In this issue of BE Connected, I would like to highlight the successes of our BE students and faculty. Bioengineering at UofL continues to be at the forefront of biomedical research. Our department generated the highest amount of research funding and peer-reviewed journal publications in Speed School. Bioengineering students and faculty have received international recognition, and won a number of awards, including grants from NSF, NIH, The Jewish Heritage Fund, and industry. Fifteen students won awards for research, and three BE faculty were recognized as Student Champions. Our students, faculty, and staff attended the BMES conference in Seattle and our booth received significant interest and attention.

Our department is leading the effort in internationalizing Speed School programs by collaborating with universities in Egypt, Abu Dhabi, Spain and Germany. These efforts have led to students from Egypt enrolling in our 2+2 undergraduate program. We hosted seven cooperative students from Egypt during the summer. The Bioengineering program successes would not have been possible without the support of our alumni, donors and students. We are very grateful for the support of our donors, and we look forward to your continued support to help us achieve our target of raising $200,000. Your donations have already made a difference and have led to eleven student awards last year. With your support, we hope to increase the number of student awards. We would love to hear from you. Please email us to send your updates. We wish you all a joyous and healthy holiday season, and a wonderful new year!

Mohamed Tarek Ali, John M. Houchens Award, 2023

Mohamed Tarek Ali has been awarded the John M. Houchens award for most meritorious doctoral dissertation entitled, “Interogating autism from a multi-dimensional perspective: and integrative framework.” The Houchens Prize is awarded to the doctoral student whose dissertation has the greatest potential for significant impact on a field. The nomination letter must provide a description in lay language, accessible to faculty from various disciplines, of the significance of the dissertation work, the impact within the discipline and the broader applications of the work. Congratulations to Dr. Ali on receiving this prestigious award!

Farhiya Awale, Multiple Awards

Farhiya Awale, has obtained numerous awards this semester. She is a Woodford R. Porters in Medicine Scholar, a Louis Stokes Alliance for Minority Participation Scholar and named an official member of the Mortar Board National College Senior Honor Society. She has also earned the Ronaldo “Chip” Cheng, Jr. Memorial Scholarship Award. We are honored to have her as a Bioengineering student and congratulate her on her amazing accomplishments.

Zachary Fowler, 2nd Place Award

Congratulations to Zach Fowler, 2nd Place winner of the Presentation Award at the Brown Cancer Center Retreat. Zach’s presentation, entitled, “Microfluidic Generation of Alginate Microbeads to Quantify Intra-tumoral Compressive Stress,” utilizes a novel force probe to quantify compressive stresses in spatial dimensions. This data enables researchers to understand how real-time intra-tumoral stresses are developing in growing tumors. Zach is a recent BE MEng graduate who is working as a research capacity with Dr. Joseph Chen.
We asked one of our students, Mary Baxter, about her experiences as a Master of Bioengineering student at UofL. Mary is currently enrolled in her first year of medical school at the University of Kentucky.

1. What prompted you to choose the Bioengineering program? I have always been interested in puzzles, human health, and the complexity of life. I have always liked helping people, too. Bioengineering just seemed perfect. I considered many professions in high school: Accounting, Civil Engineering, Physical Therapy, Optometry. Each was interesting but seemed to be missing something. Bioengineering was the perfect combination of my passions and skills. I was also interested in medicine, and I thought it would help lead me down that path if I chose to pursue it. The master's degree was icing on the cake; by then, I had decided to apply to medical school, and I wanted to get an in-depth research experience to better understand the connections between research and clinical applications.

2. Overall, how do you feel about the program? I love the Bioengineering program at U of L. I felt that all the professors cared about students' success and supported them well, morally and academically. There was a wide variety of electives to choose from, so I felt free to explore my interests. Most importantly, I was constantly challenged to be the best worker possible and to think abstractly.

3. How has the program improved your knowledge and opportunities? Before I started the Master's program, I was horrible at reviewing literature and understanding research studies. I would take hours to read articles and still could barely grasp the main idea. All of my Master's classes forced me to read journal articles. I became quicker and better at reading and understanding articles. I also had to review articles extensively for my own research. My mentor, Dr. Hunter Miller, helped me at the beginning by listing relevant articles to read and providing worksheet-like pages of questions to answer about them. I feel empowered with my new ability to review literature, especially now in medical school.

4. What advice can you impart to potential applicants of the Master's program? Study not only what interests you, but also what you think will be especially relevant in the future.

5. How might the program be improved? The program could benefit from more career guidance regarding career options for bioengineers.

6. What has this program helped you to achieve? The program has helped me get accepted into a couple medical schools, fine-tune my research skills, learn about brain cancer, and build up my tolerance for stressful work.
Dr. Karen Bertocci is an Associate Professor in the Injury Risk Assessment and Prevention Laboratory and Department of Bioengineering. She received her PhD in Rehabilitation Sciences and Technology in 2004 from the University of Pittsburgh.

Dr. Bertocci took a circuitous route to academia. Her undergraduate degree was in journalism and communications (University of Pittsburgh). She spent a couple years working for a Pittsburgh radio and television station before working in the field of environmental regulatory compliance, researching and documenting environmental regulations across the northeast. Next, she applied her skills to construction management, focusing again on regulatory and contract compliance in the healthcare arena. She began evening classes on her MBA. After several years, hospital expansion ceased due to funding issues and Dr. Bertocci found herself without a position. She immersed herself in her MBA coursework and sought out new opportunities. The result was a pivot to a Carnegie Group Inc., a software development startup. There she managed a contracts management team, immersing herself in the field of intellectual property and business development. She also completed her MBA (Duquesne University).

It was during this time that Dr. Bertocci felt something was lacking in her career. She didn’t feel like she was making a difference in people’s lives. That’s when she enrolled in the University of Pittsburgh’s doctoral program in Rehabilitation and Technology Sciences. While completing her PhD, Dr. Bertocci worked for Dynamic Contours, LLC, serving as PI on an SBIR grant aimed at developing a novel, dynamic, pressure-relieving wheelchair seat cushion. This opportunity allowed her to draw on her business and academic experience.

Fast-forward to Dr. Bertocci’s research career and you’ll see that pivoting is something she continues to do. Her early research career focused on rehabilitation interventions to improve functional outcomes following total hip replacement and total knee replacement surgeries. Next, she focused on wheelchair transportation safety in public transit, leading studies of lift and ramp technology and usage on large, accessible transit buses and paratransit vehicles. “Almost 20 years after the Americans with Disabilities Act, wheelchair users were still encountering access issues and experiencing injuries during public transportation access. We wanted to identify these issues and quantify the problem to begin a conversation about potential solutions to improve wheelchair user access to the community.”

In recent years Dr. Bertocci has been active in the field of pediatric injury as co-investigator on several National Institute of Justice grants. This work has spanned biomechanical characterization of video recorded short distance falls in children, development of a probability model to predict head injury risk in pediatric falls, and investigation of the prevalence, legal basis and medical evidence of overturned abusive head trauma and shaken baby syndrome convictions. Currently she is part of a multi-site team working to validate an injury plausibility assessment model for differentiating abusive from accidental fractures in young children (NIH #R01HD102428).

Dr. Bertocci is also one of four PIs leading an NIH-funded training grant aimed at post-baccalaureate scholars interested in pursuing doctoral studies aimed at post-baccalaureate scholars interested in pursuing doctoral studies.
Dr. Karen Bertocci...cont’d. from pg 3

in the biomedical field (NIH # R25GM148314). The University of Louisville BIOMED PREP program is a unique, integrated, 12-month program among the Schools of Medicine, Dentistry, Arts & Science, and Engineering (biomed@louisville.edu). It provides graduates from Kentucky and surrounding areas who are underrepresented in the STEM fields with extensive mentored development and research opportunities in these disciplines. Scholars have access to an extensive array of scientific projects and tailored courses designed to develop skills that will prepare them to apply to a Biomedical Sciences Ph.D. program.

Dr. Bertocci, with her spouse, Dr. Gina Bertocci co-founded Bearcat Innovations, LLC, which provides expert witness services in the fields of pediatric injury and wheelchair transportation safety. When she is not doing research, Dr. Bertocci teaches Research Methods for Bioengineers (BE 695) and Bioengineering Research Ethics (BE 603). She also serves as Co-Director (with Dr. Tricia Soucy) for the Interdisciplinary Bioengineering Translational PhD program and as ABET Coordinator for the department.

BE Grants for 2023

1. K. Bertocci, Role: (MPI) University of Louisville Biomedical Integrative Opportunity for Mentored Experience Development NIH #R25, $1.9M.
2. G. Monreal, S. Koenig, role (MPI), Sensor- and instrumentation-based mock flow loop educational platform in support of Heartwheels! STEM Mobile Outreach in Kentucky NSF KY EPSCoR EOC grant, $10k.
3. Patricia Soucy, Hydrogel Production, Funded by Samtec, Inc. $42.3k.
4. Michael Voor, Stuart Williams, Max Boyake, Vertify Probe, Intraoperative Device for Measurement of Bone Quality, in KYNETIC Cycle 7 contingent upon approval by the NIH and the Kentucky Cabinet for Economic Development. Provisional recommendation, $40.6k.
5. Nichola Garbett (PI), Thomas Roussel (Co-PI), A Differential Scanning Calorimetry device for diagnosing myocardial infarction, Jewish Heritage Fund for Excellence Research Enhancement Grant Program, University of Louisville, School of Medicine, $73k.

El-Baz Visits Malaya University

BE Chairperson Ayman El-Baz visited Malaya’s Malaya University with President and Deputy Vice Chancellor Dr. Sabri Musa to enhance collaborations between the two universities in October:

2023 BMES Conference/ Seattle

The Biomedical Engineering Society (BMES) held their annual conference in Seattle, WA from Oct 11-14. The UofL BE Student Chapter was in attendance with a booth and networked with both students and biomedical vendors and employers. The department provided financial support to BE student attendees. The departmental booth attracted significant interest from undergraduate and graduate students from other universities.

BE Donations

We have established a student endowment with a goal of raising $200,000 by 2025. Due to the generosity of our donors we have raised approximately $60,000 to date. This has enabled us to present ten new BE student awards this year. We are deeply grateful to all our donors for contributing significant amounts to this cause. Your continued support is vital to fulfilling the endowment objective of recognizing meritorious students. For more information about how your donations can help transform the BE Department, please contact allison.commings@louisville.edu or call (502)852-2379.

BE Student Champions

Drs. Claudia Angeli, Hermann Frieboes and Tommy Roussel were nominated by the students as Student Champions for going above and beyond their duties by providing exceptional and critical support. To view the entire UofL list of all faculty nominees, click this link.