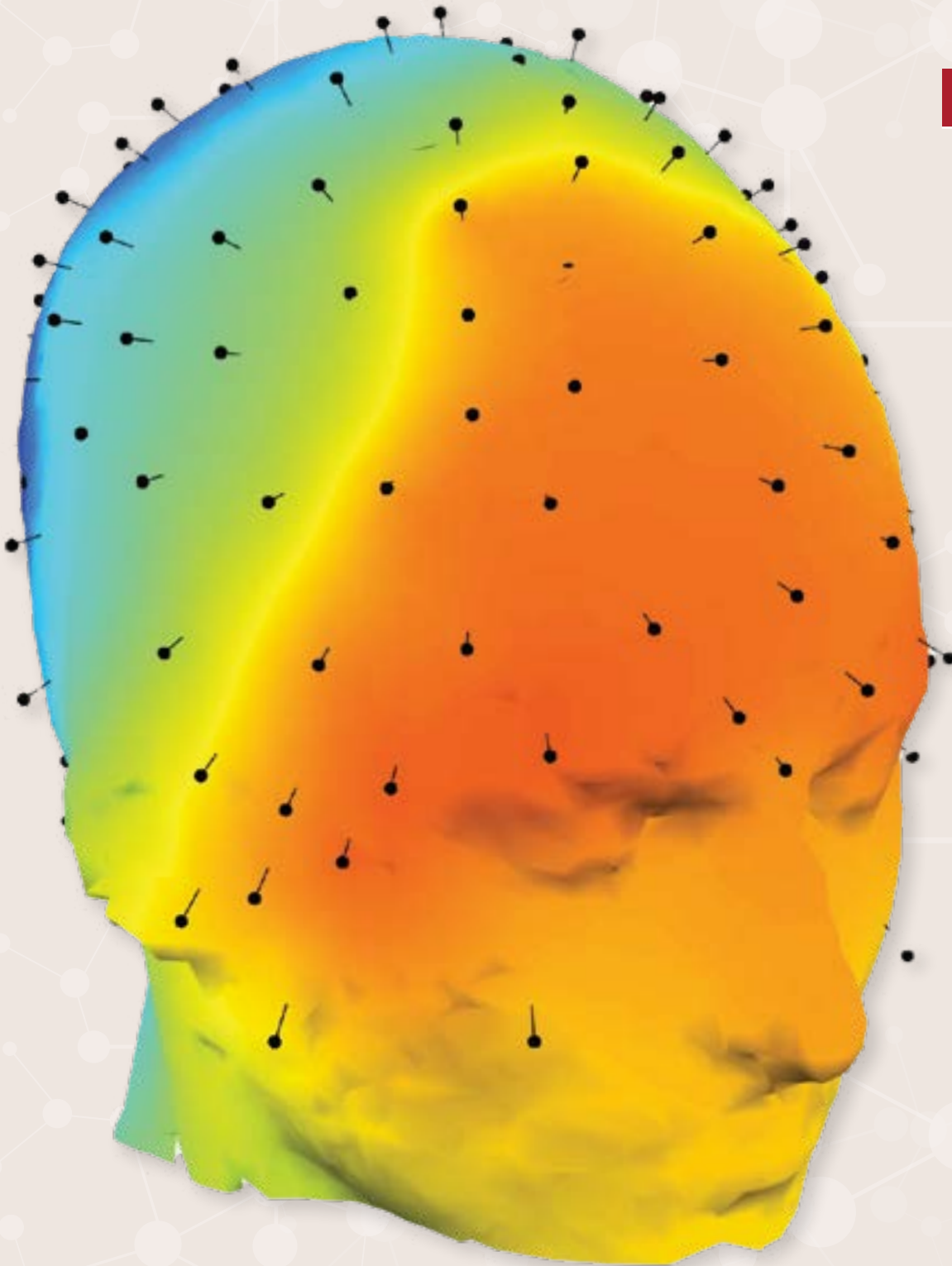




**LEHIGH**  
UNIVERSITY

P.C. Rossin College  
of Engineering and  
Applied Science



**IN THIS ISSUE:**

—2—

Creative Paths  
& Possibilities  
Women of Lehigh  
Soaring Together

—3—

Bioengineering  
Moving to a New  
Research  
Neighborhood

—5—

Building a  
Better Tool for the  
Diagnostic Toolkit

—6—

The Lehigh  
MS Degree: A  
Path to Promising  
Careers

FALL 2021 Newsletter



## DEPARTMENT WELCOME

What a year it's been! When I came aboard as the department Chair in the Fall of 2020, Lehigh Bioengineering was, as I am sure you were too, in the thick of pandemic-imposed lockdowns, remote classes, and mandatory health screenings. Our faculty, staff, and students rose to the challenge and adapted to this new academic culture with aplomb! We're still not out of the woods, but we have emerged stronger, experienced, and with critical insight into the benefits and enhanced outreach of virtual learning. As we've returned to in-person learning this Fall, we are adapting our situation-mandated pedagogical changes to expand the scope and outreach of our degree programs, including recruiting non-traditional and cross-disciplinary students to our disciplinary fold. Watch for exciting, diversified programmatic offerings from Lehigh Bioengineering in the next year!

### Lehigh Bioengineering through the years

LAUNCHED  
UNDERGRADUATE  
PROGRAM

**2002**

GRANTED FIRST  
BACHELOR'S  
DEGREES

**2006**

LAUNCHED  
GRADUATE PROGRAM

**2010**

GRANTED FIRST  
MASTER'S DEGREES

**2011**

GRANTED FIRST  
DOCTORAL  
DEGREES

**2014**

CONVERSION TO  
DEPARTMENT OF  
BIOENGINEERING

**2017**

COLLEGE OF HEALTH  
LAUNCHED

**2018**

ANAND RAMAMURTHI  
APPOINTED AS  
DEPARTMENT CHAIR

**2020**

In this issue of the newsletter, we join the University in celebrating Lehigh Women and 50 Years of Coeducation at Lehigh by celebrating the Women of LU BioE! We are proud to highlight our strong track record of engaging women in bioengineering education - 40% of our faculty members, close to 60% of our students, and all our administrative staff are women! Our women faculty are trailblazers in the Bioengineering field, with dynamic and award-winning contributions to teaching, pedagogical innovation, cutting-edge research, and to providing leadership for BioE degree programs, the College of Engineering, and our Interdisciplinary Research Institute for Functional Materials and Devices (I-FMD). In the 'Soaring Together' article, we highlight two accomplished female undergraduate BioE students, making their mark as bioengineers, scientists, and entrepreneurs; our 'Alumni Spotlight' visits recent MS program alumni in their new professional roles.

We have many successes to be proud of! Yu Zhang's research program in computational neuroscience, medical imaging computing, and machine-learning/AI is tackling diagnosis and treatment of complex neurological disorders. A team of undergraduates including BioE students, mentored by Xuanhong Cheng, won 1st place in the NIH DEBUT Challenge on Healthcare Technologies for Low-Resource Settings. A research paper from Yaling Liu's group published in Scientific Reports, was ranked among the 2021 top 100 downloaded cancer papers in the journal. Frank Zhang and collaborators have, for the first time, identified the specific mechanism for activation of von Willebrand Factor (vWF), an essential blood clotting protein. This work, with wide implications to develop novel antithrombotic treatments, was recently funded by a \$2.3-million NIH R01 award.

We also are excited to introduce our newest faculty member, Niels Holten-Andersen (Massachusetts Institute of Technology), an expert in bio-inspired materials engineering. Niels, with a joint faculty appointment in Material Science and Engineering and an educational background in Biomolecular Sciences, is ideally qualified to advance cross-disciplinary collaborations. This past year, the first cohort of our new undergraduate Biocomputational Engineering major took advantage of new course offerings in the department. And we're particularly excited about our role in the upcoming launch of a new research neighborhood focused on healthcare-driven research and the Health and Science Technology (HST) Building opening later this Fall, the new home of several current bioengineering faculty and new hires, along with faculty from the Rossin College of Engineering, the I-FMD, and the College of Health.

We are eager to tell you about other successes, too - publications, grant awards, recognitions and student achievements. We hope to hear from you, and now that we are back open, we look forward to your visit!

ANAND RAMAMURTHI



# Welcome

## NEW BIOENGINEERING FACULTY & STAFF



**NIELS HOLTEN-ANDERSEN**

Joined the BioE/  
MatSci faculty in  
August 2021 as an  
Associate professor,

after holding a position of Associate Professor in the Department of Material Science and Engineering at the Massachusetts Institute of Technology. He earned his PhD in Biochemistry from the University of California, Santa Barbara. Holten-Andersen's research focuses on biological and bioinspired materials, with a secondary emphasis on soft condensed matter mechanics.



**SAJEDEH  
YAZDANPARAST**

Completed her PhD  
in Bioengineering  
at Lehigh University  
and began work as a  
postdoctoral fellow  
in the X.F. Zhang  
research group.



**YINAN LU**

Earned a PhD  
in Mechanical  
Engineering from  
the University of  
Colorado at Boulder.

In his role as a postdoctoral fellow in the lab of Anand Jagota, Lu works on the fracture, friction and adhesion of soft materials.

# CREATIVE PATHS AND POSSIBILITIES

WOMEN OF LEHIGH SOARING TOGETHER



Lehigh recognizes the leadership and accomplishments of Lehigh women like Hunt and Karim and the impact of coeducation through Soaring Together, a celebration marking 50 years since the admission of undergraduate women. Read more at [lehigh.edu/soaringtogether](http://lehigh.edu/soaringtogether).

## Natasha Hunt '22: Research experience reveals new paths and possibilities.

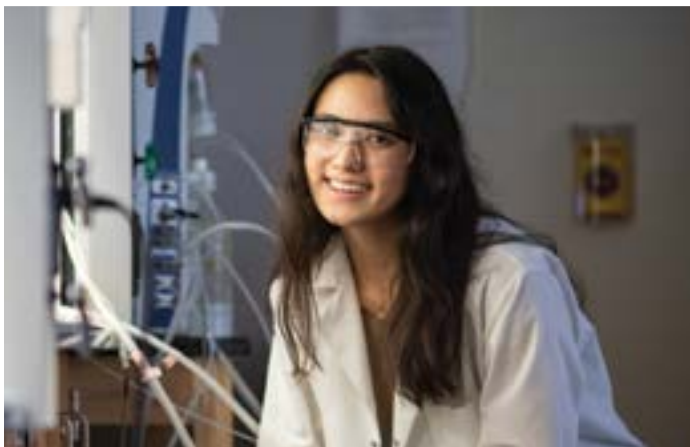
Bioengineering major Natasha Hunt '22 is grateful for her research experience at Lehigh and how it has put her on a path she once only dreamed about. "I get excited by so many aspects of it," she says. "You get to design the project and organize how it goes, then you get to do it, and you hope it works out great. But the failures are research, too, because when things don't work out, you learn so much."

Hunt works in the **Chow Lab** (Lehigh's modular biomaterials laboratory) with a team **designing 3D scaffolds** to address osteochondral defects—those composed of both bone and cartilage—in the knee. Her own project is a collaboration with Johns Hopkins University and looks specifically at using a similar approach for craniofacial injuries. It's been funded in part through **Lehigh's Grants for Experiential Learning in Health** program.

Hunt came to campus convinced she wanted to become a doctor—especially after shadowing physicians and attending more than a dozen surgeries the summer after her first year of college. But the exposure to research as a sophomore and junior upended that certainty.

"I was swinging back and forth between the two, and now what appeals to me most is an MD-PhD." Both pursuits appeal to her in similar ways. She loves puzzles, and diagnosing patients and analyzing results present different puzzles to solve, every day. And success depends on teamwork.

It would be a long process, she says, eight years at least. But she's adopted the mindset that her life and professional career doesn't begin at graduation, it begins now.



## Sareena Karim '22: A creative scientist, bioengineer, and entrepreneur.

It would be a long process, she says, eight years at least. But she's adopted the mindset that her life and professional career doesn't begin at graduation, it begins now.

If there's one thing that research has taught Sareena Karim '22, it's to have an open mind, and not just be so focused on producing data that you miss the creative potential in those data.

Karim, whose mother has multiple sclerosis, had a long interest in pursuing a career in regenerative medicine and tissue engineering. She came to Lehigh as a bioengineering major, with an entrepreneurship minor, and a RARE scholar. **The Rapidly Accelerated Research Experience** is a four-year program that provides students from backgrounds underrepresented in STEM with innovative experiential learning opportunities to accelerate their development as scientists.

As a sophomore, she began working with **Lesley Chow**, an assistant professor of bioengineering and materials science and engineering. Karim was part of the Chow Lab team designing tissue scaffolds that promote tissue growth when she had a lightbulb moment for her haircare startup, **Foli-Q**.

"My sisters and I are all mixed, and we've always struggled to find products that actually fit us," says Karim. "With Foli-Q, I analyze a customer's hair, and based on that analysis, pair specific ingredients for their hair's optimum health."

The company is currently in beta, and Karim is planning for a formal launch after graduation, and before she starts a graduate degree in cosmetic science.

It's a path that never would have materialized without the skills she developed in Chow's lab, and what she calls "idea thinking." But it did take considerable self-reflection.

"Realizing I want to run a business meant taking a step back from what I initially came to do and figuring out who I am and what I want for my life," she says. "I'm definitely a scientist and engineer, but I'm a creative scientist and engineer."

— CHRISTINE FENNESSEY

Photo credits: Douglas Benedict/Academic Image

# BIOENGINEERING MOVING TO A NEW RESEARCH NEIGHBORHOOD

*Building Image Credits HGA*

Our most highly anticipated event this fall is our move to the **Health, Sciences & Technology Building (HST)**

Located on Lehigh's Asa Packer campus, the HST is a flagship, strategic academic and research initiative. Dubbed a 'research sandbox,' the 195,000 sq-foot facility is designed to blur disciplinary boundaries to facilitate collaboration among researchers from different colleges, departments, and fields to provide synergy to applied healthcare research on campus. The building presents an open-concept, flexible floor plan with shared labs and core facilities for experimentalists, workspaces for computational and quantitative researchers, and gathering spaces for students and faculty.

Research in the HST will focus on the dual interdisciplinary themes of *Functional Materials and Devices for Energy Conversion and Biofabrication, Devices, and Quantitative Bioscience for Health*. Integration of research expertise within the HST will be driven by activities centered on *Advanced Characterization and Device Performance and Computational, Theoretical, and Data-Driven Research*. In the past decade, rapid advances in tissue engineering, stem cell technologies, gene editing, and 3D printing have raised prospects for design and fabrication of sophisticated biological constructs suitable for clinical applications. Integration of these platforms with emerging diagnostic, imaging, and treatment devices, in combination with faculty strengths in computational modeling and data analytics, promises to drive research in bio-health. Additionally, this integration can provide the framework to advance point-of-care, precision health, and health monitoring device technologies, and to generate new paradigms for soft nanorobotics.

Joining faculty from Chemical and Biomolecular Engineering, Material Science and Engineering, and members of the Lehigh University Institute for Functional Materials and Devices (I-FMD), several of our Bioengineering faculty working at this disciplinary intersection (see **Schematic**) will relocate their research programs to the HST. The HST will provide bioengineering faculty and students with critical research infrastructure and the collaborations necessary to support innovative research and development in bio-health. Importantly, it will be the impetus for the department's growth in point-of-care and wireless technologies for diagnostics, and remote health monitoring and therapy.

As the home of the new College of Health (CoH), "the HST will provide tremendous opportunities for Bioengineering faculty to develop mutually beneficial work around the research pillars of the CoH, in population health, precision health and health innovation and technology" says Anand Jagota, Professor of Bioengineering and Associate Dean of Research of the CoH (see **Inset**). **We can't wait!**

## BIOENGINEERING AT THE FRONTIER OF POPULATION AND PRECISION HEALTH

Lehigh's newest of its five colleges, the College of Health (CoH), is a pioneer in offering undergraduate and graduate degrees in population health with emphasis on health innovation and technology. Founded in 2019 as a nexus for healthcare research focusing on value-based healthcare delivery, and social and behavioral determinants of health, the CoH has expanded its mission to include data-driven research in precision health and health innovation and technology. Not surprising, thus, that Anand Jagota, Professor of Bioengineering and Founding Chair of the Department, was called upon to serve as the first Associate Dean of Research of the CoH. In his new role, Jagota will identify new research opportunities, support cross-disciplinary collaborations, particularly with the Rossin College of Engineering, develop infrastructure for healthcare research, and lead the development of external research partnerships with healthcare institutions and industry.

As the primary home of biomedical engineering research and development on campus, the BioE department is excited to leverage the complementary expertise offered by the rapidly growing CoH faculty. Besides serving as a coordinating hub for health-related research at Lehigh, the CoH is expected to support the strategic diversification and growth of the BioE department over the next five years in technology innovation in wearables, flexible electronics, point-of-care devices, and remote sensors, in addition to biocomputational modeling and data analytics. With the added value of research partnerships, experiential learning opportunities in the CoH for our undergraduate Biocomputational Engineering students and possibilities for new, interdisciplinary graduate programs centered on healthcare analytics and biocomputations, the future is bright for Bio-health at Lehigh.

# COLLEGE OF HEALTH

Functional Materials  
and Devices for  
Energy Conservation

Biofabrication,  
Devices, and  
Quantitative  
Bioresearch for Health

Computational, Theoretical,  
and Data-Driven Research

## HST

The Hub of  
Interdisciplinary Research.

Advanced Characterization  
and Device Performance

# INSTITUTE FOR FUNCTIONAL MATERIALS AND DEVICES



## BIOINSPIRED MATERIALS

**THE HOLTEN-ANDERSEN GROUP**  
The Holten-Andersen Group studies bio-inspired materials to enhance control and expand applications of polymer materials designed to help overcome global challenges in energy, environment and health.



## BIOMEMS AND POINT-OF-CARE DEVICES

**THE CHENG LAB** focuses on micro/nanotechnology, chemical, optical, mechanical and electrical approaches for understanding cell metabolism and function, and on novel microfluidic devices for point-of-care and global health diagnostics.



## NANO/MICRO ENGINEERING

**THE LIU GROUP** uses experimental and computational mechanics approaches to characterize the interfacial phenomena at the micro/nano scale and in biological systems. His lab focuses on emerging applications in biosensing, micro/nanofabrication and bio medicine.



## NANOBIOTECHNOLOGY

**THE JAGOTA GROUP** focuses on interfacial mechanical properties of soft materials, and DNA interactions with nanomaterials, specifically on hybrids with carbon nanotubes, biomechanics of viral adhesion and biomimetics of fibrillar adhesion.



## MATRIX REGENERATIVE NANTHERAPEUTICS

**THE RAMAMURTHI LAB** develops stem cell, and biomimetic, nanomaterial-based technologies to grow connective tissues on demand or enable tissue repair, and to identify novel drug targets for regenerative benefits to alleviate proteolytic disorders.



## ENZYME-RESPONSIVE BIOMATERIALS

**THE PASHUCK LAB** designs novel, clinically-applicable biomaterials to guide cells for specific regenerative outcomes by utilizing enzyme responsive peptides and nanoscale organization to control the chemistry and placement of biological motifs within hydrogels.

# BUILDING A BETTER TOOL

## FOR THE DIAGNOSTIC TOOLKIT

*Yu Zhang and his team combine machine learning and brain imaging that may aid in the optimization of treatment for brain disorders*



One of the difficulties of treating psychological disorders is the hit-or-miss nature of pharmacological treatments and therapies. “For depression, patients may all get more or less the same antidepressant medication. Some patients may improve and other won’t,” says Yu Zhang, assistant professor of bioengineering.

Currently Zhang is researching ways to better target remedies for psychological disorders by identifying biomarkers in the brain that could provide more precise diagnoses of disorders, and therefore better predict which therapies would have the best chance of success. “Right now, psychological treatments are often one-size-fits-all,” Zhang says. “We want to customize treatments in a more focused and effective way.”

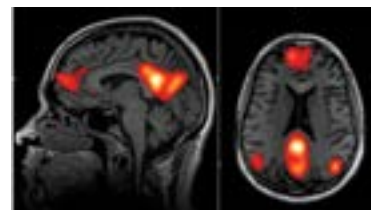
Zhang, who came to Lehigh last year from Stanford, is the founder and director of the Brain Imaging and Computation Laboratory, which combines machine learning and brain imaging for uses like targeted medicine and brain/computer interactions.

Presently, the Diagnostic and Statistical Manual of Mental Disorders, or DSM, is the standard resource available to clinicians for psychological diagnoses, and it provides a framework for diagnosis. But Zhang points out two limitations to the framework, the potential for subjective diagnosis that is not clearly associated with neurobiological abnormalities, and the presence of comorbidities that might span distinct diagnoses. “The intrinsic limitation of DSM is that it cannot handle the heterogeneity issue in the brain disorders. Different causal mechanisms may relate to the same disorder and multiple outcomes of interest can occur within one individual. A patient might have depression, but also some symptoms associated with anxiety or PTSD,” says Zhang. “So, if you treat this patient as having a single disorder, it could be difficult to arrive at an optimal approach.”

Zhang looks to add biomarkers to the diagnostic equation by examining the physiognomy and connectivity in the brain to create what he calls biological profiles of patients. By testing the effectiveness of particular therapies on patients with similar profiles, clinicians would have another tool in their kit when deciding which therapy to select for patients. “By leveraging machine learning, we’re trying to build a data-driven model that can capture dysfunctions as measured by functional MRI, EEG, and other types of imaging,” explains Zhang. “That could then be measured against the treatment outcome of a certain type of intervention.”

Zhang has already had results that point to the effectiveness of his methods. In a paper published earlier this year in *Nature Biomedical Engineering*, based on EEG connectivity patterns, Zhang and his team identified two distinct profiles found in the brains of patients with PTSD, and found the same profiles in patients with major depressive disorder (MDD). The team further investigated to see if there was a difference in the patients’ response to anti-depressant medication and psychotherapy and discovered one profile responded far better to the therapies, in comparison to the placebo. “This was a very encouraging result,” Zhang says. “It’s the kind of thing that could lead to very precise and effective interventions for patients.”

Zhang is hopeful that his continued work and feedback from psychotherapists will lead to faster and more reliable help for those dealing with psychological disorders. “We always stay in very frequent communication with psychiatrists and psychologists,” he says. The information they provide is quite important to build a more interpretable and functional model that is translatable to clinical practice.”





# THE LEHIGH MS DEGREE: A PATH TO PROMISING CAREERS



Three women who recently completed the Department of Bioengineering master's program highlight the depth of the program's offerings, a curriculum designed to meet each student's academic goals, and the variety of career opportunities open to graduates. Nelly Cheruiyot '20, Megan Kozar '18 and Whitney Lai '18 each blazed their own path through the program, and they are now pursuing promising careers in challenging industry sectors.

Cheruiyot, who is now a biochemist in assay development at Vessel Health, selected Lehigh's master's program because the flexibility of the curriculum appealed to her. "I liked the fact that there were different tracks—such as biocomputations, materials and therapies, and diagnostics and devices," she said. "I focused on biopharmaceutical engineering as I had a strong background in biology and chemistry."

At Vessel, Cheruiyot is enjoying the variety of her work, and the chance to take the initiative and pursue promising leads. "I don't do the same thing day in, day out, because it's still a young company," she says. "There is a lot of room for innovation in my job, and a lot of room for growth."

After several years working at Sanofi Pasteur, Kozar began a new position as an associate scientist at Johnson & Johnson in June, developing processes to make monoclonal antibodies and cell-based therapies. "I think what sets engineering apart from a lot of other fields is its practical, problem-solving nature," she says. "You have to be fixing something that's going to ultimately be useful and cost-effective. I've really enjoyed that aspect of my work."

Since Kozar studied at Lehigh as an undergraduate, the master's program was an easy choice. "The engineering here is very strong, and I had a great connection with the faculty. What I really liked about the program was that it gave me the chance to explore several different interests; the program provides the knowledge base to pursue various avenues with our degree," Kozar says. "There was a lot of support for people who wanted to follow the academic route, but there was plenty of support too for people like me who wanted to go into industry. You could weave your way through the program as you saw fit, depending on your ultimate career goal."

Lai, too, found she could branch off and try out new things with the support of the faculty. "I think what made me really love Lehigh was just how passionate the professors were, and how much they believed in their students," she says. While at Lehigh, Lai started her own nonprofit, Enabling the Future, using 3-D printing to produce prosthetics for those in underserved communities. "The initiative is focused on children, since oftentimes children need to wait until they're 18 to get a prosthesis because they keep growing and the manufacturing is expensive," Lai says.

After completing her studies, Lai parlayed her expertise into orthopedics, constructing models based on MRI scans to assist doctors preparing for complex operations. She then was hired by Surgical Theater, a medical startup, where she is a senior virtual reality clinical engineer, creating virtual replications to assist in the analysis and planning for surgical procedures and patient consultations. Working at the nexus between product developers and doctors, Lai's role is critical to making the surgical simulations successful. "My job is to use the company software to create these simulations. If a doctor says they need to see more of that section of the spinal cord, I make it happen," she says. "I'm their eyes and ears."

— CHRIS QUIRK

Learn more about Lehigh's Bioengineering **graduate program and degree options** and about the yearlong **Soaring Together** celebration of Lehigh Women and 50 Years of Coeducation

## 2021 GRANT SUCCESS

**XUANHONG CHENG** (BioE, MatSci) in collaboration with James Gilchrist (ChBE) and Kelly Schultz (ChBE) recently received funding in the amount of \$400k from the The National Science Foundation for a research project titled “*Thermophoresis in quiescent non-Newtonian fluids for bioseparations.*”

**THOMAS PASHUCK** (BioE) was awarded a 2 year NIH R21 Grant of \$408k focused on “*Designing technologies to visualize protease activity in cancer models.*”

**X. FRANK ZHANG** (BioE), Wonpil Im (Chemistry), Renhao Li (Emory), and Shixin Liu (Rockefeller) have received a 4 year grant in the amount of \$2.3 million from the U.S. Department of Health & Human Services for a project titled “*Mechanical regulation of von Willebrand factor.*”

**X. FRANK ZHANG** (BioE) and Wonpil Im (Chemistry) recently received funding for 2 years in the amount of \$426k for a project titled “*Biophysical characterization of SARS-CoV-2 spike protein-receptor interactions.*”

**ANAND JAGOTA** (BioE, ChBE) and **YALING LIU** (BioE, MEM) received funding in the amount of \$381k from the National Science Foundation (NSF) for a 3-year research project titled “*Multiphase Modelling and Experimental Characterization of Respiratory Microdroplet Suspension and Resuspension Dynamics Near Surfaces.*”

**ANAND RAMAMURTHI** (BioE) received funding in the amount of \$220k from the National Science Foundation (NSF) for a 2 year research project titled “*Collaborative Research: Design and development of a multifunctional nanoplatfom for augmented elastic matrix repair.*”

**ANAND RAMAMURTHI** (BioE) was awarded \$360K from the U.S. Dept. of Health & Human Services for a research project titled, “*Matrix regenerative nanotherapeutics for small abdominal aortic aneurysm repair.*”

Massachusetts General Hospital awarded **YEVGENY BERDICHEVSKY** (BioE, ECE) \$88K for a research project titled “*Anticonvulsant screening using chronic epilepsy models.*”

## 2021 PUBLICATION SPOTLIGHT

Lehigh Bioengineering faculty members and Bioengineering students co-authored more than 50 publications that were accepted for print in the last year. Some of the notable ones are listed below. (Names in BOLD are current Lehigh BioE faculty or current/former Lehigh BioE students)

**GHIASVAND, S.**, Liu, J., **ABEDIN, MD.**, **BERDICHEVSKY, Y.** 2021 Protocol for Rodent Organotypic Hippocampal Slice Culture Model for Ex Vivo Monitoring of Epileptogenesis. *Experimental and Translational Methods to Screen Drugs Effective Against Seizures and Epilepsy* 11-28

Zeng, Y., Ferdous, Z., Zhang, W., Xu, M., Yu, A., Patel, D., Post, V., Guo, X., **BERDICHEVSKY, Y.**, Yan, Z. 2021 Understanding the Impact of Neural Variations and Random Connections. *Frontiers in Computational Neuroscience* **15**

Liaw, CY., Tolbert J.W., **CHOW, L. W.**, Guvendiren, M. 2021 Interlayer bonding strength of 3D printed PEEK specimens. *Soft Matter* **17**

**CAMACHO, P.**, **FAINOR, M.**, **SEIMS, K. B.**, Tolbert, J. W., and **CHOW, L. W.** 2021 Fabrication of Spatially Functionalized 3D-printed Scaffolds for Osteochondral Tissue Engineering. *Journal of Biological Methods* **8** This paper was also featured on the cover.

**CAMACHO, P.**, Behre, A., **FAINOR, M.**, **SEIMS, K.B.**, **CHOW, L.W.** 2021 Spatial Organization of Biochemical Cues in 3D-Printed Scaffold to Guide Osteochondral Tissue Engineering. 2021 *Biomaterials Science: Emerging Investigators Issue*

Nikfar, M., Paul, R., Islam, K., Razizadeh, M., **JAGOTA, A.**, **LIU, Y.** 2021 Respiratory Droplet Resuspension Near Surfaces: Modeling and Analysis. *Journal of Applied Physics* **130** 024702

Razizadeh, M., Nikfar, M., **LIU, Y.** 2021 Small Molecule Therapeutics to Destabilize the ACE2-RBD Complex: a Molecular Dynamics Study. *Biophysical Journal* **120**

**CHANDRASEKAR, S.** and **JEDLICKA, S.** 2021 Impact of Single-Walled Carbon Nanotubes on Neural Progenitors: From Endocytosis to Differentiation *Biophysical Journal* **120**, 171a

Lin, Y., Penna, M., Spicer, C. Higgins, S., Gelmi, A., Kim, N., Wang, S., Wojciechowski, J., **PASHUCK, E.T.**, Yarovsky, I., Stevens, M. 2021 High-Throughput Peptide Derivatization Toward Supramolecular Diversification in Microtiter Plates. *ACS nano* **15**

Carney, S, Broekelmann, T., Mecham, R., **RAMAMURTHI, A.** 2021 JNK2 Gene Silencing for Elastic Matrix Regenerative Repair. *Tissue Engineering Part A* **August**

**FERGUSON, C.**, Pini, N., Du, X., Farina, M., Hwang, J., Pietrangelo, T., **CHENG, X.** 2021 Broadband Electrical Impedance as a Novel Characterization of Oxidative Stress in Single L6 Skeletal Muscle Cells *Analytica Chimica Acta* **338678**

Kania, S., Oztekin, A., **CHENG, X.**, **ZHANG, X. F.**, Webb III, E. 2021 Predicting Pathological von Willebrand Factor Unraveling in Elongational Flow. *Biophysical Journal* **120** 1903-1915

Wang Y, **PISAPATI, A.**, **ZHANG X. F.**, **CHENG, X.** 2021 Recent Developments in Nanomaterial-Based Shear-Sensitive Drug Delivery Systems. *Advanced Healthcare Materials* **2002196**

Arce, N.A., **CAO, W.**, Brown, A.K., Legan, E.R., Wilson, M.S., Xu, E.R., Berndt, M.B., Emsley, J., **ZHANG, X. F.**, Li, R. 2021 Activation of von Willebrand Factor via Mechanical Unfolding of its Discontinuous Autoinhibitory Module. *Nature Communications* **12**, 1-14

Dong, C., Choi, Y.K., Lee, J., **ZHANG, X. F.**, Honerkamp-Smith, A., Widmalm, G., Lowe-Krentz, L., **IM, W.** 2021 Structure, Dynamics, and Interactions of GPI-Anchored Human Glypican-1 with Heparan Sulfates in a Membrane. *Glycobiology* **31**, 593-602

Chen, X., Yao, L., Zhou, T., Dong, J., **ZHANG, Y.** 2021 Momentum Contrastive Learning for Few-Shot COVID-19 Diagnosis from Chest CT Images. *Pattern Recognition* **113**

**WE'D LOVE TO HEAR MORE FROM YOU!**  
Send your news to [inbioe@lehigh.edu](mailto:inbioe@lehigh.edu), or visit our home page, [lehigh.edu/bioe](http://lehigh.edu/bioe) and scroll down to our news update link!



## NOTABLES AND MEDIA MENTIONS



A research paper from the **LIU LAB**, (Professor **YALING LIU**), “Label-free detection of rare circulating tumor cells by image analysis and machine learning,” published July 22, 2020, in **Scientific Reports**, was downloaded 2,587 times in 2020, making it one of the top 100 downloaded cancer papers in the journal for the year.

**LESLEY CHOW** (BioE/MSE) is a 2021 recipient of the *Early-Career Undergraduate Research Mentoring Award* presented by the Engineering Division of the Council on Undergraduate Research. The award recognizes her contributions as a mentor to undergraduate students “from a diverse range of backgrounds and identities” and her support of their efforts to share their work with the scholarly community.

The Accreditation Activities Committee of BMES has chosen Professor **LORI HERZ** to become a Program Evaluator. ABET program evaluators are a group of professionals from industry and academia who help evaluate undergraduate engineering programs, visit campuses, and support accreditation activities. They serve their profession by contributing their experience and their time to colleges and universities with engineering programs.

**ANAND JAGOTA** (BioE, ChBE) was named Associate Dean of Research in the College of Health. In this role, he supports collaborations between the College of Engineering, where he has retained his academic appointment, and the College of Health, as well as developing external research partnerships, extending opportunities for interdisciplinary research.

## GRADUATE STUDENT NEWS

Congratulations to our 2021 Bioengineering doctoral degrees recipients: **SHABNAM GHIASVAND** PhD, **SAJEDEH YAZDANPARAST TAFTI** PhD, and our Master of Science degree recipients: **JACOB FISCHER**, **MICHAEL LEVIN**, **NICOLE MALOFSKY** AND **BRIAN YEUNG**.

**CAROLINE FERGUSON**, a doctoral student in the Cheng Lab, is serving as the NE Director of Communications & Outreach in the National Association for Graduate Professional Students (NAGPS)

**PAULA CAMACHO**, a doctoral student in the Chow Lab, was named a 2021 Boston University Emerging Scholar and presented her work on the fabrication of spatially functionalized 3D-printed scaffolds for osteochondral tissue engineering.

Congratulations to **SIMRAN DAYAL**, PhD student in Anand Ramamurthi’s research group, for her 1st place poster award at the 47th Annual Northeast Bioengineering Conference! Simran’s poster was titled “Targeting Epidermal Growth Factor Receptor Pathway to Stimulate Vascular Elastic Matrix Regenerative Repair”

**YUE (ANTHONY) WU**, PhD student in the Liu Lab, has been accepted into the Rossin Professional Development Program. The 2021 group includes 21 other doctoral students from across the college who will receive targeted support to prepare for academic careers.

## ALUMNI UPDATES

**NICOLE MALOFSKY BS '19 MS '21** (BioE) was selected for a prestigious NSF Graduate Research Fellowship. Malofsky, who was advised by Professor Lesley Chow, an assistant professor of bioengineering and materials science and engineering. Malofsky, who received an MS degree in May, now is pursuing her PhD in biomedical engineering at Vanderbilt University. She will transition from her previous work in corneal tissue engineering to new research developing global health technologies.

**MATTHEW FAINOR '20** (BioE) recently had his interview with bioartist, Corinne Okada Takara, spotlighted on the **@Biodesigned** Newsletter. Fainor is currently a Research Engineer at the University of Pennsylvania.

**SCOTT GRANT BS '16** (BioE), MEng '18 (HSE) recently completed Merck’s Manufacturing Leadership Development Program (MLDP) and accepted a position as a Senior Procurement Specialist and Strategy Lead for Indirect Materials in the Animal Health Organization at Merck

**EVAN ECKERSLEY '18** (BioE, IBE) has entered a new venture with Icarus Medical Innovations in Charlottesville, VA, as Chief Operating Officer. Prior to the move, Eckersley served as the COO and cofounder of Lytos Technologies, LLC.

Hearty thanks to **ELENA RAMIREZ BS '15** (BioE), a Senior Biomedical Engineer at Lumicell, who shared her experiences as a OR Integration Specialist, a Field Clinical Engineer and Biomedical Engineer to Lehigh students participating in the inaugural *Clinical Projects in BioE* course this summer. Thanks also to **CHRISTAL SCHWENK BS '14** (BioE), MEng '15 (MechE), a Project Engineer at Stryker Spine, for her assistance in helping undergraduate students develop industry-relevant design skills in the *Computer Aided Design in Bioengineering* course.

**MATT HAVENER BS '06** (BioE) recently accepted a position as Director of Product Development at Embody, Inc.

FACULTY

GRADUATE

ALUMNI



# UNDERGRADUATE STUDENT SUCCESS

We are thrilled to announce that **TIFFANY PANG '22** is a member of the Lehigh team of undergraduate research students who were awarded the **2021 National Institute on Minority Health and Health Disparities (NIMHD) Prize for Healthcare Technologies for Low-Resource Settings** in the **2021 Design by Biomedical Undergraduate Team (DEBUT) Challenge**. The team, consisting of Pang (BioE), Heidi Shen (Pre-Dental Sci), Katie Goettle (IDEAS/BioE concentration), Laura Duffany (Behav. Neurosci), Wei Ngai (Biol Sci), Thomas Perillo (IDEAS/BioE concentration) is mentored by **PROF. XUANHONG CHENG**, as the students develop a low-cost sickle cell disease (SCD) screening device designed to be implemented in low-to-middle income healthcare settings. Modeled after the common pregnancy test, the goal is to lower the high rate of infant death due to SCD. [Click here to watch a video on the project.](#)

**MASON BLACK '22**, was selected 85th overall in the 2021 MLB draft by the San Francisco Giants. Black joins an elite group of 18th players in Lehigh baseball program history to be picked up by a big-league franchise and the 15th player drafted. Black is the second-highest drafted player in program history and the highest-drafted pitcher. Black also was named 2021 Patriot League Pitcher of the Year, a First Team All-Patriot League selection and an ABCA/Rawlings First Team All-East Region selection for his performances. His success on the baseball field is paralleled by his academic success - Mason was one of three Lehigh baseball players named to the Academic All-Patriot League team in May, and named a Second Team Academic All-American by the College Sports Information Directors of America (CoSIDA) in July.

The Baker Institute for Entrepreneurship, Creativity, and Innovation recently awarded **SAREENA KARIM '22** the Michael Levin '87 Advanced Technology Award, which goes to an engineering student developing new technologies. The award is accompanied by a \$1,000 prize.

Congratulations to **NATASHA HUNT '22** an undergraduate researcher in the Chow Lab on being awarded a Grant for Experiential Learning in Health (GELH)! This GELH grant will fund her research project titled, "Synthesizing Peptide-Polymer Conjugates with Enzyme-Cleavable Sequences for Cell-Mediated Degradation." This work is in collaboration with the Grayson Lab at Johns Hopkins University and the Pashuck Lab at Lehigh.

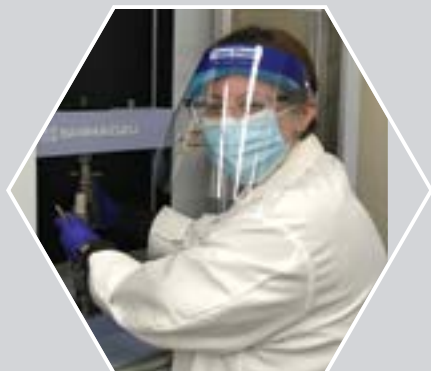
**NATE YUCHIMIUK '21** presented his work on "Developing Techniques to Characterize Solvent-Cast 3D-Printed Scaffolds" at Lehigh Engineering's annual David and Lorraine Freed Undergraduate Research Symposium on April 7, 2021.

Congratulations to **NATALIE CONDON '22**, **NATASHA HUNT '22**, **SAREENA KARIM '22**, and **ANDREW KITSON '22**, **STEPHEN GEE '23** and **SHOSHANNA VICTOR '22** who presented their research at STEM-SI Research Day on August 5, 2021.

The following BioE undergrad students were recipients of 2021 Student Life Leadership Awards which were presented during a virtual awards ceremony:

- Contribution to Student Life Award - **MASON BLACK '22**
- James J Duane Student Life Leadership Awards – **MIRANDA ROYDS '21**, **AMANDA RUBIN '22** AND **SUSAN WESTMAN '21**
- Student Senate Leadership Award – **MIRANDA ROYDS '21**
- Deborah Pearsall Award - **MIRANDA ROYDS '21** and **AMANDA RUBIN '22**

Congratulations to the new Bioengineering Rossin Junior Fellows: **SYDNEY WATERMAN '23**, **ANNA EDMUNDSON '23**, and **STEPHEN GEE (BiocompE) '23**. They join **EMMA CHIUSANO (IDEAS) '23**, **AMANDA RUBIN '22**, **THOMAS PERILLO '22**, and **RAFI NABER '22** to round out the 2021-2022 group of Bioengineering RJJ's. The RJJ's are a prestigious group of students who serve as important ambassadors of the Rossin College of Engineering.



**INTERESTED IN SUPPORTING UNDERGRADUATE RESEARCH?**  
**At [gocampaign.Lehigh.Edu](http://gocampaign.Lehigh.Edu) click on *give now* – Under Areas of Support, add **BIOENGINEERING** in the comments box**

# BIOENGINEERING RESEARCH

## AT LEHIGH UNIVERSITY

Names in **BOLD** are Lehigh BioE core faculty

### BIOCOMPUTATIONS AND MODELING

Biomolecular Modeling  
Bioinformatics  
Bioengineering Systems & Controls  
Biophysics

Modeling of Biological Systems  
Computational Bioengineering  
Data Analytics  
Biomedical Image Analysis

**Y. BERDICHEVSKY**, B. Chen, **J. HSU**, **A. JAGOTA**, M. Kotare, **Y. LIU**, D. Lopresti, **D. OU-YANG**,  
D. Vavylonis, A. Voloshin, **Y. ZHANG**

### DIAGNOSTICS, SENSORS AND DEVICES

Biomedical Imaging  
Biophotonics  
BioMEMS  
Biosensors

Microfluidics  
Bioelectronics  
Medical Devices

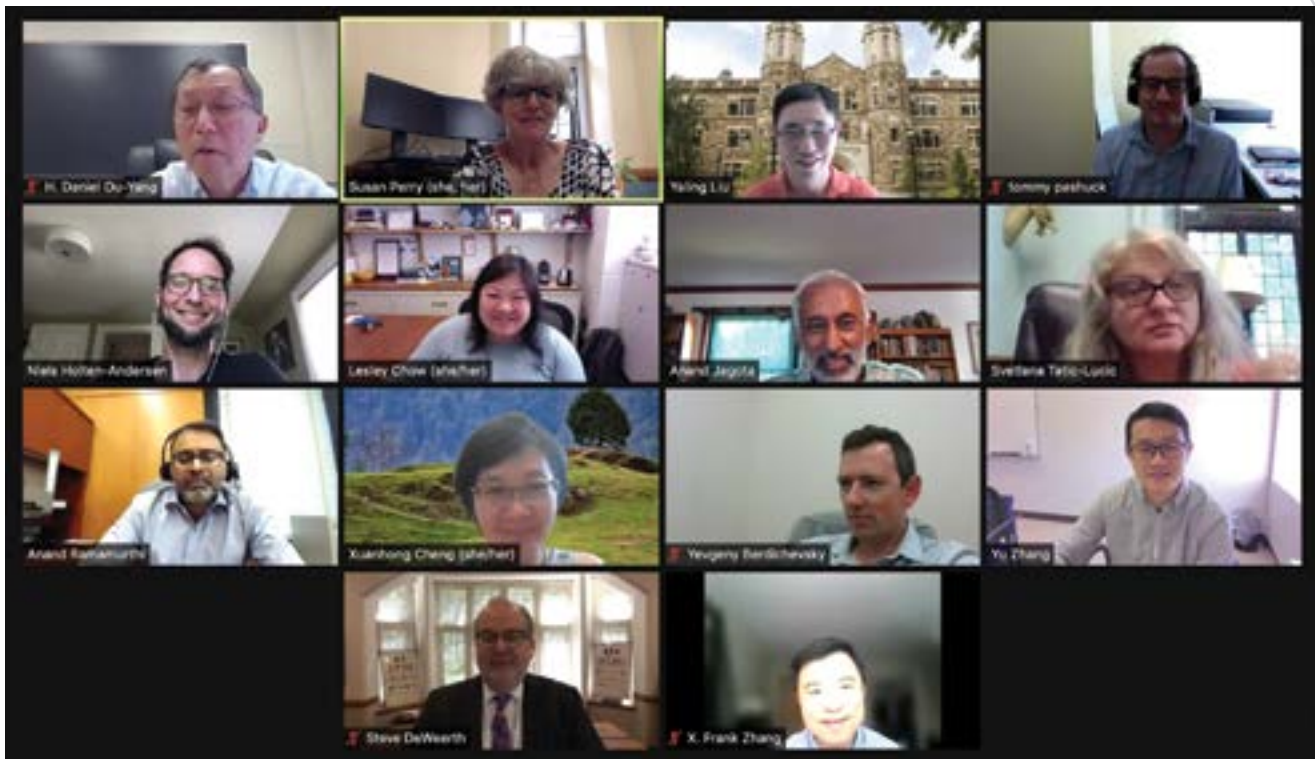
**Y. BERDICHEVSKY**, D. Brown, **X. CHENG**, H. Dailey, J. Hwang, **Y. LIU**, D. Lopresti, L. Lowe-Krentz,  
**D. OU-YANG**, **S. TATIC-LUCIC**, D. Vavylonis, D. Vezenov, **Y. ZHANG**

### MATERIALS AND THERAPIES

Biomaterials  
Molecular Bioengineering  
Biopharmaceutical Engineering  
Cell & Tissue Engineering

Neuroengineering  
Biofluid & Solid Mechanics  
Biomolecular & Cellular Mechanics  
Environmental Bioengineering

**Y. BERDICHEVSKY**, A. Brown, D. Brown, **X. CHENG**, **L. CHOW**, H. Dailey, M. Falk,  
**N. HOLTEN-ANDERSEN**, **J. HSU**, **A. JAGOTA**, **S. JEDLICKA**, H. Jain, **Y. LIU**, **D. OU-YANG**,  
**T. PASHUCK**, **A. RAMAMURTHI**, **I. SEABRA**, K. Shultz, **S. TATIC-LUCIC**, D. Thevenin,  
D. Vezenov, A. Voloshin, **X. F. ZHANG**

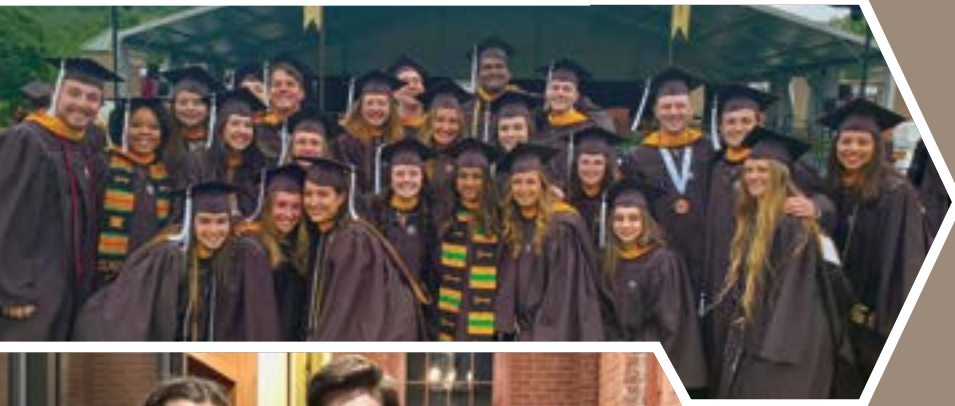


Department members missing from the picture:  
**LORI HERZ, JIM HSU, SABRINA JEDLICKA, INES SEABRA, GWEN HUGHES, CINDY LOHMAN** and **WILL XIA**.

*Department  
at a glance:*



**18**  
CORE FACULTY  
MEMBERS

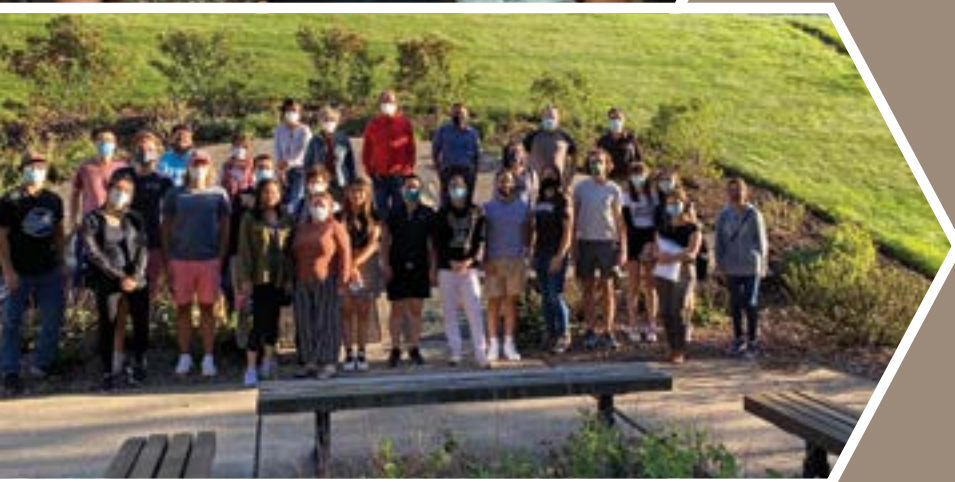


**16**  
ASSOCIATED FACULTY  
MEMBERS



**2**  
POST-DOCTORAL  
SCIENTISTS

**1**  
TECHNICAL &  
2 ADMINISTRATIVE  
STAFF



**29**  
PHD LEVEL  
GRADUATE  
STUDENTS

**11**  
MS LEVEL  
GRADUATE  
STUDENTS



**170**  
UNDERGRADUATE  
MAJORS IN 2 MAJORS:  
*(Biocomputational Engineering and Bioengineering)*