school," Stabler said. "And sometimes all it takes is just that personalized encouragement: 'Yes, you do belong and this is the place for you.'"

Acknowledging the program's demanding nature is also important in helping students — especially women and minorities — feel connected and confident. Stabler cited studies showing that when a lecture "doesn't make any sense, if you are an underrepresented minority or a woman, you tend to think, 'I'm the only person in the room who doesn't understand this,'" she said.

That perspective discourages students from asking questions.

"You kind of isolate yourself because you feel like you're the only one who doesn't get it," she explained. "Whereas the majorities in the room ... tend to think, 'If I don't get it, nobody else does.' And that means they build better peer networks."

These dynamics, Stabler said, make it important for faculty to relay to students that, yes, the program is tough, and it is OK if they don't always understand the material. Personally addressing obstacles specific to women is helpful, too. Stabler uses student exit interviews to discuss workplace issues, including the importance of women "realizing their power," and negotiating for favorable positions and salaries.

Female Engineering Students

THEN AND NOW

Then: The first woman to receive an engineering degree earned hers in **1876**, according to the Society of Women Engineers (SWE). From then until **1900**, most years saw **one or no degrees** awarded to women. Some women completed all the requisite coursework, but were **denied degrees because of their gender**. It wasn't until **1972** that women received even **1 percent** of total undergraduate degrees in engineering.

Now: Today, female students are a growing presence in engineering colleges. Of all engineering degrees earned in 2017, **21.3 percent** at the bachelor's level, **25.7 percent** at the master's level and **23.5 percent** at the doctoral level went to women, according to data from the American Society of Engineering Education. In total, the percentage of engineering degrees awarded to women was higher in 2017 than it had been since 2008.



The proportion of women graduates varies greatly by discipline. In 2017, **half of all bachelor's degrees in environmental engineering** went to women. **Biomedical engineering** was second, with **44 percent** of bachelor's degrees going to women.

Still, there are **more women in professions such as accounting, medicine and law** than in engineering, according to SWE.

Department faculty take this approach beyond UF, as well. Lakiesha Williams, Ph.D., an associate professor, is a mentor with ACADEME. The workshop, which operates at a different campus each summer, coaches engineering postdocs and doctoral students who are women or members of other underrepresented groups, to help them jumpstart and succeed in academic careers.

Opening Doors For Everyone

The biomedical engineering department has not overlooked undergraduate students, or even younger learners. Sarah Rowlinson, Ph.D., a lecturer and the department's undergraduate coordinator, leads the charge with these populations by organizing a variety of opportunities for females and underrepresented minorities (including opportunities for grade-school students) to engage with and progress further in engineering education and professional development. For kids, she hosts interactive laboratory activities that provide first-hand experience with the science of engineering. So far, hundreds have participated.

Rowlinson also advises several student organizations, in which she encourages female and underrepresented minority students to take leadership positions. Having these students in leadership roles, she says, provides them a greater sense of belonging and "creates a new cycle of underrepresented groups in role model positions to inspire younger students, further aiding in recruiting these populations."

It also opens the door for the students in leadership roles to have more and better opportunities in the future. Such opportunities may include internships, for which Rowlinson seeks to prepare students by leading workshops.

The Importance of Allies

The department is making great strides. And, importantly, its progress in attracting and keeping women faculty members and students is not due solely to the efforts of women. Cultural change takes root most firmly when everyone invests.

In testament to this, Williams recalled two white, male mentors instrumental in her own education, and their advocacy for her in less-than-comfortable environments. She also praised the department's male faculty members for their support, saying it overshadows what she's seen elsewhere.

"The culture is outstanding here," Williams said. "Our male faculty are our allies. They sympathize. They understand. No questions asked about things, and they're allies for our students as well — just as much as we are."

Meet the Women Transforming UF BME



Dr. Ruogu Fang

- National Science Foundation (NSF) Information Integration and Informatics (III) Core Award, 2019
- Senior Member, Institute of Electrical and Electronics Engineers, 2019
- Association for Computing Machinery's Inaugural Future Computing Academy, 2017



Dr. Christine Schmidt

- Fellow, International Academy of Medical and Biological Engineering (IAMBE), 2019
- Society for Biomaterials, Clemson Award for Applied Research, 2019
- Fellow, National Academy of Inventors (NAI), 2018



Dr. Aysegul Gunduz

- Presidential Early Career Award for Scientists and Engineers (PECASE), 2019
- Denise Denton Emerging Leader ABIE Award, 2017
- National Science Foundation (NSF) CAREER Award, 2016



Dr. Blanka Sharma

- National Science Foundation (NSF) CAREER Award, 2019
- UF Clinical and Translational Science Institute Junior Faculty Award, 2017
- "20 under 40" Outstanding Young Faculty, American Society for Engineering Education, 2014



Dr. Jennifer Nichols

- UF Clinical and Translational Science Institute KL2 Award, 2019
- Outstanding Researcher Award, NIH-funded National Center for Simulation in Rehabilitation Research (NCSRR), 2019
- Young Scientist Post-Doctoral Award from the American Society of Biomechanics, 2018



Dr. Cherie Stabler

- Society for Biomaterials, Member-at-Large, 2019
- UF Herbert Wertheim College of Engineering Teacher/Scholar Award, 2019
- Fellow, American Institute for Medical and Biological Engineering (AIMBE), 2018



Dr. Parisa Rashidi

- Excellence Award for Assistant Professors, University of Florida, 2019
- National Institute of Health (NIH), Trailblazer Award, 2019
- National Science Foundation (NSF) CAREER Award, 2018



Dr. Lakiesha Williams

- National Role Model Faculty Researcher Award, Minority Access Inc., 2017
- Mississippi Business Journal Top in Technology, 2017
- Mississippi State Institutions of Higher Learning-Diversity Educator of the Year Nominee, 2015

Transforming Engineering Education



Dr. May Mansy



Dr. Sarah Rowlinson

Girls with Nerve

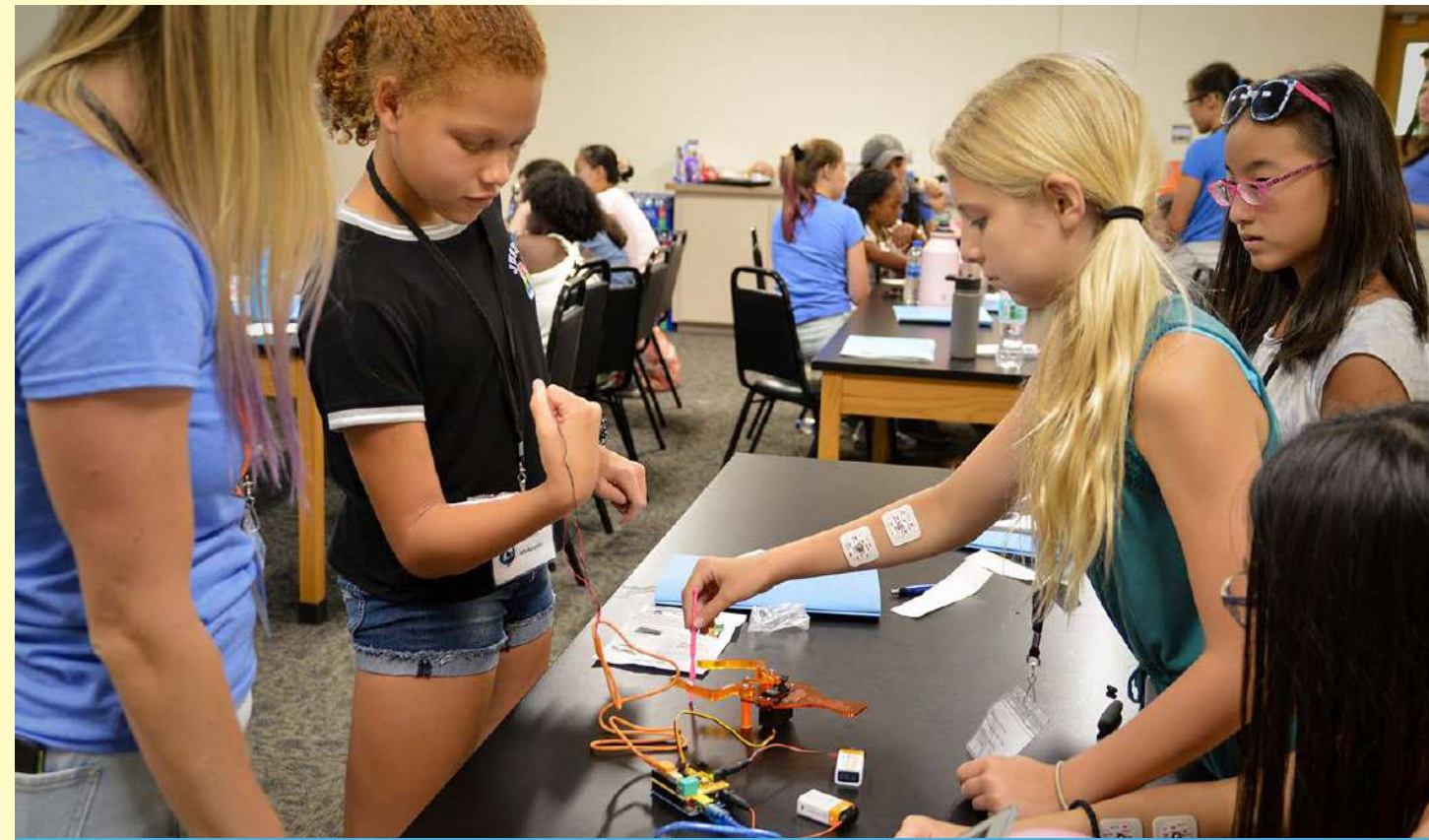
Middle School Summer Camp Empowers the Pursuit of Neuroscience



This summer, University of Florida researchers Daniel Ferris, Ph.D., and Rachael Seidler, Ph.D., teamed up to bring more than 20 middle school students to campus for a free, week-long summer camp aimed at empowering girls to explore neuroscience.

Held in July, the camp brought sixth, seventh and eighth graders together for hands-on activities, field trips to multiple neuroscience labs and to hear from leading women researchers at UF.

Kristine Snyder, Helen Huang, and Julia Kline, three member of Ferris' laboratory, started the camp at the University of Michigan in 2013 with the goal of providing girls the chance to see themselves at a university and hear from potential role models. The camp has since expanded to additional universities. This was the first time the camp was hosted at UF. Funding for the camp came from a grant to Ferris and Seidler from the National Science Foundation (NSF). Amanda Studnicki and Theresa Hauge, two UF doctoral students led the camp this summer.



We wanted to break the model of what TV and movies show as your typical scientist – boring and old,” Seidler said. “The camp allows girls to see scientists in another way.



“We wanted to break the model of what TV and movies show as your typical scientist – boring and old,” said Seidler, professor in the Department of Applied Physiology and Kinesiology. “The camp allows girls to see scientists in another way.”

The curriculum ranged from the basics of muscle and brain physiology, learning about action potentials from the leg of a cockroach, and talking about historical women who made significant scientific and technological advances.

Jennifer Nichols, Ph.D., assistant professor, J. Crayton Pruitt Family Department of Biomedical Engineering, led biomechanics activities with the girls using a model of yarn, paper, and straws to mimic how tendons function in the in hand. Aysegul Gunduz, Ph.D., associate professor, J. Crayton Pruitt Family Department of Biomedical Engineering, spoke with the girls about her experience as a woman in STEM and advice she would give her past middle-school self – she talked about the importance of trying new things, regardless of the chance of failure.

While girls are taught to be “perfect,” and boys are taught to be “brave,” it is important for more girls to be brave, Gunduz said.

The program also gives campers the chance to get to know the campus, travel from one lab to another and experience college.

On the last day, there was an activity called “If I were a neuroscientist” where the girls wrote down what kind of real-world problems they hope to solve in the future. Theresa Hauge, doctoral student in the Department of Applied Physiology and Kinesiology, who helped co-organize the event said, “It was so rewarding watching these girls start the week asking questions about basic brain anatomy and ending it asking questions about their own research ideas in neuroscience. There were campers interested in neuropathologies, prostheses, and neuroimaging to create real-world solutions to the problems around them.”

Machine intelligence for hacking into safer, more accessible care

By Laura E. Mize



If Ruogu Fang has her way, computed tomography scans of the future will emit about one tenth the radiation of today’s scans, and retinal imaging will one day upend current diagnostic methods for Alzheimer’s and Parkinson’s diseases.

An assistant professor in UF’s J. Crayton Pruitt Family Department of Biomedical Engineering, Fang, Ph.D., has been at UF for two years. Previously, she was an assistant professor at Florida International University, where she contributed to efforts to better distinguish and classify the tens of thousands of different types of neurons in the brain. But FIU’s lack of a medical school made it tough to work hand-in-hand with physicians and patients to address practical challenges in patient care.

With UF’s Herbert Wertheim College of Engineering adjacent to UF Health, Fang has teamed up with neuroradiologists and medical physicists from UF Health - and from Weill Cornell Medical College and Northwell Health Systems - and is now focused on one of modern medicine’s most commonplace, and seemingly unavoidable, risks of treatment.

“Fifty-two percent of the radiation people receive today is from CT imaging, because of the increasing number of CT scans,” Fang explained.

For stroke patients, who undergo numerous CT scans to evaluate both damage and recovery, the risks accumulate quickly. But anyone can face increased cancer risk and possibly also the risk of cataract development from repeated CT scans.

Two of Fang’s collaborators are Keith Peters, M.D., an associate professor in the UF College of Medicine’s department of radiology, and Chris Fox, M.D., an associate professor in the college’s department of neurosurgery. Together, they’re using computer programming to glean high-quality data (normally requiring high doses of radiation) from scans created with low-dose radiation.

To accomplish their goal, the scientists have “hacked” high-quality scans and studied their underlying computer coding. Based on that, they have created a so-called “training code,” which matches data points picked up during a new scan to corresponding ones found in high-dose scans.



“We can just apply this network to the low-dose images,” Fang noted, “and the network will naturally output” high-quality images with reduced noise and artifacts, as well as superior spatial and temporal resolution. The resulting images match the clarity and quality of a high-dose scan, but with much less radiation exposure. For single-mode CT scans, the team has slashed exposure by 90 percent — for each scan performed. Now, their focus is on doing the same for multi-modal CT scans. This portion of the work is funded through a joint grant from the UF Informatics Institute and Clinical and Translational Science Institute.

Fang also works with UF Health’s Center for Movement Disorders & Neurorestoration in search of more accessible ways to diagnose Parkinson’s Disease, and to differentiate between subtypes.

Her robust research experience related to completely different health conditions — such as her work on early screening methods for diabetic retinopathy — makes her an especially strong collaborator, said Adolfo Ramirez-Zamora, M.D., a UF College of Medicine associate professor of neurology and the center’s director of clinical trials.

“This is a great example of how interdisciplinary collaboration can really expand and improve research,” he commented. “We had this hypothesis about maybe looking into patient’s brains through their retinas, but didn’t really have ways for us to do it.”

Fang knew how to approach the project. She and student assistants perform double retinal scans on consenting patients. Using artificial intelligence to analyze the scans, the team is hoping machine learning will uncover “hidden biomarkers” that could be combined with other data “to predict whether the patient has Parkinson’s or not.” This goal is based on recently published studies hinting that vascular, structural, and functional changes in the retina — including thinning of the retinal nerve fiber layer — may be indicators

of Parkinson’s disease that are detectable before changes in the brain are.

Additional data that may be considered in a new diagnostic process could include visual acuity and other vision information, demographic information, and drug and medical history. Fang believes such a process could be much more accessible than current diagnostic scans, which cost \$2,000-\$3,000 each and require a trip to an imaging center — an inconvenience patients in cognitive decline may resist.

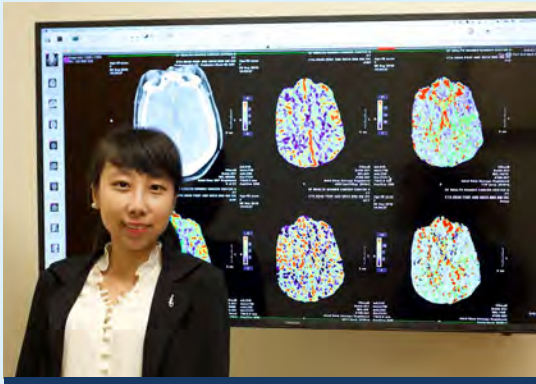
Fang, Ramirez-Zamora and Nikolaus McFarland, M.D., Ph.D. (also from UF’s Centers for Movement Disorders &

Neurorestoration), use portable scanners — the most accurate being the size of a book. This opens the possibility for scans to be done in physicians’ offices, including non-neurology offices, and other sites.

If such a method has merit, the team intends to expand their work to diagnosis of other neurodegenerative disorders.

Fang Focuses on Scientific Approaches to Bridge Data and Medicine

- **Research Interests:**
 - » Personalized medical imaging and robust brain hemodynamics modeling
 - » Early detection of Alzheimer’s and Parkinson’s Diseases through retinal imaging
 - » Early screening methods for diabetic retinopathy using artificial intelligence
 - » Biology- and cognition-inspired deep learning and AI-inspired neuroscience

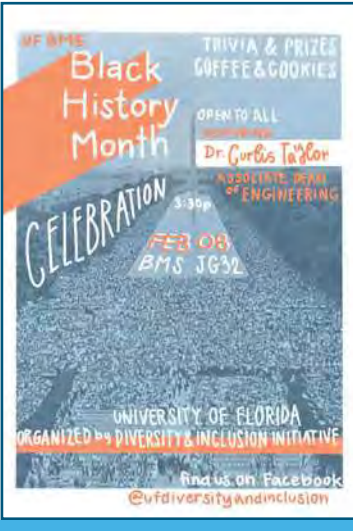


Celebrating Our Differences

FOSTERING A CULTURE OF INCLUSION

By Olivia Lanier

UF BME FACTS & DATA			
Faculty	16% URM	40% WOMEN	
Graduate	19% URM	51% WOMEN	
Undergraduate	34% URM	58% WOMEN	



While the statistics are rising and many more women and underrepresented minorities are receiving degrees in engineering, it is no secret that prejudice still exists and the road for success is paved with obstacles.

The J. Crayton Pruitt Family Department of Biomedical Engineering (BME) is dedicated to helping students, staff and faculty navigate these obstacles. In this pursuit, Dr. Aysegul Gunduz, associate professor and J. Crayton Pruitt Family Term Fellow, was appointed as the diversity and inclusion officer for the department in Fall 2018. As an international student herself, she is a fierce advocate for diversity issues. She credits her success in research to graduating from highly diverse and inclusive labs.

“Diversity and inclusion is our greatest asset - we are at our strongest when we support each other. Our goal is to create a safe and welcoming environment where everyone can thrive,” Gunduz said.

During the same semester as her appointment, Gunduz, and recent BME Ph.D. graduate, Olivia Lanier,

met with Herbert Wertheim College of Engineering leadership to discuss concerns regarding sexism, harassment, and discrimination.

Since this meeting, the college has implemented numerous policies to increase awareness of resources for women and minorities. The administration also created a diversity and inclusion board for the college, with representatives from every department.

Supporting this momentum, Gunduz, Lanier and undergraduate student, Camryn Lewis created a Diversity and Inclusion Initiative within the BME department. The goal of the initiative is to promote equity and social justice and to enhance the education experience by exposing students and faculty to these concepts and challenging them to bring more inclusive actions to the community. At monthly student body meetings, the organization participates in



Aysegul Gunduz, Ph.D.
Associate Professor &
J Crayton Pruitt Family Term Fellow

HERBERT WERTHEIM COLLEGE OF ENGINEERING FACTS & DATA

#2

Producer of doctoral engineering degrees to African American students

#6

Producer of engineering degrees to Hispanic students

-Diverse Issues in Higher Education, 2018

#3

Black Faculty

#7

Hispanic Faculty

#13

Female Faculty

-American Society for Engineering Education, 2018

“Our focus is to continue to create events and programs that focus on cultural competency and student success stories,” Gunduz said. “By celebrating differences and similarities, we hope our BME community will gain a deeper appreciation for one another.”

diversity training activities, which help promote healthy relationships among people and increase understanding of others’ backgrounds and multicultural perspectives. In addition to these meetings, the organization has hosted numerous events to celebrate diversity.

For Black History Month, the organization hosted a Black History Celebration that included a special talk from Dr. Curtis Taylor, associate professor and associate dean for undergraduate student affairs at the Herbert Wertheim College of Engineering, commemorating numerous black scientists/engineers. Taylor celebrated the work of black historical figures to an overflowing audience of engaged faculty and students. His presentation was followed by a black history trivia event.

The Diversity and Inclusion Initiative also organized a book drive for local schools. The organization collected over 150 books about black characters and/or written by black authors and donated them to local schools. “Storylines with main black female and male characters are important for children to read, these stories are often misrepresented or excluded from classroom curriculum,” Gunduz said.

For Women’s History Month, the organization also hosted an interactive panel discussion with BME professors on a variety of topics challenging women today. The group also attended the annual Equality Florida Gainesville Gala to support LGBTQ+ rights.

For her efforts with this organization, Gunduz received the 2019 Graduate Education Diversity Champion Award, a joint honor bestowed by the UF Multicultural Association of Graduate Students and the UF Graduate School’s Office of Graduate Diversity Initiatives.

Looking forward to next year, the organization aims to recruit more members and expand the number of events that enhance diversity and inclusion. Their mission is for all people who work and study at UF BME to know that their contributions matter and that they will be supported in achieving their full potential.

“Our focus is to continue to create events and programs that focus on cultural competency and student success stories, Gunduz said. “By celebrating differences and similarities, we hope our BME community will gain a deeper appreciation for one another.”

HERBERT WERTHEIM
COLLEGE OF ENGINEERING
BRONZE LEVEL AWARD FOR
THE INAUGURAL
ASEE DIVERSITY
RECOGNITION PROGRAM





Parisa Rashidi, Ph.D.

Azra Bihorac, M.D.

Artificial Intelligence adds detail to health assessments in hospital intensive care units

Every year, more than 5.7 million adults are admitted to intensive care units (ICU) in the United States, costing the health care system more than \$67 billion per year. A wealth of information is recorded on each patient in the ICU. Their electronic health records include high-resolution physiological signals, various laboratory tests, and a detailed medical history.

Today, nurses build an index of a patient's status in terms of function and reaction to environmental factors

in the ICU by periodically observing the patient and asking a battery of questions. The process is time-consuming and often incomplete due to the patient's condition. Two researchers at the University of Florida are looking toward tomorrow, where indices may be constructed from real-time autonomous observations and analyses of data based on artificial intelligence (AI).

Parisa Rashidi, Ph.D., an assistant professor in the J. Crayton Pruitt Family

Department of Biomedical Engineering at the Herbert Wertheim College of Engineering, and Dr. Azra Bihorac, M.D., the R. Glenn Davis professor of medicine in the UF College of Medicine, are collaborating to improve the assessment process for hospital staff and patients. They recently completed a pilot study, in which they examined the feasibility of using pervasive sensing technology and AI for autonomous and highly detailed monitoring in the Intensive Care Unit (ICU).

Rashidi, Bihorac and their research team performed the study on delirious patients and controls in a hospital critical care unit. They employed wearable sensors, light and sound sensors, and a camera to collect data on patients and their environment. Their results showed that granular and autonomous monitoring of critically ill patients and their environment is feasible using a noninvasive system, and they demonstrated its potential for observing and describing critical care patients' status and their surrounding environmental factors that contribute to sleep disruption and ICU delirium, such as loud background noise, intense room light, and excessive rest-time visits.

During the study, the researchers collected the data and subsequently analyzed it using algorithms developed by Rashidi and her engineering students. "AI technology could assist not only in administering repetitive patient assessments in real-time, but also in integrating and interpreting these data sources with electronic health record (EHR) data, thus potentially enabling more timely and targeted medical interventions," Rashidi said. "We were (also) able to determine that facial expressions, functional status involving extremity movement and postures, and environmental factors, including visitation frequency, light and sound pressure levels at night, were significantly different between the delirious and non-delirious patients," Bihorac added.

The results of this research project were recently published in Nature's "Scientific Reports." The paper characterizes the seven different sensing and monitoring mechanisms that were used in the research, which resulted in the most wide-ranging study of autonomous critical care monitoring to date.

The opportunity for our engineering faculty to collaborate in multidisciplinary studies such as this one enables us to develop and test innovative solutions much more quickly and comprehensively,

The co-location of medicine and engineering colleges on a single campus at the University of Florida has continued to provide an enhanced setting for researchers to perform interdisciplinary studies at an accelerated rate. "The opportunity for our engineering faculty to collaborate in multidisciplinary studies such as this one enables us to develop and test innovative solutions much more quickly and comprehensively," said Dr. Forrest Masters, Associate Dean for Research and Facilities at the Herbert Wertheim College of Engineering. "The deep relationship our biomedical engineering program has established with our College of Medicine is evidenced by the remarkable work that was done in this study."

For future work, the researchers and their team hope to incorporate real-time analysis of the data from the sensors and be able to provide immediate feedback directly to physicians and nurses as indicators of patient status and even point to possible treatment outcomes.

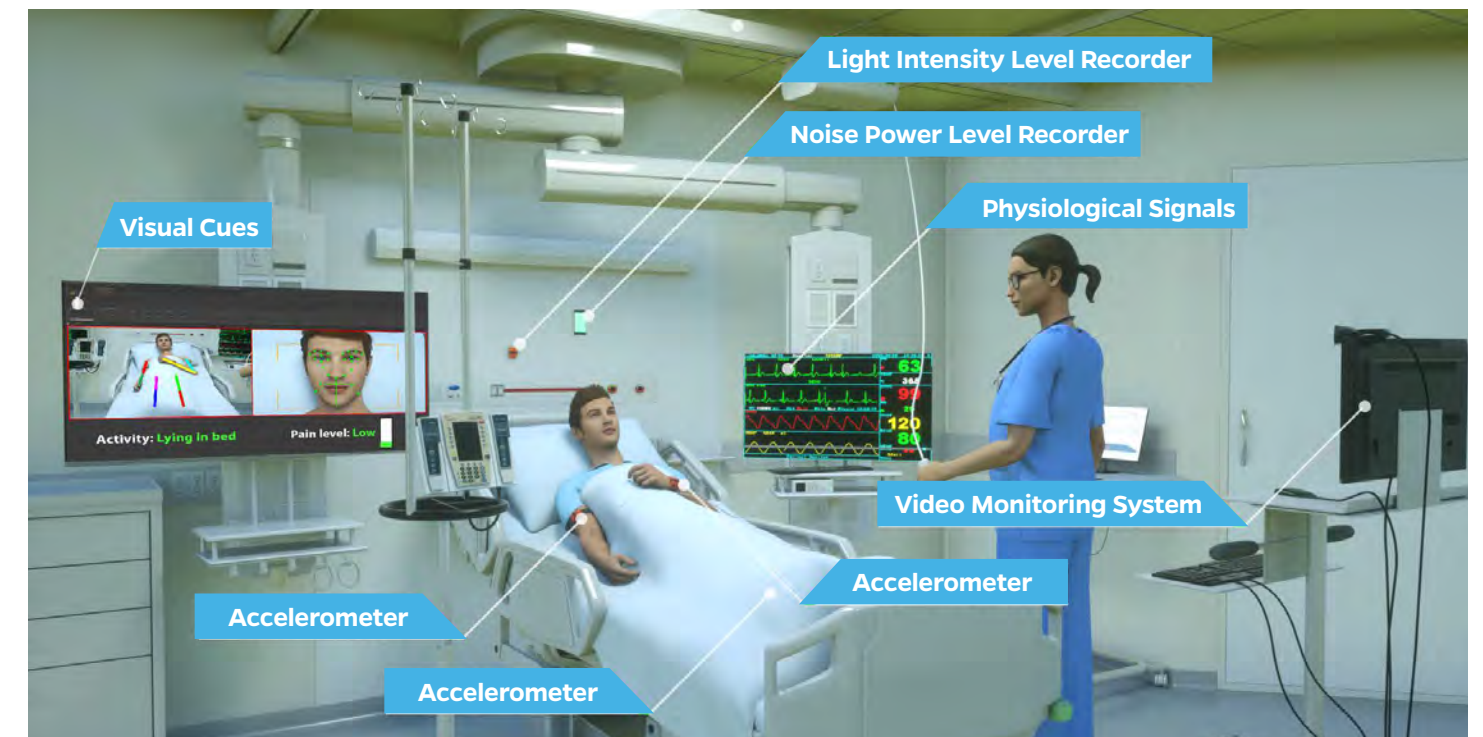


Image from Davoudi, Anis, et al. "Intelligent ICU for Autonomous Patient Monitoring Using Pervasive Sensing and Deep Learning." Nature, Scientific reports 9 (2019). This work is licensed under the Creative Commons Attribution 4.0 International License. Image created by Ella Maru Studio.

UF BME FACULTY SNAPSHOT



Kyle D. Allen
Associate Professor, Associate
Chair for Undergraduate
Studies & J. Crayton Pruitt
Family Term Fellow
Ph.D., Rice University
Novel strategies to diagnose
and treat degenerative joint
diseases



Wesley E. Bolch
Professor
Ph.D., University of Florida
Dosimetry, computational
medical physics and dose
assessment



Mingzhou Ding
Distinguished Professor &
J. Crayton Pruitt Family Professor
Ph.D., University of Maryland
Cognitive neuroscience,
multivariate signal processing and
multimodal neural imaging



Jon P. Dobson
J. Crayton Pruitt Family Professor
Ph.D., Swiss Federal Institute of
Technology, ETH-Zurich
Magnetic micro- and
nanoparticle-based
biomedical applications



Ruogu Fang
Assistant Professor
Ph.D., Cornell University
Big data analytics, brain
informatics and medical
image analysis



Daniel Ferris
Robert W. Adenbaum Professor
& Senior Associate Chair
Ph.D., University of California,
Berkeley
Biomechanics, neuromechanical
control, locomotion and
prosthetics



Aysegul Gunduz
Associate Professor &
J. Crayton Pruitt Family Term Fellow
Ph.D., University of Florida
Human brain mapping,
neuromodulation and neural
interfacing



Gregory A. Hudalla
Associate Professor &
J. Crayton Pruitt Family Term Fellow
Ph.D., University of Wisconsin
Molecular engineering for
immunotherapies and immune
modulation



Benjamin G. Keselowsky
Professor & Associate Chair
for Graduate Studies
Ph.D., Georgia Institute of
Technology
Biomaterials and controlled
release systems for vaccines,
immunotherapies and implants



Peter McFetridge
Associate Professor, Integra
LifeSciences Term Professor &
Graduate Coordinator
Ph.D., University of Bath
Naturally inspired biomaterials
for biologically functional
implants and organ
regeneration



Walter Lee Murfee
Associate Professor
Ph.D., University of Virginia
Cell dynamics, microcirculation,
angiogenesis, lymphangiogenesis
and neurogenesis



Jennifer A. Nichols
Assistant Professor
Ph.D., Northwestern University
Biomechanics, musculoskeletal
modeling, predictive simulation
and medical imaging



Kevin J. Otto
Professor
Ph.D., Arizona State University
Neural engineering, device-tissue
interfaces and neurostimulation



Edward Phelps
Assistant Professor
Ph.D., Georgia Institute of
Technology
Cell and tissue regeneration,
islet biology, diabetes and
immunoengineering



Parisa Rashidi
Assistant Professor
Ph.D., Washington State
University
Biomedical data science,
machine learning, pervasive
health and clinical informatics



Carlos Rinaldi
Dean's Leadership Professor &
Chemical Engineering Department Chair
Ph.D., Massachusetts Institute of
Technology
Nanomedicine, cancer nanotechnology,
magnetic nanoparticles and transport
phenomena



Sarah Rowlinson
Lecturer & Undergraduate Coordinator
Ph.D., Clemson University
BME cellular engineering laboratory and
engineering education research



Christine E. Schmidt
Professor, J. Crayton Pruitt
Family Chair & Department Chair
Ph.D., University of Illinois
Biomaterials for neural tissue
regeneration and neural interfacing



Blanka Sharma
Assistant Professor
Ph.D., Johns Hopkins University
Nanomedicine, stem cells,
biomaterials, tissue engineering
and targeted drug/gene
delivery



Cherie Stabler
Professor
Ph.D., Georgia Institute of
Technology
Biomaterials, cell
encapsulation, regenerative
medicine, controlled release
systems and diabetes



Hans van Oostrom
Associate Professor &
Engineering Education
Department Inaugural Chair
Ph.D., Eindhoven University of
Technology
Human physiologic simulation
to enhance noninvasive patient
monitoring and education



Lakiesha N. Williams
Associate Professor
Ph.D., Mississippi State
University
Traumatic brain injury, soft
tissue mechanics,
bio-inspired design & materials
characterization



Lin Yang
Associate Professor
Ph.D., Rutgers University
Imaging informatics, biomedical
image analysis, machine
learning, computer vision and
computer-aided diagnosis

MEET THE DEPARTMENT'S NEW EDUCATION SPECIALISTS



Eric Fuller
Lecturer
Ph.D., University of Florida

Dr. Eric Fuller joins the department
as a lecturer this fall, focusing
his expertise on engineering
design and engineering education
research.



May Mansy
Lecturer
Ph.D., University of Florida

Dr. May Mansy joins the
department as a lecturer this
fall, focusing her expertise on
biomedical signals & systems and
engineering leadership.

UF BME Alumnus, Dr. Philip Barish, named in UF's 40 under 40

M.S., Biomedical Engineering, 2008
Ph.D., Biomedical Engineering, 2011

The annual Outstanding Young Alumni awards program was established in 2006 to recognize alumni under the age of 40 whose achievements positively reflect The Gator Nation. 40 Under 40 will continue the tradition of honoring Gators who are reflecting leadership and innovation in their communities and professions.

Criteria for the competitive award include making a significant impact on the candidate's industry and having civic or professional accomplishments at the state, national or international level.

Philip Barish, Senior Vice President of Operations and R&D for AbSci has over 17 years of experience in bioengineering research, with expertise in bioprocessing, molecular and cellular biology, biochemistry, protein expression and gene therapy. At AbSci, Barish is responsible for managing research and development activities as well as overseeing business development and strategic partnerships.

His own days as a UF engineering student were filled with exciting opportunities. Barish recounts, "During the first year of graduate school, I worked on a group project utilizing an EEG that allowed people to control a video game with their minds. Through combining an EEG and basic signal processing algorithms, our team created a

program that allowed us to navigate a beginner level of a first person shooter game. It was a fascinating engineering project that combined elements of neuroscience and software development to provide a window into brain-machine interfacing."

Things he learned at UF helped Barish take the lead in innovating for success. He said, "AbSci collaborates with leading pharmaceutical companies to enable step-changes in productivity to their bio-pharmaceutical R&D and manufacturing. One of the exciting things about working in startups is that you're often called onto projects where you lack specific expertise. As our company grew, we had a need to develop a fermentation process for protein production, but we had no one with those credentials in-house. Optimizing fermentation is primarily an exercise in process development, precisely the things you are taught as an engineer, so I volunteered to take on the task. I was able to build out and lead an entire team dedicated to fermentation, which ultimately led me to my current position."



The 2019 40 Gators Under 40 event honored 40 outstanding young alumni spanning 15 colleges and 10 states. BME alumnus, Dr. Philip Barish pictured second row from bottom.

SCIENCE BECOMES ART in the winning and notable photographs from the J. Crayton Pruitt Family Department of Biomedical Engineering annual 2018 Art of Research Photo Contest.

The competition is aimed at providing a creative and accessible method of sharing and celebrating the ground-breaking research being done by our department. Judging was based on scientific significance, originality, and artistic and/or visual impact of the images.

Contest winner and finalists:

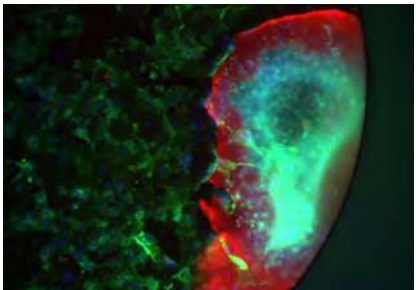
1st Gator Wonderland

by Maggie Fettis, BME Ph.D. student



2nd Skull

by Daniel Stewart, BME Ph.D. student



3rd Media

by Eric Fuller, BME Ph.D. student



UF BME Welcomes New Industry Partner



KLS Martin Group develops and markets medical technology solutions such as implant systems, electrosurgery units, surgical laser systems, sterilization containers, OR lights, surgical instruments as well as individual OR solutions.

The KLS Martin Group's success throughout the world is due to innovative, high-quality products, as well as excellent customer service and local sales consultants. The feedback and partnership with their customers and educational groups within cranio-maxillofacial surgery, neurosurgery, cardiothoracic surgery and small bone orthopedics are critical to developing products that have advanced the field of surgical reconstruction.

Thank you to all of the UF BME Industry Partners!

PLATINUM



GOLD



SILVER



If your company or organization would like more information on how to give to BME or become an industry partner, please contact Ryan Litzinger at **352-294-7947** or rlitzinger@eng.ufl.edu.





Herbert Wertheim College of Engineering
J. Crayton Pruitt Family Department of
Biomedical Engineering at the University of Florida
Biomedical Sciences Building JG56
1275 Center Drive, P.O. Box 116131
Gainesville, FL 32611-6131

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J. Crayton Pruitt Family Department of
Biomedical Engineering