



IUPUI

DEPARTMENT OF BIOMEDICAL ENGINEERING

SCHOOL OF ENGINEERING AND TECHNOLOGY, IUPUI

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

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THE

BME

NETWORK

Newsletter of the Department of Biomedical Engineering

BME Students Pursuing Professional School

**Julia Wamhoff (BS BME '19)
(formerly Julia Wright)
Northwestern University**

Julia is currently pursuing a Master's in Prosthetics and Orthotics at Northwestern University in Chicago, IL. She will graduate in May 2021 and complete two years of residency before becoming a certified prosthetist/orthotist. Julia loves the field of prosthetics and orthotics because it is the perfect balance of engineering and patient care. Julia has the opportunity to interact with patients every day as well as being able to utilize her



hands to create custom prostheses and orthoses to improve their quality of life. As Julia said, "Seeing someone walk for the first time post-amputation on a prosthesis you made is so rewarding."

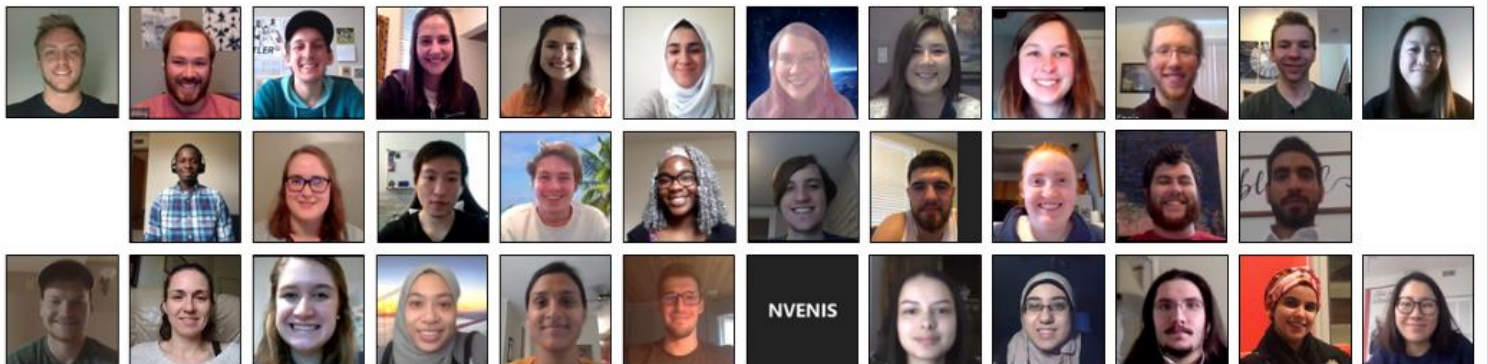
students, Alec has had to familiarize himself with fellow classmates through, as he stated, "our little boxes in Zoom and an extremely active GroupMe." Even still, Alec says he has shared a lot of laughs and frustrations with classmates, shared study materials, worked through the night, and learned about fellow classmates' personalities and strengths. Alec says that the BME program at IUPUI uniquely prepared him for many aspects of the dental school curriculum including dental material science and tooth morphology. He stated, "Not only is much of the content from BME classes applicable, but the rigor and pace of the BME curriculum helped to sharpen my critical thinking and improve my self-discipline in preparation for professional school."

**Alec Weiss (BS BME '20)
IU School of Dentistry (IUSD)**



Dental school at IUSD has been a unique experience thus far for Alec, since students have adapted to a primarily home-based study. While the school traditionally holds retreats and activities for newly matriculated

Congratulations to the BME Class of 2020!



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Class of 2020



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MESSAGE FROM THE

CHAIR

Joseph M. Wallace, PhD

Professor and Interim Chair of the Department of Biomedical Engineering

I arrived on the campus of IUPUI 10 years ago this fall as a new Assistant Professor of Biomedical Engineering. I had no way of knowing what things would look like a decade later. In January of 2020, I was given the opportunity to take on the role of Chair of BME. I step into the shoes of our former (and only) previous Chair, Dr. Ed Berbari. Ed started this program and along with several other current faculty, built things from the ground up. I am so thankful to have the opportunity to take over the reins and navigate IUPUI at BME into the next phase of its maturation. Among other exciting things to come, we recently received approval from the Indiana Commission for Higher Education for our own locally-administered PhD program. Although this means a departure from the joint program we have shared with the Weldon School of Biomedical Engineering in West Lafayette, we see this as an important next step in our growth. We are all excited to bring on our first students this upcoming spring.

I would like to share that my research lab is alive and well during this administrative appointment. I am the Director of the Bone Biology and Mechanics Laboratory (BBML). As the name implies, we focus on bone mechanics (the ability of bone to bear loads) and mechanobiology (how cells respond to mechanical stimuli to maintain or increase bone mass). The BBML's goal is to utilize combinatorial treatments for a number of relevant diseases which have musculoskeletal complications leading to bone fragility and fracture. Our current focus is on mechanical and pharmaceutical manipulations of bone quality and

quantity. We heavily study the role collagen plays in bone fracture resistance, and how osteocytes maintain and modulate bone tissue quality. More information about the BBML can be seen [here](#).

I specialize in mechanical properties of biological tissues, mechanically mediated skeletal adaptation, and atomic force microscopy. My interests include how collagen plays a role in bone health and fracture resistance; mechanically mediated skeletal adaptation; and combinatorial drug and mechanical therapeutics for defects and disease in bone.

Although this academic year has come with unprecedented challenges, the BME department is proud of our student and faculty accomplishments. Several BME graduates from the past few years have entered professional school at the IU School of Dentistry, Northwestern University Prosthetics and Orthotics, and MD/PHD at Texas A&M, while others have sought out internships at Eli Lilly and Company, research positions at IUPUI, and more. Many BME undergraduate seniors decided to continue their higher education and pursue a master's degree as part of our 5-year BS/MS BME combined degree program. This year, we have 27 graduate students at IUPUI. As a sign of the current and future strength of the department, BME faculty were awarded over \$2.3 million in research funding in the last fiscal year. Notable sources of this funding include local and state entities, as well as federal sources including the National Institutes of Health and the National Science Foundation. Given the size of

our faculty, this is a remarkable achievement so congrats to all!

This fall, we welcome Kayla Maxey as a Visiting Lecturer in BME. Kayla completed her BS in BME from Syracuse University and went on to complete her master's degree in healthcare technology management from Marquette University and The Medical College of Wisconsin. After spending several years in industry, she returned to academics and is completing her PhD in Engineering Education at Purdue University. Kayla will initially be teaching our 200-level laboratory courses and will help to execute other courses throughout the curriculum. We also welcome our continued collaboration with organizational leadership, specifically with Julie Stella who is teaching our BME second and third year in their Technical Communication courses with emphasis on technical writing, data reporting, and data presentation.

Our BME department also strives to foster BME community. Our BME undergraduate students are using Miro and Zoom to encourage virtual community building and engagement. Students are encouraged to use these platforms for activities to facilitate classmate bonding across the BME department. More information about virtual community building can be seen [here](#) in the first edition of the BME Education journal, [Biomedical Engineering Education](#).

None of us know what will come over the next academic year. I am confident that our faculty, staff, and students will rise to whatever challenges we meet. I am grateful for the opportunity to serve as Chair and look forward to the road ahead.

UNDERGRADUATE STUDENTS



This summer, all manufacturing and quality science (MQ) interns had a virtual internship at Eli Lilly and Company. Lilly shipped each intern a company laptop with all the essential software and ergonomic equipment since the majority of the projects were computer based. **Wushuang Yang (BS BME '21)** applied strategies related to drug product commercialization and had many opportunities to schedule one-on-one meetings with Lilly employees to learn more about the company, culture, and opportunities that Lilly has to offer. Wushuang really enjoyed the internship and learned about the many opportunities in MQ for engineers (besides the typical engineering role) that still practice the engineering principles, such as problem solving and GMP (good manufacturing practice).

Although COVID-19 caused his 10-week summer internship to be held virtually rather than on site at the Eglin Air Force Base in Florida, **Charles Rumberger's (BS BME '21)** is thankful to have been given this opportunity to expand his skill set, interact with military and industry representatives, and learn

about today's key areas of focus within defense and aerospace research. Charles's primary work over the summer was to develop software tools and methods for wireless communication with magnetic field sensors to support research into flight navigation in honeybees. Past experiences with Python, Raspberry Pi, and analog sensors were important to his selection for this role.



Charles is continuing to work with the Air Force Research Laboratory through a part-time internship this fall.

GRADUATE STUDENTS

Sabria Abufares (BS BME '20, MS BME '21), a master's student in BME, was a Medicines Innovation Hub intern within Bioproduct Research and Development at Eli Lilly and Company. Sabria had both a virtual and lab-based internship in bioassay development.

Over the course of the internship, Sabria was able to see the ethics of Team Lilly and the role they play in the community, especially with their rapid response to COVID-19 in Indianapolis. After

concluding the internship, Sabria improved her research techniques, communication skills, and confidence as a biomedical engineer.

Carli Tastad's (MS BME '20) studies originate in ceramic engineering, but after she had two internships at the orthopedics company Ossur, her interest in biomechanics led her to the BME master's program at IUPUI. She started as a research assistant in Dr. Wallace's BBML in August of last year.



She spent the first year working on several different projects in the lab learning about the biology and mechanics of bone and how to conduct various mechanical tests, such as 3 and 4-point bending and fracture toughness. This past summer, Carli started her thesis project about investigating the thermoregulation of mice. She is currently running a tibial loading study in combination with raloxifene treatment and housing mice at different temperatures. She will be utilizing mechanical testing techniques and applying her new knowledge of bone biology to her analysis.

BME Award Recipients and Recognition for 2020

Student Scholarship and Award Recipients

BME Awards

Timothy Hostetler Bepko Scholarship for Outstanding Academic Achievement
Isaac Demaree, Anna Snider BME Scholarship for Outstanding Academic Achievement for Sophomore Year
Jacob Slack Bepko Scholarship for Outstanding Academic Achievement
Collier Smith BME Scholarship for Outstanding Academic Achievement
Rachel Surridge Charles H. Turner Outstanding Academic Achievement
Charles Rumberger Bepko Continuing BME Student Scholarship
Rachel Cadle Biomedical Engineering Outstanding Service Award
Cayla Skaggs Exemplary Internship or Research Award
Ashley Twigg Outstanding Engineering EDDP Student Award

IUPUI Top 100

Sabria Abufares (Top 10 Recipient), **Samuel Olubakinde, Cayla Skaggs, Nicole Zellers**

Other Recognitions

Sabria Abufares William M. Plater Civic Engagement Medallion
Thomas Hess Pacers Foundation Scholarship
Nicole Zellers Indy 500 Princess, Graduate Fellowship from Alpha Lambda Delta, Maria Leonard Senior Book Award from ALD, Distinguished Member Scholarship from Phi Eta Sigma
Jen Hatch IUPUI University Fellowship
Alec Weiss Richard J. Schnell Memorial Scholarship

Faculty Awards and Accomplishments

Awards

Dr. Lin Full Professor Status and Thomas J. Linnemeier Guidant Foundation Endowed Chair
Dr. Wallace Full Professor Status, Interim Chair
Dr. Miller NSF IAspire Leadership Fellow

Funding Recognition

Dr. Lin Walther Cancer Foundation
Dr. Wallace NSF LEAP-HI, NIH F30

Publications

Dr. Xie published in the journals: Journal of Biomaterials Applications, Journal of Biomaterials Science Polymer Edition, Polymers for Advanced Technologies, Journal of Composite Materials, and Saudi Dental Journal
Dr. Lin published in the journals: Advanced Biosystems, Journal of Materials Chemistry B, Carbohydrate Polymers, and Gels
Dr. Wallace published in the journals: Bone Reports, Calcified Tissue Intl, Journal of the American Society of Nephrology, and more
Dr. Na published in the journals: Archives of Biochemistry and biophysics, Biochemical, and Biophysical Research Communications
Dr. Higbee, Dr. Miller, and colleagues published in the journals: Australasian Journal of Engineering Education, Biomedical Engineering Education (inaugural issue)

Biomedical Engineering

Seminar Schedule • Fridays at 12 PM

September 4th

Craig Goergen, PhD • Purdue University Weldon School of Biomedical Engineering

September 18th

Lauren Christopher, PhD • IUPUI Department of Electrical and Computer Engineering

October 2nd

Richard Gregory, PhD • IU School of Dentistry

November 6th

James Marrs, PhD • IUPUI Department of Biology

November 20th

John Schild, PhD • IUPUI Department of Biomedical Engineering

December 4th

Joseph Wallace, PhD • IUPUI Department of Biomedical Engineering

Faculty Research Areas

Julie Ji, PhD

- Vascular Mechanobiology

Chlen-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