2024 HOPKINS ENGINEERING EXPLORATORY PROGRAM

JUNE 23-29, 2024

WELCOME

SRI SARMA

Vice Dean for Graduate Education and Lifelong Learning and Associate Professor
Department of Biomedical Engineering

We are delighted to welcome you to the Hopkins Engineering Exploratory Program (HEEP)! Our goal is to offer you a glimpse of the Whiting School of Engineering's cutting-edge research and outstanding faculty. Additionally, we will provide you with opportunities to explore both the Homewood campus and Baltimore. Throughout the week, we will highlight several master's degrees programs in engineering and will provide guidance on processes to apply. You will have the opportunity to meet with current graduate students and visit departments of interest. Although each program varies, there is a consistency in rigor across the school. The coursework is designed to provide students with a strong foundation in engineering principles and advanced technical skills. Hopkins also offers flexibility. Our master's programs offer both part-time and full-time options, allowing students to balance their education with their professional and personal responsibilities. Hopkins Engineering is known for its interdisciplinary culture, combining engineering with fields such as computer science, biomedical engineering, and materials science to address complex real-world problems. Students also have access to state-of-the-art research facilities and can seek opportunities to work with renowned faculty members on groundbreaking research projects. Our industry partners provide students with opportunities to network with professionals and gain practical experience through internships and co-op programs. Finally, graduates of Johns Hopkins Engineering master's programs are highly sought after by employers in a variety of industries. The university has a strong career services department that provides students with resources and support to help them achieve their professional goals. We hope you find this experience enriching and inspiring—welcome to Johns Hopkins University!

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2024 HEEP AT A GLANCE

Sunday, June 23

3 p.m.	Arrival and Check-in The Study at Johns Hopkins 3215 N. Charles St, Baltimore, MD 21218
6 p.m.	Dinner at Nolan's on 33rd

Monday, June 24

Day 1: Welcome *(Shriver Hall, Clipper Room)*

8:15 a.m.	Attendees gather in the hotel lobby, walk to Shriver Hall
8:30 to 9:30 a.m.	Welcome Breakfast at Clipper Room
8:50 to 9 a.m.	Welcome Remarks via Zoom (Christine Kavanagh)
9 to 9:30 a.m.	Remarks
9:30 to 10:30 a.m.	Pablo Iglesias – Excitable Systems: Using Control and Dynamical Systems to Understand How Cells Move
10:30 to 11 a.m.	Break
11 a.m. to 12 p.m.	Vishal Patel – AI and Vision
12 to 1 p.m.	Lunch at Shriver Hall, Clipper Room
1 to 2 p.m.	Siamak Ardekani – Computational Medical Imaging
2 to 2:30 p.m.	Break
2:30 to 3:30 p.m.	Brandon Bukowski – Accelerating Sustainable Chemistry Using AI and Data Science
3:30 to 4 p.m.	Break
4 to 5 p.m.	Swaroop Vedula – Can AI do Surgery?
5 to 6 p.m.	Faculty meeting times
6 to 7 p.m.	Dinner at Nolan's on 33rd
7 p.m.	Social event with current graduate students in the hotel lobby

Tuesday, June 25

Day 2: Energy and Power *(Clark 316)*

8 to 9 a.m.	Breakfast at Nolan's on 33rd
9:30 to 10:30 a.m.	Enrique Mallada – Hybrid Systems: Computation and Control
10:30 to 11 a.m.	Break
11 a.m. to 12 p.m.	Charles Meneveau – Fluid Dynamics and Turbulence Science for Sustainable Wind Energy Harvesting
12 to 1 p.m.	Lunch at Clark 318
1 to 2 p.m.	Susanna Thon – Quantum Materials for Next-Generation Solar Energy Technology
2 to 2:30 p.m.	Break
2:30 to 3:30 p.m.	Lucas Buccafusca – Designing and Controlling a Wind Farm
3:30 to 4 p.m.	Break
4 to 5 p.m.	GKII Presentation
6 to 7 p.m.	Dinner at Nolan's on 33rd
7 p.m.	Social event with current graduate students in the hotel lobby

Wednesday, June 26

Day 3: CLE and ECE *(Shriver Hall, Clipper Room)*

8 to 9 a.m.	Breakfast at Nolan's on 33rd
9:15 to 9:30 a.m.	Pam Sheff – Welcome and Topics in Engineering Management
9:30 to 10:15 a.m.	Business Cases Overview
10:15 to 10:30 a.m.	Break
10:30 to 11:30 a.m.	Business Case Competition Activity
11:30 a.m. to 12 p.m.	Business Case Presentation Discussion
12 to 1:30 p.m.	Lunch at Clipper Room
1:30 to 2:30 p.m.	Jerry Prince – Problems and Progress in Medical Image Analysis
2:30 to 3 p.m.	Break
3 to 4 p.m.	Sanjeev Khudanpur – Human Language Technologies
4 to 4:30 p.m.	Break
4:30 to 5:30 p.m.	Krishan Sabnani – Amazing Impact of Networking
6 to 7 p.m.	Dinner at Nolan's on 33rd
7 p.m.	Social event with current graduate students in the hotel lobby

Thursday, June 27

Day 4: CLE and Medical Robotics *(Clark 110)*

8 to 9 a.m.	Breakfast at Nolan's on 33rd
9:15 to 9:20 a.m.	Sarah Smith – Welcome
9:20 to 10 a.m.	Business Case Competition Activity Continued
10 to 10:15 a.m.	Break
10:15 to 10:45 a.m.	Business Case Presentations
10:45 to 11 a.m.	Business Case Activity Debrief
11 a.m. to 12 p.m.	Closing Discussion
12 to 1 p.m.	Lunch at Clark 110
1 to 2 p.m.	Axel Krieger – Autonomous Robotic Surgery: Science Fiction or Reality?
2 to 2:30 p.m.	Break
2:30 to 3:30 p.m.	Nitish Thakor – Build Your Brain Machine Interface (From Prosthetic Hand to Reading Your Mind)
3:30 to 4:30 p.m.	Lab tour – Thakor lab
4:30 to 5 p.m.	Back to the hotel the student at Johns Hopkins
6 to 8 p.m.	Banquet at Shriver Hall, Clipper Room

2024 HEEP AT A GLANCE (CONT'D)

Friday, June 28

Day 5: Closing Keynote, Remarks, and Robotics *(Clark 110)*

8 to 9 a.m.	Breakfast at Nolan's on 33rd
9:30 to 10:30 a.m.	Rama Chellappa – Trustworthy AI
10:30 to 10:45 a.m.	Break
10:45 to 11:15 a.m.	Closing Remarks – Sri Sarma
11:15 to 11:45 a.m.	Ceremony
12 to 1:15 p.m.	Lunch at Clark 110
1:30 to 2:30 p.m.	Louis Whitcomb – Advances in Underwater Robotic Vehicles for Extreme Oceanographic Exploration
2:30 to 3 p.m.	Break
3 to 4 p.m.	Robotics lab tours
4 to 5 p.m.	Baltimore tour
5 to 7 p.m.	Visit Baltimore Aquarium
7 p.m.	Dinner at Inner Harbor

Saturday, June 29

11 a.m.	Check-out and Departure

ABOUT WSE

HOPKINS ENGINEERING:

CREATING A BETTER FUTURE.

Excellence in Education, Research, and Translation

We are the source of many of the discoveries and innovations that have shaped the past and are defining the future. From potable water in the 1920s to 21st-century prosthetic limbs, to a COVID-19 tracking map, we solve complex global challenges to make the world a better place.

Our faculty members are pioneers in their fields, our students are dedicated and driven, and our entire community contributes to the outstanding resources and breadth of expertise that exemplify Johns Hopkins University.

We are defined by a culture of intentional collaboration. Our strategic partnerships—across the institution and around the world—advance technology, human health, and resiliency.

BY THE NUMBERS

10 departments

25+ centers and institutes

200+ faculty

20+ part-time/online master's degrees and certificates

$200M external research funding

40,000+ alumni

#1 undergraduate and graduate programs in biomedical engineering *(U.S. News & World Report)*

2,000 undergraduate students

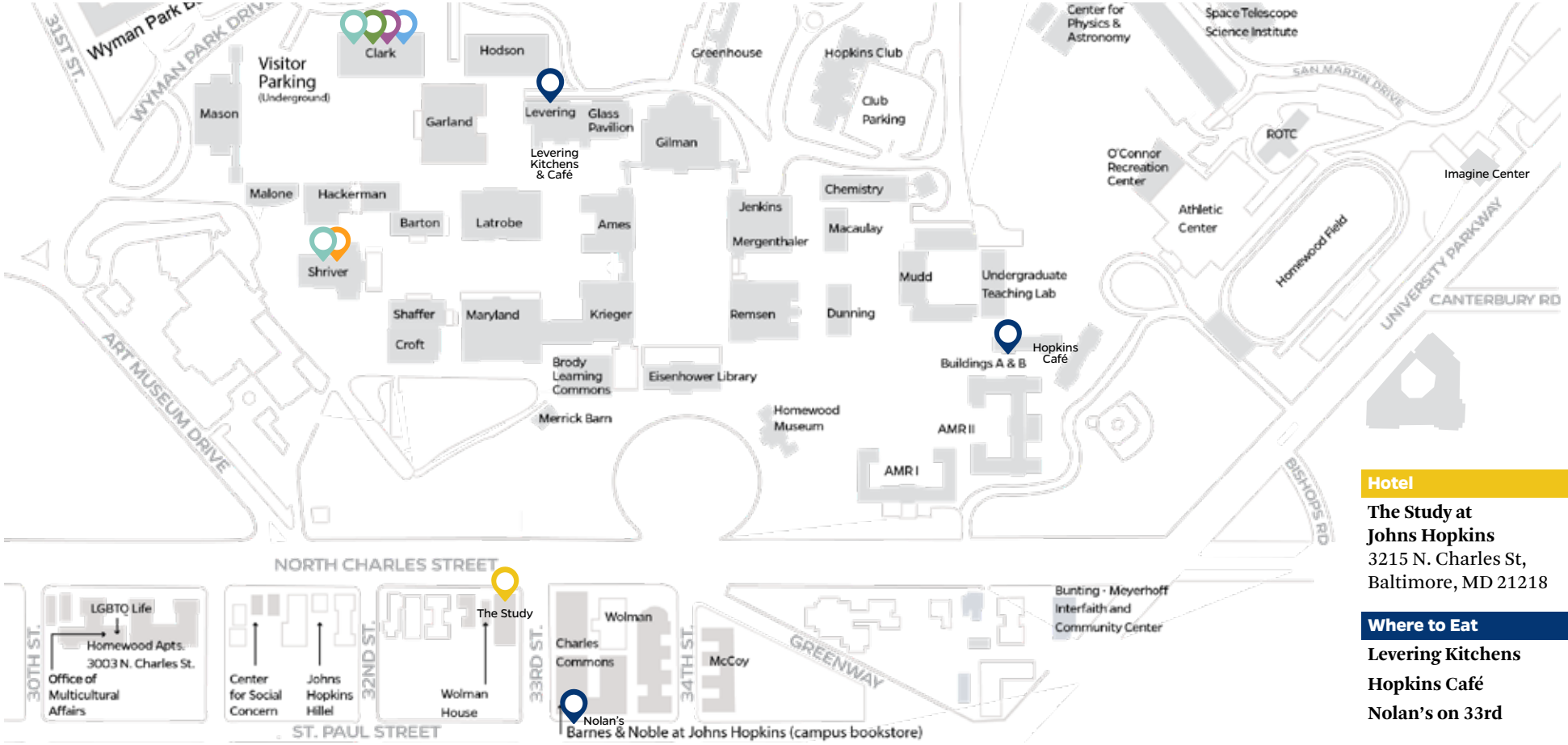
2,500+ graduate students

5,000+ online students

FULL-TIME PROGRAMS

13	**17**	**10**
bachelor's	master's	doctoral

CAMPUS



Hotel

The Study at Johns Hopkins
3215 N. Charles St,
Baltimore, MD 21218

Where to Eat

Levering Kitchens

Hopkins Café

Nolan's on 33rd

June 24

Pablo Iglesias
Excitable Systems: Using Control and Dynamical Systems to Understand How Cells Move

Vishal Patel
AI and Vision

Siamak Ardekani
Computational Medical Imaging

Brandon Bukowski
Accelerating Sustainable Chemistry Using AI and Data Science

June 24 *(cont'd)*

Swaroop Vedula
Can AI do Surgery?

June 25

Enrique Mallada
Hybrid Systems: Computation and Control

Charles Meneveau
Fluid Dynamics and Turbulence Science for Sustainable Wind Energy Harvesting

June 25 *(cont'd)*

Susanna Thon
Quantum Materials for Next-Generation Solar Energy Technology

Lucas Buccafusca
Designing and Controlling a Wind Farm

June 26

Pam Sheff
Topics in Engineering Management

Jerry Prince
Problems and Progress in Medical Image Analysis

Sanjeev Khudanpur
Human Language Technologies

Krishan Sabnani
Amazing Impact of Networking

June 27

Sarah Smith
Engineering Management

Axel Krieger
Autonomous Robotic Surgery: Science Fiction or Reality?

Nitish Thakor
Build Your Brain Machine Interface (From Prosthetic Hand to Reading Your Mind)

June 28

Rama Chellappa
Trustworthy AI

Louis Whitcomb
Advances in Underwater Robotic Vehicles for Extreme Oceanographic Exploration

PABLO IGLESIAS

Interim Department Head and
Edward J. Schaefer Professor
Department of Electrical and Computer Engineering
PI@JHU.EDU

EXCITABLE SYSTEMS: USING CONTROL AND DYNAMICAL SYSTEMS TO UNDERSTAND HOW CELLS MOVE

9:30 to 10:30 a.m.
Shriver Hall, Clipper Room

Pablo Iglesias, interim department head and the Edward J. Schaefer Professor in electrical and computer engineering, uses computational techniques grounded in control and information theory to study biological signal transduction pathways. In addition to his primary appointment in the Department of Electrical and Computer Engineering, he holds secondary appointments in the Department of Applied Mathematics and Statistics and the departments of Cell Biology and Biomedical Engineering at the Johns Hopkins School of Medicine.

Iglesias' research investigates how cells interpret directional cues to guide cell motion, the regulatory mechanisms that control cell division, and the sensing and actuation that enable cells to maintain lipid homeostasis. His computational models largely explore two stages of cell division—mitotic spindle formation and cytokinesis—and how cells direct motion. Applications of his work include engineering "killer cells" that can engulf pathogens with high efficiency, analyzing the implications of cell morphology, and predicting behavioral changes that lead cells to become metastatic.

Iglesias received his bachelor's degree in engineering science from the University of Toronto and his PhD in control engineering from the University of Cambridge.

VISHAL PATEL

Associate Professor
Department of Electrical and Computer Engineering
VPATEL36@JHU.EDU

AI AND VISION

11 a.m. to 12 p.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Biomedical Image Analysis Biometrics
Computer Vision
Machine Learning
Signal and Image Processing

Vishal M. Patel is an associate professor of electrical and computer engineering and a member of the Vision and Image Understanding Lab. His research interests are focused on biomedical image analysis, biometrics, computer vision, machine learning, and signal and image processing.

Patel serves on the Machine Learning for Signal Processing (MLSP) Committee of the IEEE Signal Processing Society. He also serves as the vice president of conferences for the IEEE Biometrics Council.

Prior to joining Hopkins, he was an A. Walter Tyson Assistant Professor in the Department of ECE at Rutgers University and a member of the research faculty at the University of Maryland Institute for Advanced Computer Studies (UMIACS). He completed his PhD in electrical engineering at the University of Maryland, College Park.

SIAMAK ARDEKANI

Assistant Research Professor
Department of Biomedical Engineering
SARDEKANI@JHU.EDU

COMPUTATIONAL MEDICAL IMAGING

1 to 2 p.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Computational Medical Imaging, MRI, Developing image-based statistical shape and function models for early disease detection, monitoring response to therapy, and validating new therapeutic strategies in neurological and cardiovascular diseases

Siamak Ardekani is an assistant research professor in the Department of Biomedical Engineering and the Center for Imaging Science and is on the faculty of Engineering for Professionals' Applied Biomedical Engineering program.

With a background in medicine and medical imaging, Ardekani focuses on developing computational models to extract clinically relevant information from medical images—generated through magnetic resonance imaging and computed tomography—that are used to quantify and visualize alterations in the shape and function of anatomical structures, such as the brain and heart. Models developed by Ardekani have the potential to assist physicians in identifying patients that are at a high risk of complications and monitor these patients' responsiveness to therapy.

Ardekani earned his PhD in biomedical engineering from the University of California, Los Angeles, an MD from Shiraz University of Medical Sciences, and a master's in biomedical engineering from Drexel University.

BRANDON C. BUKOWSKI

Assistant Professor
Department of Chemical and Biomolecular Engineering
BBUKOWS1@JHU.EDU

ACCELERATING SUSTAINABLE CHEMISTRY USING AI AND DATA SCIENCE

2:30 to 3:30 p.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Computational Catalysis
Kinetic Modeling
Molecular Simulations
Diffusion
Separations
Sustainability

Brandon C. Bukowski is an assistant professor in the Department of Chemical and Biomolecular Engineering. He is dedicated to discovering new catalysts for a more sustainable future that benefits all. His research group accomplishes this by using computer modeling to develop new technologies to responsibly and sustainably utilize conventional and emergent feedstocks to meet the energy needs of the future.

The Bukowski research group utilizes cutting-edge tools from computational chemistry, molecular simulations, and data science to identify, understand, and engineer new catalysts. In particular, the group is interested in nanoporous catalysts—such as zeolites and metal-organic frameworks—as well as supported metal and metal-oxide nanoparticles for highly selective chemical transformations. The group seeks to design optimal nanoporous materials that will have a transformative impact on energy and the environment.

Bukowski received a bachelor's in chemical engineering and a minor in physics from Worcester Polytechnic Institute and a PhD in chemical engineering from Purdue University.

SWAROOP VEDULA

Associate Research Professor

Malone Center for Engineering in Healthcare

VEDULA@JHU.EDU

CAN AI DO SURGERY?

4 to 5 p.m.

Shriver Hall, Clipper Room

RESEARCH AREAS

Surgery
Epidemiology
Biostatistics
Machine Learning

Swaroop Vedula is an epidemiologist and a medical doctor with surgical training. His research interests overlap several disciplines including clinical trials, different areas of surgery, epidemiology, biostatistics, and machine learning. He works on research related to measuring surgical skill and competency, technology for acquisition of motor and cognitive skill by surgeons, methods for fair comparisons of surgical interventions to estimate treatment effectiveness, analytics for surgical processes, and robotic assistance for skill acquisition and surgical coaching.

ENRIQUE MALLADA

Associate Professor

Department of Electrical and Computer Engineering

MALLADA@JHU.EDU

HYBRID SYSTEMS: COMPUTATION AND CONTROL

9:30 to 10:30 a.m.

Clark Hall 316

RESEARCH AREAS

Control of Networked Systems
Power Systems
Optimization
Machine Learning

Enrique Mallada is an associate professor of electrical and computer engineering. He has secondary appointments in the departments of Mechanical Engineering, Applied Mathematics and Statistics, and Computer Science. He is the director of the Networks, Dynamics, and Learning Laboratory, a core member of the Mathematical Institute for Data Science and the Ralph O'Conner Sustainable Energy Institute, and an affiliate of the Laboratory of Computational Sensing and Robotics.

Mallada's research interests include control and dynamical systems, networks and graph theory, mathematical optimization, and machine learning, and their applications in engineering and science. His lab seeks to develop new tools and algorithmic solutions devoted to the analysis, design, and operation of large-scale and/or highly coupled networked systems in an efficient and reliable manner. The work encompasses several application areas such as data, social and biological networks, and electric power grids.

Current projects include real-time optimization with feedback for efficient and robust optimization of infrastructure networks, structured sparse recovery for networked inverse problems, optimization-based online trajectory planning of multi-agent UAV systems, and several projects devoted to improving electric power grid efficiency and resilience.

Mallada received his bachelor's degree in telecommunications engineering from Universidad ORT in Uruguay. He earned his PhD in electrical and computer engineering—with a minor in applied mathematics—from Cornell University.

CHARLES MENEVEAU

Louis M. Sardella Professor
in Mechanical Engineering
Department of Mechanical Engineering
MENEVEAU@JHU.EDU

FLUID DYNAMICS AND TURBULENCE SCIENCE FOR SUSTAINABLE WIND ENERGY HARVESTING

11 a.m. to 12 p.m.
Clark Hall 316

RESEARCH AREAS

Large Eddy Simulation
Turbulence Research and Modeling
Fractals
Fluid Flow Processes
Wind Energy
Environmental Transport
Wall-Bounded Flows

Charles Meneveau, the Louis M. Sardella Professor in Mechanical Engineering and associate director of the Institute for Data-Intensive Engineering and Science (IDIES), is an expert in the multiscale aspects of turbulence, large-eddy simulations, and wind farm fluid dynamics.

Meneveau employs computational and theoretical tools for his research and pursues subgrid-scale modeling, downscaling methods, fractal geometry, and their applications to large eddy simulation (LES). His current LES research is focused on improving wall models and subgrid-scale models for velocity gradients which is of interest to some turbulent multiphase flows. Among the application areas of LES being pursued in Meneveau's group is the study of complex flows in large wind farms. Using the improved simulation tools as well as wind tunnel tests, Meneveau and his colleagues identified the important process of vertical entrainment of mean flow kinetic energy into an array of wind turbines.

As deputy director of JHU's IDIES, Meneveau led a team who built the Johns Hopkins Turbulence Databases. This open numerical laboratory provides researchers from around the world with user-friendly access to large data sets arising from direct numerical simulations of various types of turbulent flows. He received a bachelor's from the Universidad Técnica Federico Santa Maria and earned his master's degrees and a PhD at Yale University.

SUSANNA THON

Associate Professor
Department of Electrical and Computer Engineering
SUSANNA.THON@JHU.EDU

QUANTUM MATERIALS FOR NEXT-GENERATION SOLAR ENERGY TECHNOLOGY

1 to 2 p.m.
Clark Hall 316

RESEARCH AREAS

Renewable Energy Conversion and Storage
Photovoltaics
Optoelectronics
Nanoengineering and Nanophotonics
Scalable Fabrication
Quantum Optics

Susanna M. Thon is an associate professor of electrical and computer engineering. She studies nanomaterials engineering for optoelectronic devices, with a focus on solar energy conversion and sensing.

Her work applies techniques from nanophotonics and scalable fabrication to produce devices and materials with novel optical and electrical functionality. Thon's team is currently working on several projects, including developing plasmonic-photocatalytic systems that use nanoparticles containing aluminum to enhance light absorption in titanium dioxide. Team members are also researching ways to use nanostructured materials, such as colloidal quantum dots and plasmonic metal nanoparticles, to build multicolored, transparent, and next-generation devices.

Thon and her colleagues have recently developed new materials-based methods to increase the power output of next-generation solar cells, as well as a new multimodal characterization technique to accelerate technology development. Thon's work has received funding from the American Chemical Society, National Science Foundation, Maryland Energy Innovation Institute, Cohen Translational Engineering Fund, and the U.S. Army.

She received her bachelor's degree from MIT and her master's and PhD in physics from the University of California Santa Barbara.

LUCAS BUCCAFUSCA

Lecturer
Department of Electrical and Computer Engineering
LBUCCAFUSCA@JHU.EDU

DESIGNING AND CONTROLLING A WIND FARM

2:30 to 3:30 p.m.
Clark Hall 316

Lucas Buccafusca is a lecturer in the Department of Electrical and Computer Engineering. Buccafusca's research interests are in distributed control, learning, distributed optimization, and nonlinear systems. Applications of his research are primarily used for wind farm arrays. His research has been featured in publications such as the Journal of Renewable and Sustainable Energy.

He received his PhD in industrial and systems engineering at the University of Illinois at Urbana-Champaign, a master's in electrical and computer engineering from the University of Illinois at Urbana-Champaign, and a bachelor's degree in electrical and computer engineering from the University of Colorado at Boulder.

PAM SHEFF

Director, Center for Leadership Education and Master of Science in Engineering Management Program
Center for Leadership Education
PSHEFF@JHU.EDU

TOPICS IN ENGINEERING MANAGEMENT

9:15 to 9:30 a.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Business Communications

Pamela H. Sheff is the director of the Center for Leadership Education and the Master of Science in Engineering Management Program at Johns Hopkins University.

She is an award-winning writer and marketing communications consultant who founded Sheff & Lano Communications, which specialized in developing and writing public and in-house communications for corporate, institutional, and government clients.

Sheff is a founder of the Goucher Prison Education Partnership which offers a liberal arts college degree program to people incarcerated in the state of Maryland.

She serves on the board of Advocates for the Goucher Prison Education Partnership.

She holds a PhD in english from Harvard University and has previously taught in both the writing program and communications department at Goucher College. She has developed and taught business communications courses for private companies, and prior to becoming a consultant, served for three years as the assistant public affairs director and editorial director for WMAR-TV.

JERRY PRINCE

William B. Kouwenhoven Professor
Department of Electrical and Computer Engineering
PRINCE@JHU.EDU

PROBLEMS AND PROGRESS IN MEDICAL IMAGE ANALYSIS

1:30 to 2:30 p.m.
Shriver Hall, Clipper Room

Jerry Prince, the William B. Kouwenhoven Professor of Electrical and Computer Engineering, has more than 30 years of experience in the research and practice of 3D medical image reconstruction, registration, segmentation, and shape and motion analysis. He holds secondary appointments in the departments of Applied Mathematics and Statistics and Computer Science at Johns Hopkins University. He also holds joint appointments in the departments of Biomedical Engineering and Radiology at the Johns Hopkins University School of Medicine.

Prince's lab was among the first to work on methods to tag structures during magnetic resonance imaging tests. Algorithms developed by his lab to use MR tagging while studying cardiac motion led to the formation of Diagnosoft and Myocardial Solutions. Prince is also known for his work segmenting the human brain cortex from MR images and making improvements to optical coherence tomography imaging of the retina.

His current research interests focus on image processing and computer vision, with primary application to medical imaging. Ongoing projects include developing imaging and image processing methods to study speech pathologies in patients who have had partial surgical removal of the tongue due to cancer and developing image processing methods to characterize hydrocephalus, a condition in which fluid accumulates in the brain. Prince also co-founded Sonavex, Inc., a medical device company that develops ultrasound solutions to visualize and quantify elements such as blood flow following surgery.

Prince received his bachelor's degree in electrical engineering and computer science from the University of Connecticut and a PhD in electrical engineering from the Massachusetts Institute of Technology.

SANJEEV KHUDANPUR

Associate Professor
Department of Electrical and Computer Engineering
KHUDANPUR@JHU.EDU

HUMAN LANGUAGE TECHNOLOGIES

3 to 4 p.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Application of information-theoretic methods to human language technologies
Speech Recognition
Machine Translation
Language Processing

Sanjeev P. Khudanpur, an associate professor of electrical and computer engineering, is an expert in the application of information-theoretic methods to human language technologies, such as automatic speech recognition, machine translation, and natural language processing. He has a secondary appointment in the Department of Computer Science, is a member of the Center for Language and Speech Processing, and is affiliated with the Human Language Technology Center of Excellence.

He received a BTech in electrical engineering at the Indian Institute of Technology and a PhD in electrical and computer engineering at the University of Maryland College Park.

KRISHAN SABNANI

Homewood Professor of Computer Science
Department of Computer Science
KSABNAN2@JHU.EDU

AMAZING IMPACT OF NETWORKING

4:30 to 5:30 p.m.
Shriver Hall, Clipper Room

RESEARCH AREAS

Communication Protocols
Computer Networks
Telecommunications
Wireless Networking

Krishan Sabnani is a Homewood Distinguished Professor at Johns Hopkins University. He is a networking researcher who has made many seminal contributions to internet infrastructure design, protocol design, and wireless networks. His groundbreaking work helped shape both the internet and cellular networks, substantially reducing network infrastructure costs.

Sabnani's breakthrough discovery in internet redesign was to separate control functions and complex software from the forwarding portions on internet routers. This work made it possible for forwarding technologies (e.g. different link layers and switching protocols) to evolve and be deployed independently from control protocols (e.g. routing and security). This contribution was a precursor to the current Software Defined Networking (SDN) revolution. He was also the first to develop a systematic approach to conformance testing, allowing communications systems to work together and reducing test time from weeks to a few hours.

Sabnani received his undergraduate degree in electrical engineering from the Indian Institute of Technology, Delhi. He completed his PhD in reliable multicasting at Columbia University.

SARAH SMITH

Senior Lecturer and Director,
MS in Global Innovation and Leadership through Engineering
Center for Leadership Education
SSMIT263@JHU.EDU

ENGINEERING MANAGEMENT

9:30 a.m. to 12 p.m.
Shriver Hall, Clipper Room

Sarah Harrison Smith earned degrees from Oxford University and Columbia University. Prior to joining Johns Hopkins University, she held management roles at *The New York Times* and was editorial director for books and Kindle at Amazon. She is currently a senior lecturer in the Whiting School of Engineering's Center for Leadership Education and director of the Master of Science in Global Innovation and Leadership through Engineering program.

AXEL KRIEGER

Associate Professor
Department of Mechanical Engineering
AXEL@JHU.EDU

AUTONOMOUS ROBOTIC SURGERY: SCIENCE FICTION OR REALITY?

1 to 2 p.m.
Clark 110

RESEARCH AREAS

Research and development of surgical robotic systems, robotic tools, and laparoscopic devices. Projects include autonomous robotic surgery systems, 3D-Printed Patient-Specific Implants, and Magnetically Controlled Microsurgery.

Axel Krieger, Engr '08 (PhD), an associate professor in mechanical engineering with a secondary appointment in computer science, focuses on both the fundamental and translational development of novel tools, imaging, and robot control techniques for medical robotics. Specifically, he investigates methodologies that increase smartness and autonomy and improve image guidance of medical robots to perform previously impossible tasks, improve efficiency, and ultimately enhance patient outcomes.

As director of the Intelligent Medical Robotic Systems and Equipment Lab, Krieger leads a team of students, scientists, and engineers in the research and development of robotic tools and laparoscopic devices. Additional projects include the use of 3D printing for surgical planning and patient-specific implants, autonomous robotic soft tissue surgery, image-guided interventions and planning, autonomous robotic trauma diagnosis and care, magnetically actuated microrobots, and cardiac planning and patient-specific implant design.

Krieger completed his undergraduate and master's degrees at the University of Karlsruhe in Germany and his doctorate at Johns Hopkins University.

THURSDAY, JUNE 27 (CONT'D)

NITISH THAKOR

Professor
Department of Biomedical Engineering
Department of Electrical and Computer Engineering
NTHAKOR@BME.JHU.EDU NEUROENGINEERING.BME.JHU.EDU

BUILD YOUR BRAIN MACHINE INTERFACE (FROM PROSTHETIC HAND TO READING YOUR MIND)

2:30 to 3:30 p.m.
Clark 110

RESEARCH AREAS

Imaging and Medical Devices Neuroengineering

Nitish Thakor is a professor of biomedical engineering at the Whiting School of Engineering and neurology at the Johns Hopkins University School of Medicine. He also has an appointment in the Whiting School's Department of Electrical and Computer Engineering. He conducts research on neurological instrumentation, biomedical signal processing, micro and nanotechnologies, neural prosthesis, clinical applications of neural and rehabilitation technologies, and brain-machine interface.

Thakor directs the Laboratory for Neuroengineering and is also the director of the NIH Training Grant on Neuroengineering.

One of Thakor's research projects, in collaboration with a multi-university consortium funded by DARPA, focuses on developing a next-generation neurally controlled upper limb prosthesis. He is actively engaged in developing international scientific programs, collaborative exchanges, tutorials, and conferences in the field of biomedical engineering.

He received his undergraduate degree from the Indian Institute of Technology. He earned both a master's and doctoral degree in biomedical engineering from the University of Wisconsin-Madison.

RAMA CHELLAPPA

Bloomberg Distinguished Professor
Department of Electrical and Computer Engineering
Department of Biomedical Engineering
RCHELLA4@JHU.EDU AIEM.JHU.EDU

TRUSTWORTHY AI

9:30 to 10:30 a.m.
Clark 110

RESEARCH AREAS

Computer Vision
Biomedical Data Science
Artificial Intelligence
Machine Learning

Rama Chellappa, a Bloomberg Distinguished Professor of electrical and computer engineering and biomedical engineering and chief scientist at the Johns Hopkins Institute for Assured Autonomy, is a pioneer in artificial intelligence. His work in computer vision, pattern recognition, and machine learning have had a profound impact on areas including biometrics, smart cars, forensics, and 2D and 3D modeling of faces, objects, and terrain. His work in motion capturing and imaging shows promise for future use in healthcare and medicine. He is also a member of Johns Hopkins' Mathematical Institute for Data Science and the Center for Imaging Science.

Chellappa's research has shaped the field of facial recognition technology—developing detailed face models based on shape, appearance, texture, and bone and muscle structure. He also is known as an expert in machine learning, a branch of artificial intelligence that instructs computer systems to perform tasks based on patterns and inferences.

He earned his doctorate in electrical engineering from Purdue University in Indiana.

LOUIS L. WHITCOMB

Professor
Department of Mechanical Engineering
LLW@JHU.EDU

ADVANCES IN UNDERWATER ROBOTIC VEHICLES FOR EXTREME OCEANOGRAPHIC EXPLORATION

1:30 to 2:30 p.m.
Clark 110

RESEARCH AREAS

Control Systems
Underwater Robotics
Industrial and Medical Robotics

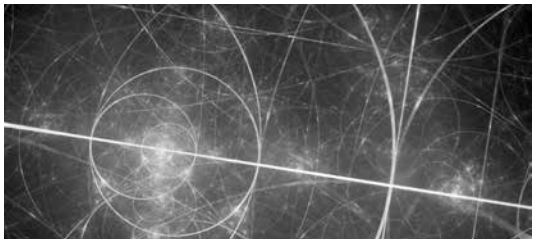
Louis L. Whitcomb is professor and former chair of the Department of Mechanical Engineering at the Johns Hopkins University's Whiting School of Engineering. His research focuses on the navigation, dynamics, and control of robot systems—with applications to robotics in extreme environments including space and underwater robots.

Whitcomb was a co-principal investigator of the Nereus and Nereid Under-Ice Projects. He is the former (founding) director of the JHU Laboratory for Computational Sensing and Robotics. He is an adjunct scientist from the Department of Applied Ocean Physics and Engineering at the Woods Hole Oceanographic Institution.

DEPARTMENTS

APPLIED MATHEMATICS AND STATISTICS

Solutions for Real-World Problems.



Powered by the unique juxtaposition of mathematics and statistics, the Department of Applied Mathematics and Statistics (AMS) emphasizes research and education that advances fundamental knowledge of mathematics and statistics, as well as the application of mathematical models to solve problems across science, engineering, medicine, and society. Our degree programs and research all reflect this interdisciplinary focus. Building upon the department's historic focus on applied mathematics, we have developed major training and research areas in probability and statistics, operations research and optimization, discrete mathematics, financial mathematics, and applied analysis and computational mathematics. Our collaborative work with colleagues from across the university has led to advances in medical imaging, social network analysis, bioinformatics, and the understanding of turbulence.

BIOMEDICAL ENGINEERING

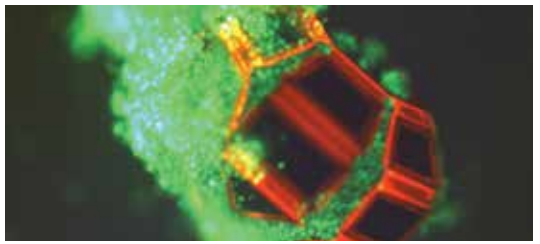
Engineering the Future of Medicine.

The Department of Biomedical Engineering (BME) is home to the nation's first and top-ranked training program in the field, setting the bar for BME research and education for more than 50 years. Our unique position within the Johns Hopkins schools of Engineering and Medicine fosters close collaborations between leading engineers, physicians, and industry partners, providing the pathways needed to translate research advances to clinical use. Our pioneering students and faculty are developing the technologies that diagnose and treat disease, transforming the practice of medicine, and improving human health on a global scale.

DEPARTMENTS (CONT'D)

CHEMICAL AND BIOMOLECULAR ENGINEERING

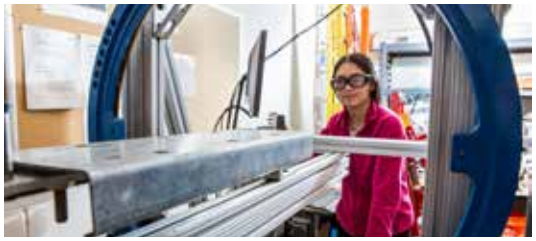
Innovating for Impact.



Combining an interdisciplinary culture of innovation with world-class faculty and deep connections to Johns Hopkins School of Medicine, the Department of Chemical and Biomolecular Engineering (ChemBE) is tackling some of the world's most challenging problems. Using the tools of chemistry, biology, physics, and data science, we develop chemical and biological technologies for an array of industries—chemical and pharmaceutical production, biomedicine, biotechnology, material design, food, and energy—making an impact worldwide.

CIVIL AND SYSTEMS ENGINEERING

Civilization Engineered.



The Department of Civil and Systems Engineering (CaSE) is redefining the practice of civil engineering by integrating civil and systems engineering to bring scientifically grounded analysis to grand societal challenges. Our goal is to improve the safety, security, and resiliency of an increasingly fragile and complex infrastructure that is threatened by evolving natural and human-made hazards. Building on our department's longstanding strengths in mechanics of materials, structures, and systems, and cross-fertilized with research from other fields, CaSE is tackling five fundamental civil engineering challenges of the coming century: resilient cities, human safety and security, space exploration and habitation, decision-making for health, and future energy infrastructure.

COMPUTER SCIENCE

Powering Discovery and Innovation in Engineering, Science, and Society.

The mission of the Department of Computer Science is to enhance discovery and innovation in engineering, science, and society through research and education. Our research is intensely collaborative and interdisciplinary. Our faculty members' expertise is broad, encompassing core computer science and a range of application areas. As leaders of major universitywide computing-intensive initiatives, they contribute to the advancement of knowledge across disciplines and are making an impact on the world in areas ranging from medical robotics to cybersecurity. Equally important is the preparation of skilled, visionary graduates who are advancing knowledge and fulfilling the promise of today's revolution in computation and artificial intelligence through a diverse and inclusive community.

ELECTRICAL AND COMPUTER ENGINEERING

Powering World-Changing Progress.

While research conducted in the Department of Electrical and Computer Engineering (ECE) covers a wide range of applications, the question that underlies every ECE project remains the same: How can we help? Through our research collaborations with partners from across the university and around the world, we are accelerating our understanding of science and engineering to fuel innovations that make an impact on society and shape our experiences of the world—from smart tools that reduce human error in surgery and prosthetics that are controlled by the user's mind to ultrafast photonics that speed information transmission and advances that are making alternative energy technologies more efficient.

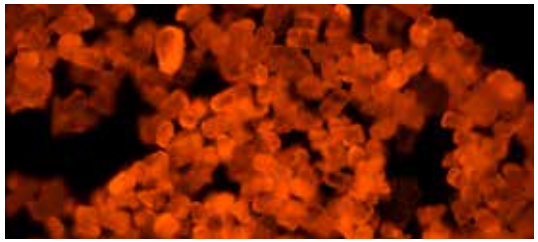
ENVIRONMENTAL AND HEALTH ENGINEERING

Working Toward a Healthy and Sustainable World.

Everything around us impacts our health—the air we breathe, the water we drink, the food we eat, and the neighborhoods in which we live. Faculty and students in the cross-divisional Department of Environmental Health and Engineering (EHE) translate fundamental science into innovative, multidisciplinary solutions to critical and complex challenges in our environment. The department's unique structure—spanning the Whiting School of Engineering and the Bloomberg School of Public Health—expresses both divisions' deep commitment to cross-disciplinary research and education. With faculty whose expertise ranges from basic physical, chemical, and biological sciences to population studies, clean energy, and environmental policy, the department works to make the world a better place through research and teaching.

MATERIALS SCIENCE AND ENGINEERING

Improving the Material World.



Materials scientists are, by nature, visionaries who imagine the world as it could be and then develop the materials needed to realize their vision. The Department of Materials Science (MatSci) brings together students and faculty with diverse interests in areas including biomaterials, nanomaterials, organic semiconductors, metals, materials characterization, and thin films. Working in collaboration with colleagues from multiple disciplines, they are improving and inventing materials that solve global problems affecting human health, energy, security, and the environment. Recent projects have included the development of new drug delivery systems; semiconductor materials and chemical sensing; work in the structure of metals at the atomic scale; materials for clean energy, fuel cells, and nanoparticles; and the engineering of structural materials.

MECHANICAL ENGINEERING

A Force for Innovation.

Mechanical engineering today is tackling big societal problems, examining phenomena at a small scale using ever-more powerful imaging technology and computers to provide solutions for large-scale applications. In all of its activities, the Department of Mechanical Engineering (MechE) focuses on meeting these needs by addressing real problems in real time and collaborating with partners around the globe. Unlocking the mysteries of the basic forces and processes—around and within us—that determine how things work, our faculty members are defining the future of their fields of inquiry and are developing innovations that are shaping our lives today—and for generations to come.

THE CENTER FOR LEADERSHIP EDUCATION

Engineering Leadership.

The Center for Leadership Education (CLE) offers coursework, minors, competitions, graduate programs, hands-on experiences, and networking opportunities to prepare students for leadership roles in the professional world. More than 1,500 students each semester from the schools of Engineering, Public Health, Peabody Institute, and Arts and Sciences take courses through the CLE. At the graduate level, CLE offers a Master of Science in Engineering Management, a Master of Science in Global Innovation and Leadership through Engineering, and an extensive suite of professional development courses.

CENTER FOR BIOENGINEERING INNOVATION AND DESIGN (CBID)

The CBID MSE program at Johns Hopkins University is a premier graduate program focused on healthcare innovation and design. It aims to educate and develop the next generation of leaders in this field by providing a comprehensive curriculum that combines technical, clinical, and business perspectives. Students engage in real-world projects—both in the U.S. and globally—addressing pressing healthcare challenges through a structured, iterative design process. The program emphasizes the importance of understanding clinical needs, developing viable solutions, and ensuring these solutions can be effectively commercialized and implemented. Graduates of the CBID MSE program leave with the skills and experience necessary to create transformational healthcare solutions and make a significant positive impact on human health worldwide.

MASTER OF SCIENCE IN SECURITY INFORMATICS

Securing Cyberspace and National Information Infrastructure.

Computer Science and Information Security Institute faculty members work closely with U.S. government research agencies and industry partners to advance research in areas including AI security, critical infrastructure protection, cryptography theory and algorithms, applied cryptography, privacy, medical information security, network security, national and international cybersecurity policy and practice, internet of things security, and software and system security. The full-time Master of Science in Security Informatics (MSSI) degree program covers the most current topics in information security. Research is central to the MSSI program of study. MSSI students work with government intelligence agencies and industry, participate in paid on-campus research projects, and complete summer internships across the country.

BALTIMORE

LIVING IN BALTIMORE

With its cultural heritage, rich history, and unique neighborhoods, Baltimore is a city with something to offer everyone.

Welcome to the Charm City

From popular tourist attractions—the Inner Harbor, the National Aquarium, and Fort McHenry (birthplace of "The Star Spangled Banner")—to more off-the-beaten-path destinations—the Edgar Allan Poe House and Museum or the tranquil Sherwood Gardens—there is always something new to discover.

The city hosts events both big and small throughout the year. Baltimore sports fans are passionate about their Orioles and the Ravens; sci-fi lovers can geek out at Baltimore Comic-Con; and hundreds drop by the Baltimore Farmer's Market every Sunday to pick up fresh local produce, cheeses, flowers, and breads (and perhaps a cup of locally roasted Zeke's coffee, too). There's the Maryland Film Festival each spring, a book festival each fall, and Artscape—America's largest free crafts festival—in the summer.

Student Favorites

Baltimore is where JHU students grow and build their lives. Our students enjoy exploring Baltimore's many neighborhoods, including Charles Village and Hampden (home to the famous holiday lights on 34th Street and the colorful, quirky Honfest); Mount Vernon and Station North, a prime destination for artists and arts enthusiasts alike; and the historic waterfront neighborhoods of Fells Point, Canton, and Federal Hill.

Hopkins in the Community

With our main campus located in Baltimore, Johns Hopkins is truly and proudly a city resident. Community engagement is part of who we are as a university.

Our commitment to our local communities is based on the simple truth that the health and well-being of the university are inextricably tied to the physical, social, and economic well-being of the city in which we live.

RESOURCES

EMERGENCY CONTACTS

Hong Lan
443-540-9028
HLAN1@JHMI.EDU

Christine Kavanagh
CHRISTINEKAVANAGH@JHU.EDU

Security
410-526-4600

EMERGENCIES

Call 911 immediately for medical emergencies.

Local Area Hospitals

Union Memorial Hospital
410-554-2000

Johns Hopkins Hospital
410-955-5000

LOCAL PHARMACIES

CVS Pharmacy
3200 Saint Paul Street
410-243-1025

CVS Pharmacy
2504 North Charles Street
410-662-7594

INTERNET CONNECTION ON CAMPUS

- Guests, patients, visitors, students, and staff who simply need internet-only access can use the JHGuestnet wireless network.
- The JHaccess Wireless network provides wireless connectivity for all medical devices.
- Guests visiting Johns Hopkins from other institutions can use eduroam for their connectivity needs.

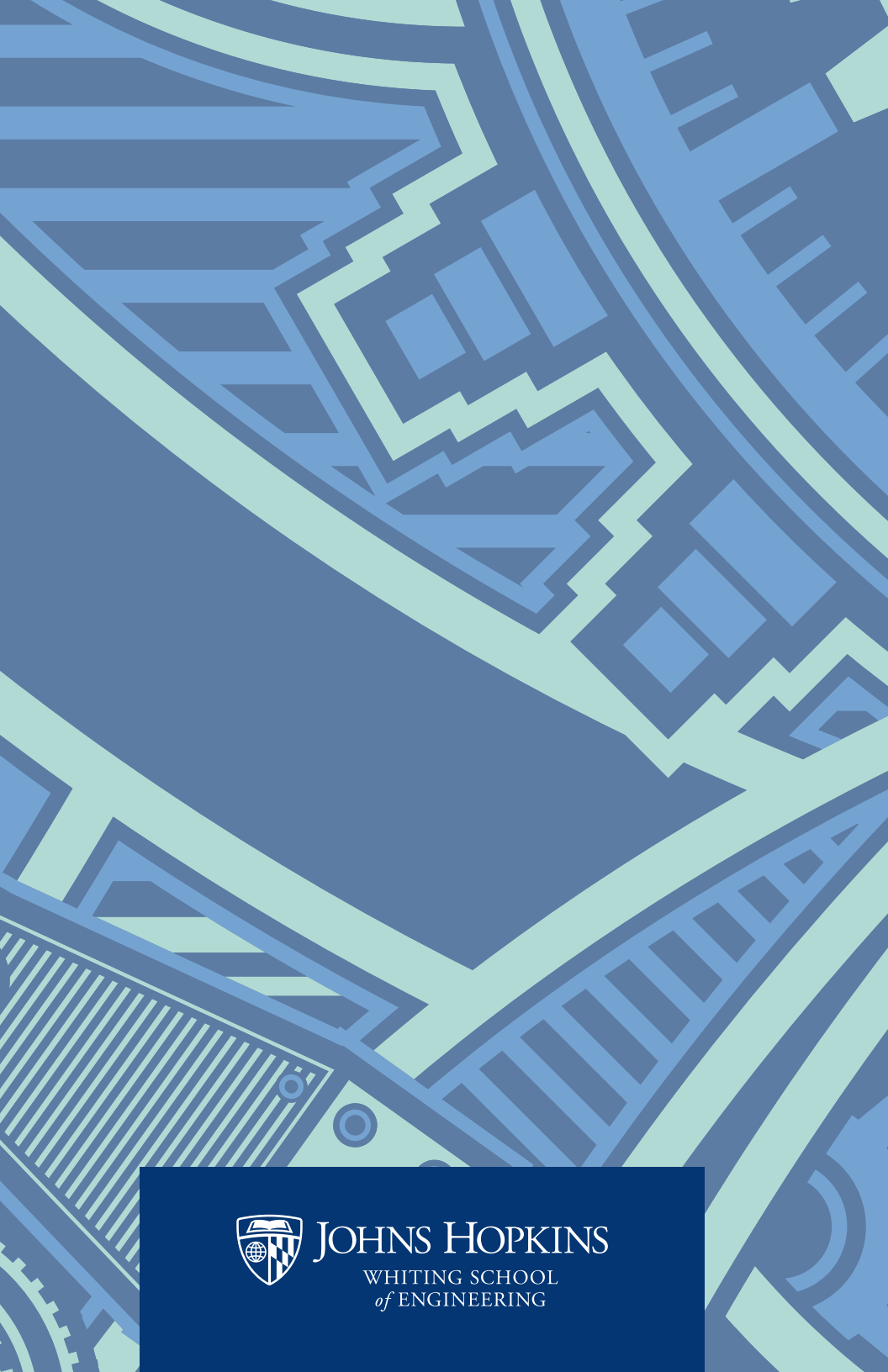
SOCIAL MEDIA

FACEBOOK.COM/JHUENGINEERING @HOPKINSENGINEER @HOPKINSENGINEER

Please use the hashtag **#June2024HEEP** when tagging images.

WE WANT YOUR FEEDBACK

Scan the QR code to fill out a brief survey.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