



IUPUI

DEPARTMENT OF BIOMEDICAL ENGINEERING

SCHOOL OF ENGINEERING AND
TECHNOLOGY, IUPUI

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<https://et.iupui.edu/department/bme/>

THE

BME

NETWORK

Newsletter of the Department of Biomedical Engineering

FALL 2021
ISSUE # 14

New Graduate Programs Rollout

PhD and Prosper

In spring 2020, the BME department at IUPUI took a major step in growing the department by instituting a fully on-site PhD program. The program offers the opportunity for individuals with a Bachelor's or Master's degree in biomedical engineering or a related field to further develop their knowledge and interests in BME through an in-depth thesis research project.

The new BME PhD program offers students opportunities to collaborate with clinical and biomedical researchers in the Indiana University School of Medicine while earning a Purdue degree. BME PhD students at IUPUI can also capitalize on a wide variety of research opportunities, from the Biomechanics & Biomaterials Research Center to the IU Stark Neurosciences Research Institute.

The BME PhD plan of study includes 90 total credit hours. A minimum of 30 credit hours are graded course work. Students will work directly with their Doctoral Major Professor and Advisory Committee to design an appropriately themed course of study. PhD students may complete their core coursework on either the IUPUI campus or the

Purdue West Lafayette campus. The remaining 60 credit hours are designated for thesis research. Research opportunities exist in all areas of concentration: biomaterials, biomechanics, and neural engineering or bioinstrumentation. If you would like more information about our IUPUI BME PhD program, contact us at bme@iupui.edu.



PhD Students Awadh Al Hawwash and Ryne Horn.

Mastering Medicine

The BME Department is launching a new MD/MS dual degree program this fall! Together with the Indiana University School of Medicine (IUSM), the BME Department will offer a dual degree program on the IUPUI campus that integrates a Master's degree in BME with a Doctor of Medicine degree. This dual degree

MD/MS program at IUPUI allows IUSM students the opportunity for in-depth training in engineering and technology relevant to the clinic and translational research.

This program is available to IU Medical School students enrolled at the Indianapolis campus. Students enrolled in the medical doctorate in Indianapolis can take a year away from the medical school curriculum to complete the necessary course work for the MS BME degree at IUPUI. This will allow students the benefit of earning a medical doctorate from Indiana University and an MS in BME from Purdue University right here on the same campus within 5 years.

The MS BME program requires a total of 30 credit hours. Medical school students can transfer 12 credits from their medical school program toward the BME MS degree as part of this dual degree program. These medical school credits will satisfy graduate life science course requirements. The remaining 18 credit hours will include graduate BME and engineering courses, along with a mathematics or statistics course, to be taken in two semesters to minimize time away from the MD curriculum.

Space for Success

The 2020-21 year brought exciting new student spaces to IUPUI and the BME department. First, the campus welcomed its newest building, Innovation Hall. The building is designed for students in the School of Science, the School of Informatics and Computing, and the Purdue School of Engineering and Technology. On top of additional classroom learning spaces, Innovation Hall has a dedicated student makerspace where engineering and technology students can interact in electronic and wet labs, wood and machine shops, and a

collaboration studio. The addition of this space provides the opportunity to expand their technical skills through coursework, and perhaps, take advantage of these new machines in their project work, including capstone.

Also last year, the BME department renovated its student collaboration space in SL144. In the past, the department has always reserved a space for students to socialize and collaborate on projects. With the help of a Learning Environment Grant from the Center for Teaching and Learning, the

department is now able to optimize this space for students. Three glass boards, two mobile whiteboards, and two large monitors can now accommodate student collaboration. Additionally, two Lulzbot Mini 2 3D printers, a Craftsman toolbox, calipers, and other tools make this space useful for students by providing them with technical tools necessary to excel in coursework and BME project work. These new and renovated spaces will help cultivate a hands-on learning experience for BME students in the years to come.



SL 144 under renovation.



Newly renovated SL 144.



Innovation Hall - the newest building on campus.

A Year in BME During COVID-19

During the onset of the COVID-19 pandemic, the BME department quickly adapted departmental protocols to ensure the educational environment was safe for students, staff, and faculty. Associate Chair and BME Undergraduate Program Director, Dr. Sharon Miller describes the experience as one that challenged everyone in the department on how to learn, to teach, to collaborate, and to research. As undergraduate classes transitioned to remote/hybrid learning, individual project kits were assembled for each student, BME spaces were micromanaged to follow capacity guidelines, and team projects emphasized modeling in addition to physical prototyping. Travis Kening (BS BME '21) shared the following about his experience as a senior during the 2020-21 academic year, "transitioning to online classes made

it harder to ask quick questions about assignments and projects to classmates that sit around me and teachers around class time."

However, positives did emerge. According to Dr. Miller, faculty were encouraged to deliver content creatively and incorporate technology into their courses. Instructors were able to record lectures giving students additional resources to study later. Travis confirmed that recorded lectures were helpful when revisiting concepts and Zoom made project meetings with group members much more challenging. Instrumental in office hours and student advising, online Zoom meetings allowed faculty and students greater scheduling flexibility. The technology gains during the academic year culminated in a hybrid BME Research & Design Day in April 2021, where graduate

students presented current research and capstone teams shared their final designs. This day was a day to celebrate with both our in-person and online attendees the BME successes during a challenging academic year.

This fall, IUPUI is opening its doors to students and welcoming back traditional in-person instruction. However, students and faculty will not leave behind the skills and new classroom tools that they have gained through adapting to the pandemic. As these spaces open again, Dr. Miller shared that the BME Department looks forward to in-person interactions with students, staff, and faculty during BME events, so we can continue celebrating successes together. Most of all, Dr. Miller says she is eager for students to stop by the office to just say hello.

Congratulations to the BS BME Class of 2021!



MESSAGE FROM THE
CHAIR

Joseph M. Wallace, PhD

Chair of the Department of Biomedical Engineering
and Professor of Biomedical Engineering



I am proud to highlight developments in the BME department through this unprecedented pandemic year. Our department saw swift shifts in how we research and educate, and I would like to thank our BME community for bringing patience to the many situations we faced together. Through the faculty's hard work, classes were able to transition to hybrid and online formats. This included synchronous courses delivered via Zoom, hundreds of lectures captured via Kaltura, and a transition to online assessment. Students understood this transition for faculty, and they braved this new format as they learned to collaborate with peers remotely in group projects and manage technological difficulties to still find success. Through all this, faculty and staff were able to coordinate online meetings and bring some exciting new changes to the department.

One such development in the department is a new MS partnership with the Neuroscience department at IUPUI. Through this plan of study, students will be able to enroll in a 5-year program that enables them to earn a Bachelor of Science degree in

Neuroscience and a Master's degree in BME. This multidisciplinary route will provide a unique path for Neuroscience students with BME interests.

Another exciting program being added to the department is an MD/MS partnership with the IU School of Medicine. By earning a Master's degree in BME alongside their medical training, medical students will develop a deeper understanding of BME topics in an increasingly complex field.

To continue fostering the opportunity to strengthen our BME community, PIs within the department were awarded two grants during the 2020-21 academic year. A Department Enhancement Grant, funded internally as a part of IUPUI's NSF ADVANCE award, has brought about the opportunity for the department to revisit and rethink how colleagues are recruited to join our team. A part of this initiative has established the **BeingME** Speaker Series. The goal of the **BeingME** Speaker Series is to provide insightful talks from successful and inspiring individuals from diverse backgrounds in BME or related fields. We are

excited to learn from six professionals representing academia and industry over the coming academic year.

A second grant award, funded by the National Institutes of Health, initiated a summer opportunity for BME students: the INdiana Summer Clinical Residency in Innovation for Biomedical Engineers, or (IN)SCRIBE Program. (IN)SCRIBE is a 7-week clinical immersion experience that enables students to interact with medical professionals, learn from design faculty, and identify clinical issues in the Indianapolis health care system. More information on this program can be found at <https://www.bmeed.iupui.edu/inscribe.html>.

This fall, IUPUI anticipates returning to fully opening and resuming regular activities as they were prior to the start of the pandemic. As the department moves ahead from a challenging academic year, I am proud of all the faculty, staff, and students have been able to accomplish, and I look forward to seeing the department continue to grow as things transition back to normal.

BME Spotlights

UNDERGRADUATE STUDENTS

Starting this summer, the BME department welcomed a new summer program for BME undergraduates. The INdiana Summer Clinical Residency in Innovation for Biomedical Engineers, or (IN)SCRIBE Program, is a seven-week clinical immersion and team-based design internship. Senior **Katelyn Murphy (BS BME '22)** and sophomore **Elizabeth Scott (BS BME '24)** both eagerly applied and were able to capitalize on this experience. Katelyn compared

the program to a “shortened capstone” which will

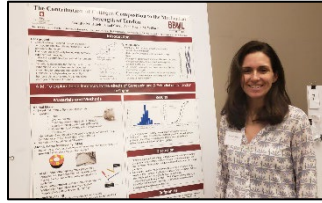


be helpful for her as she approaches her capstone courses starting in fall 2021. Elizabeth said that the program was “her first real experience with biomedical engineering” and it helped her be more certain that BME is the right major for her. Both scholars were appreciative to be able to develop their professional etiquette skills through interactions with multiple doctors and coordinating with them to brainstorm devices to solve clinical problems. Both BME students gained from the experience and shared their appreciation for all the work Program Directors, Dr. Miller and Dr. Higbee, put in to organizing and running the program and encouraging BME students to apply to the (IN)SCRIBE program in the future.

GRADUATE STUDENT

Jennifer (Jen) Hatch (BS BME '20, MS BME '21), is entering the BME's PhD program after completing her undergraduate and one-year Master's degree in BME at IUPUI. For a long time, Jen has been interested in getting humans to space and the cellular barriers that need to be overcome to achieve long term space travel. Through her undergraduate coursework, Jen learned about many diseases that affect the body, like osteoporosis. She took interest in this disease drawing a comparison to how astronauts experience bone loss in space. With this connection in mind, Jen decided to explore biomechanics and

chose to pursue this depth area. Three and a half years ago she began working in Dr. Wallace's Bone Biology and Mechanics Lab where she began pursuing her passion. She has been actively involved in this laboratory through her Master's program and plans to stay



involved through her PhD program. Jen is currently working on creating a mouse model for diabetes in female mice. Diabetes can effect bone density and cause the onset of osteoporosis. After this model is established, researchers will be able to better explore the complex relationships of osteoporosis and bone. On top of doing research in her PhD program, Jen also looks forward to getting involved in teaching. She wants to take advantage of the hands-on opportunities of engineering to be able to institute engaging coursework for students.

FACULTY MEMBER

Meet Professor Kayla Maxey. Joining the department in the summer of 2020, Kayla filled the role of Visiting Lecturer of Biomedical Engineering and is a welcoming face to the rising sophomore class as they take their first BME courses. Prior to joining the department, Professor Maxey earned a Bachelor's degree in Biomedical Engineering and began



working in the medical device industry as a Systems Engineer in new product development. While working, Professor Maxey attained a Master's degree in Healthcare Technology Management with an emphasis in drug delivery devices. Despite a rewarding career, Professor Maxey sustained a passion for advancing representation of diverse identities in the engineering profession. To follow this passion, Professor Maxey returned to

school and is currently working towards a PhD in Engineering Education at Purdue University. As a Visiting Lecturer, Professor Maxey draws upon her experiences as a BME undergraduate and industry professional to serve as a role model of the variety of career possibilities in BME. Professor Maxey's research centers around diversity, equity, and inclusion in engineering. She hopes to draw from her research to support students, faculty, and staff in creating, transforming, and sustaining authentic and holistic engineering learning environments. Professor Maxey joined the department amidst the tough transition to safe learning environments during the start of the pandemic, and proactively adapted the laboratory curriculum to lead and support student development through the semester. The BME department is excited to have Professor Maxey as she enters her second year at IUPUI and is eager for the impact she will bring.

ALUMNI

After spending the past year as an office assistant for the BME department, alumna **Abigail (Abbi) Waterfill (BS BME '20)** has just started an exciting new chapter in her career as she enters IU's Doctor of Physical Therapy program as part of the class of 2024. As an undergraduate, Abbi chose the bioinstrumentation depth area. While

working a job for her father during college, Abbi realized that she did not want a traditional office job. Upon shadowing some Physical Therapist, Abbi decided that



Physical Therapy was the right career for her. Using the flexibility of the BME curricula, Abbi was able to cover the majority of her graduate school prerequisites. Over the summer, Abbi took her first Physical Therapy course, anatomy. As her program picks up in the fall, Abbi is looking forward to the courses she is taking.

(Re)Defining the Image of STEM

September 17, 2021

Dr. Korie Grayson

Postdoctoral Research Fellow in
the Department of Chemical
Engineering
University of Michigan

Are You Sure You Have the Right Person?

October 22, 2021

Jennifer Kerr

President of Cook Research
Incorporated

Global Functional Leader for
Clinical Affairs at Cook Medical

Embrace Your Superpowers and Magnify Your Uniqueness

December 3, 2021

Jennifer Lopez

Senior Director Global Recruiting
and Talent Acquisition

Eli Lilly and Company

My Journey to Creativity Through Science

January 21, 2022

Dr. Karl Lewis

Assistant Professor of Biomedical
Engineering
Cornell University

Transformation Matters

March 4, 2022

Rod Cotton

Senior Vice President, Chief of Staff
and Head of Strategy &
Transformation

Roche Diagnostics

Translating 3D Bioprinting Tools from Lab to Market: An Academic's Perspective on Starting a Company

April 22, 2022

Dr. Stephanie Willerth

Professor and Acting Director of
Biomedical Engineering

University of Victoria

BME Award Recipients and Recognition for 2021

Student Scholarship and Award Recipients

BME Awards

Austin Chirgwin Outstanding BME Sophomore

Emily Hine Outstanding BME Sophomore

Isaac Demaree Outstanding BME Junior

Anna Snider Outstanding BME Junior

Collier Smith Charles H. Turner Outstanding Academic Achievement for Senior Year

Wushuang Yang Outstanding Engineering Dual Degree Biomedical Engineering Student Award

Karan Bhula Bepko Scholarship in Biomedical Engineering

Andrea Brunton Bepko Scholarship in Biomedical Engineering

Kaylee Crowell Bepko Scholarship in Biomedical Engineering

Charles Rumberger Bepko Scholarship in Biomedical Engineering

Ruben Vizcarra Valdez Bepko Scholarship in Biomedical Engineering

Timothy Hostetler Biomedical Engineering Outstanding Service Award

Katelyn Scott Exemplary Internship or Research Award

IUPUI Top 100

Isaac Demaree, Kellie Hoekstra, Timothy Hostetler, Travis Kening, Ashtin Wilson, Wushuang Yang

IUPUI Elite 50

Rachel Cadle

Other Recognitions

Jennifer Hatch Indiana University President Diversity Fellowship

Faculty Awards and Accomplishments

Awards

Dr. Higbee 2021 Trustee's Teaching Award

Dr. Higbee 2021 Outstanding Teacher Award, Purdue School of Engineering and Technology

Dr. Miller JACADA Advisor of the Year

Dr. Miller IUPUI Purdue School of Engineering & Technology Wisner-Stoelk Outstanding Faculty Award

Dr. Wallace 2021 Abraham M. Max Distinguished Professor Award

Dr. Wallace Fellow, American Society for Bone and Mineral Research (ASBMR)

Dr. Wallace Co-Investigator on 2 VA Merit Awards

Dr. Wallace Associate Editor, Journal of Biomechanical Engineering

Dr. Wallace Editorial Board Bone Reports

Dr. Yokota Doris H. Merritt Outstanding Leadership Award

Grants and Publications

Dr. Higbee & Dr. Miller Publication in the Journal of Biomechanical Engineering

Dr. Higbee & Dr. Miller NIH R25 Award: A Clinical Immersion Program to Train Biomedical Engineers to Identify Indiana's Urban Health Needs

Dr. Wallace Publications in Plos One, Bone, Bone Research, Scientific Reports, Connective Tissue Research, JBMR Plus, Current Opinion in Nephrology and Hypertension, Frontiers in Endocrinology

Biomedical Engineering Seminar Schedule Fall 2021

September 24th

Scott Snyder, PhD • IU School of
Medical Radiology

October 29th

Time Large, MD • IU School of
medical Urology

November 19th

Yunjie Tong, PhD • Purdue Weldon
School of Biomedical Engineering

Faculty Research Areas

Edward Berbari, PhD

- Medical Device Instrumentation
- Cardiac Electrophysiology

Julie Ji, PhD

- Vascular Mechanobiology

Chien-Chi Lin, PhD

- Polymeric Biomaterials and Tissue Engineering
- Cancer Bioengineering

Sungsoo Na, PhD

- Cellular Signaling and Reprogramming

John H. Schild, PhD

- Autonomic Neural Control
- Visceral Afferent Function

Joseph Wallace, PhD

- Bone Biomechanics
- Mechanobiology

Dong Xie, PhD

- Functional and Polymeric Biomaterials

Hiroki Yokota, PhD

- Breast Cancer and Bone Metastasis
- Mechanotransduction

Ken Yoshida, PhD

- Bioelectronics

Clinical Faculty & Lecturers

Karen Alfrey, PhD

Steven Higbee, PhD

Kayla Maxey, MS

Sharon Miller, PhD

