



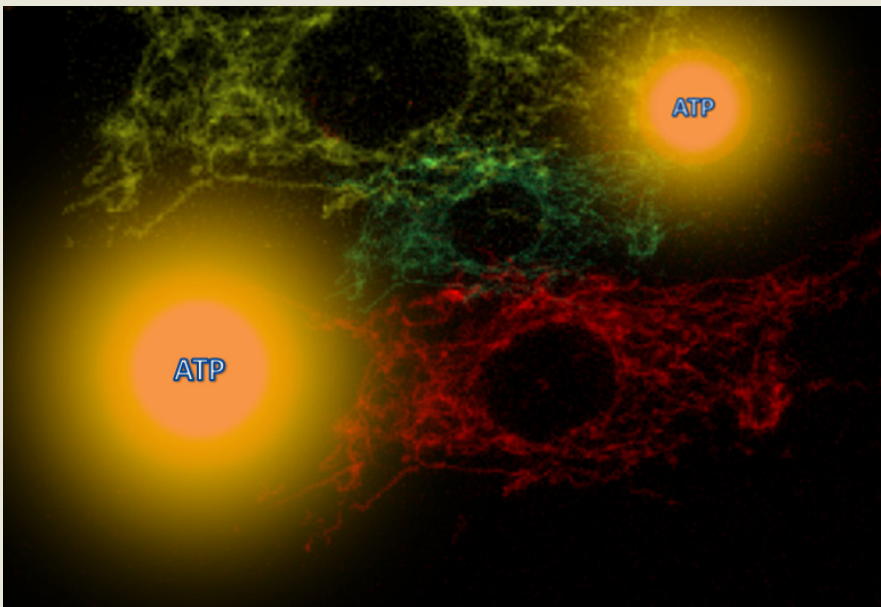
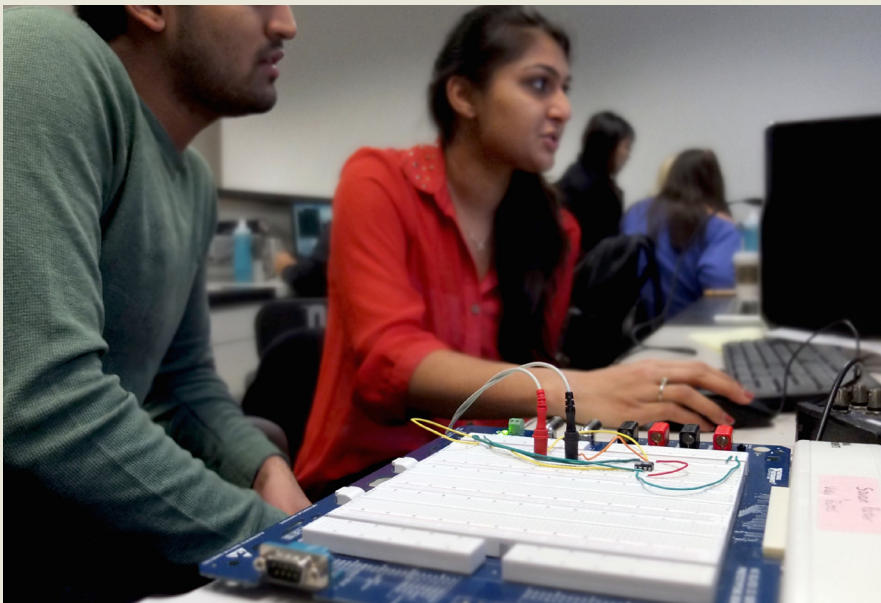
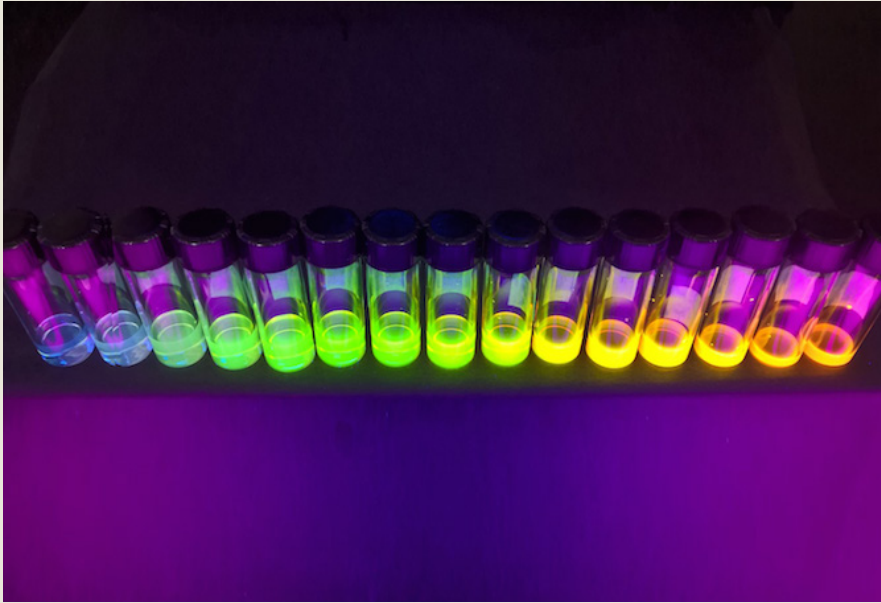
Boston University College of Engineering
Department of Biomedical Engineering



**The Center for
Integrated Life Sciences
and Engineering**
Completed Spring 2017

BIOMEDICAL ENGINEERING

2014 - 2015 ANNUAL REPORT



BU BME 2014-2015

TOP - Semiconductor quantum dots, which are photoluminescent nanocrystals used in biosensing and biomedical imaging applications.

CENTER - Undergraduates making their own Electrocardiogram in Professor Roblyer's Bioinstrumentation class.

BOTTOM - The Suki Lab discovered that blood pressure-induced mechanical fluctuations govern ATP production by vascular cells.

COVER - Architectural sketch of the new CILSE building (page 2)



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BRIDGING DISCIPLINES ACROSS SCIENCES

CENTER FOR INTEGRATED LIFE SCIENCES & ENGINEERING

FOR DECADES, some of the most exciting research at Boston University has been unfolding in a row of buildings hidden on Cummington Mall, designed originally for making carriages instead of studying the life sciences. Now University President Robert A. Brown is giving science a more prominent address on the University's main thoroughfare. In early summer of 2015, at what was a parking lot at 610 Commonwealth Avenue, BU broke ground for its new Center for Integrated Life Sciences & Engineering (CILSE), a \$140 million, state-of-the-art, nine-story research facility that will bring together life scientists, engineers, and physicians from the Medical and Charles River Campuses. The building will be dedicated to systems neuroscience, cognitive neuroimaging, and biological design. With shared, flexible lab spaces, meeting rooms and other common areas, it is being designed to encourage the kind of collaborative, interdisciplinary research that will be the hallmark of 21st-century science.

“TODAY, MANY OF THE OUTSTANDING CHALLENGES IN SCIENCE LIE AT THE BOUNDARIES BETWEEN TRADITIONAL DISCIPLINES OR THE UNCHARTERED SPACES BETWEEN THEM,”

says President Brown. These uncharted spaces will be explored at CILSE, a place, says Brown, that will foster “major interdisciplinary research efforts led by faculty from many departments and schools, but with common interests.” It will contain lab space for approximately 160 researchers, postdoctoral students, and staff, 270 graduate students, and additional space for future faculty. CILSE will be built adjacent to historic Morse Auditorium and is expected to be finished in late 2016 or early 2017. The architects are from Payette, a Boston firm that has built prize-winning science buildings for major research universities and other institutions around the world.

The 170,000-square-foot building will house the Center for Systems Neuroscience, the Biological Design Center, the Center for Sensory Communication and Neuroengineering Technology, and a Cognitive Neuroimaging Center with a 3 Tesla fMRI—a fundamental tool for studying the brain's trillions of neural connections and how they relate to human behavior.



**PROFESSOR OF
BIOMEDICAL ENGINEERING
BARBARA SHINN-CUNNINGHAM**

The University boasts one of the nation's largest clusters of researchers in the emerging fields of systems neuroscience, which examines brain function at the cellular, molecular, and cognitive levels; and biological design, which seeks to build new biological systems with the tools and techniques of engineering. These interdisciplinary fields tackle some of the thorniest problems in science and medicine, like the detection and treatment of infectious diseases, treatments for Parkinson's and Alzheimer's diseases, how memory works, and the root causes of autism. These problems draw researchers from diverse fields who are currently spread across both campuses.

The new Center for Sensory Communication and Neuroengineering Technology will be directed by BME Professor Barbara Shinn-Cunningham, and will bring together neuroscientists and sensory physiologists who study hearing, speech, and language, as well as mathematicians who investigate neural coding. The center will connect scientists in these areas to enhance technological innovation, and develop technologies such as neural prosthetics and brain-computer interfaces.

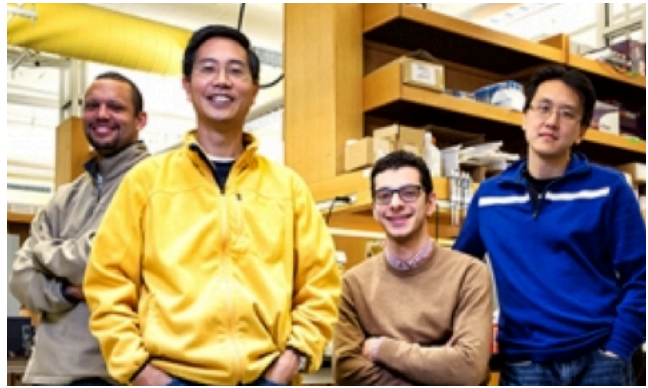
Joining Shinn-Cunningham in the CILSE Building when construction is completed in May 2017, will be two other BME faculty, John White, Professor and Chair of Biomedical Engineering and Assistant Professor Xue Han, both leaders in the field of neuroengineering. Professor White's



laboratory uses engineering approaches to understand how information is processed in the brain, with the goal of exploiting these findings to improve the human condition, and in Prof Han's lab they are working to design principles for novel neuromodulation therapies by inventing and applying various genetic, molecular, pharmacological, optical, electrical and nano tools to build functional connectomes of the brain. Ultimately, they hope to develop novel neurotechnologies to treat neurological and psychiatric disorders.

The building will also house the state-of-the-art 21st-century life sciences and engineering Biological Design Center (BDC) that will bring together forward-thinking researchers from the hottest fields in bioengineering. These scientists would combine genomic technologies like DNA sequencing and synthesis, 3-D printers, and robots to make new molecules, tissues, and entire organisms. The inaugural BDC faculty will include Christopher Chen (director), a College of Engineering Distinguished Professor and one of the world's leading experts in tissue engineering and regenerative medicine, and three young stars in synthetic biology—Ahmad (Mo) Khalil (Associate Director), Wilson W. Wong and Douglas Densmore.

Through advances in genomics and stem cell research, many of the molecular and cellular building blocks of life have been cataloged. A central challenge is to understand, control, and reengineer how these component parts fit together to bring about functional biological systems that define life and solve important societal problems, ranging from producing clean energy to fighting infection and attacking cancer. That is the fundamental quest that brought Chen, Khalil, Wong, and Densmore together and that will drive the new center. Four to six new researchers—all exceptional innovators,



BDC FACULTY (FROM LEFT) DOUG DENSMORE, CHRIS CHEN, MO KHALIL, AND WILSON WONG.

says Chen—will be added to the center's faculty over the next several years

Up until now fields such as synthetic biology and tissue engineering have arisen as separate disciplines. Synthetic biology involves designing and synthesizing genes, genetic and signaling networks, and genomes to predictably control cellular behavior. Tissue engineering involves trying to manipulate and combine cells and extracellular materials to induce the assembly of tissues. "But we realized that even though these two fields may involve slightly different tools," Chen says, "they belong under one roof." Housing the group at the CILSE, says Gloria Waters, University vice president and associate provost for research, "is a prime example of the goals of the new building—bringing together great scientists from different fields and breaking down the barriers to collaboration."

"One of the great things about BU is that we have spectacular faculty from many different disciplines," says Gloria Waters, vice president and associate provost for research. "This building will allow us to bring them together in ways that wouldn't happen if they occupied space in their individual school or college. By placing new groups in proximity to one another, we are hoping to develop collaborations that would not happen otherwise, and ultimately some unique areas of excellence."

President Brown has emphasized that the research inside the building be reflected in its exterior, says principal architect Charles Klee. Just as EPIC (the new Engineering Product Innovation Center on Commonwealth Avenue) allows the public to see the hands-on nature of engineering, CILSE's glass-walled exterior will provide a window onto basic science research at BU. "This is not a building that wants to be ashamed that it's a research building," says Klee. "You'll be able to see the exhaust fans on the roof, for example. It's transparent. You can see life in it. A lot of buildings are opaque—you have no idea whether it's a dorm, an office building, or a bank. We're giving science a front door on Commonwealth Avenue."



BME DEPARTMENT OVERVIEW

In academic year 2014-2015 the BME Department added two new faculty members, Professor and Chair John White and Assistant Professor John Ngo (Start date 7/1/15). Associate Professors Edward Damiano, Catherine Klapperich and Muhammad Zaman were promoted to Professor. Professor Carlo De Luca retired and became an Emeritus Professor of Biomedical Engineering, Professor Jim Collins resigned his tenured position and left Boston University. Sadly, Prof David Mountain passed away in November 2014 from an extended illness, he will be sorely missed. **At the end of FY15 the BME Faculty numbered 34, making the department one of the largest in the country in terms of primary faculty.**

The BME Graduate Program was led by Prof Catherine Klapperich as the Associate Chair for Graduate Programs through December 2014 and was relieved by Prof Michael Smith who served for the remainder of the academic year. **The BME Ph.D. Program awarded 16 degrees this year**, bringing our total Ph.D. degrees awarded to 246 since the program began in 1991. 18 MS degrees were awarded as well as 17 MEng degrees. Our graduate programs enrolled 150 students (119 PhD students; 4 MD/PhD; 8 MS; 19 MEng).

Graduate student recruitment was led by the Director of Graduate Admissions, Prof. Joe Tien. In the Fall 2015 we expect 57 new graduate students (27 PhD, 13 MS and 17 MEng). Our Ph.D. applicant pool continues to be competitive with other top tier Biomedical Engineering Programs. In the 2014 - 2015 recruiting season we received 643 applications. The quality of the students matriculating remains very high with a mean GPA of 3.6 (US students only).

The Associate chair for the BME Undergraduate Program was Prof Muhammad Zaman. **The BME Undergraduate Program awarded 115 Bachelor of Science degrees and enrolled 573 students.**

During 2014-2015 **the 34 primary BME faculty attracted over \$25 million in extramural funds available for expenditure during the year. This translates to over \$751,000 per faculty member.** Our faculty is comprised of world renowned scientists and engineers who work across every scale of biology and in a wide spectrum of bioengineering subspecialties. Their research is driven by advancing fundamental understanding of biology and physiology in health and disease and then translating these principles to new technologies that impact the human condition and the practice of medicine. The research laboratories of the research active faculty members are listed on our web site (<http://www.bu.edu/bme/research/labs/>) and they also participate in five interdisciplinary research centers that are directed or co-directed by BME faculty: Biomolecular Engineering Research Center (BMERC), Center for Computational Neuroscience and Neural Technology (CompNet), Center for Nanoscience and Nanobiotechnology (CNN), Biological Design Center (BDC), and Hearing Research Center (HRC).

ADMINISTRATION

CHAIRMAN

Dr. Solomon R. Eisenberg
(until April 30, 2015)
Dr. John A. White
(after May 1, 2015)

ASSOCIATE CHAIR FOR GRADUATE PROGRAM

Dr. Catherine Klapperich
(until December 31, 2014)
Dr. Michael Smith
(after January 1, 2015)

ASSOCIATE CHAIR FOR UNDERGRADUATE PROGRAM

Dr. Muhammad Zaman

DIRECTOR OF GRADUATE ADMISSIONS

Dr. Joe Tien

DIRECTOR

Matthew Barber

COULTER PROGRAM DIRECTOR

Dr. Greg Martin

BME DEPARTMENT STAFF

ADMINISTRATIVE

Bailey, Christen, Graduate Program Administrator
Wallander, Megan, Undergraduate Program Administrator
Fernandes, Fallon, Financial Administrator
Ford-Burley, Nicole, Center Administrator, HRC
Sorrentino, Tara, Financial Administrator
Daley, Lauren, Senior Program Coordinator
Orzechowski, Irene, Financial Manager
Palmer, Mary-Ellen, Administrative Assistant to the Chair
Poli, Brandon, Senior Program Coordinator
Prusaitis, Laura, Financial Manager
Sands, Nancy, Financial Manager
Studer, Roger, Assistant Coulter Program Director

TECHNICAL

Allen, Phil, Manager, Micro/Nano Imaging Core Facility
Brown, Xin, Manager, Biointerface Technologies Core Facility
Feit, Ze'ev, Manager of Clean Room Core Facility

NEW BME FACULTY



JOHN A. WHITE

Professor John A. White in the new Chair of the Biomedical Engineering starting May 1, 2015. He was recruited from the University of Utah and succeeds Professor Sol Eisenberg, who remains Senior Associate Dean for Academic Programs. John was a BME faculty member for 13 years before he joined the University of Utah in 2007 as a Professor of Bioengineering. During his tenure at the College of Engineering, he served as BME chairman ad interim and as associate chair for undergraduate and graduate studies, and received the ENG Faculty Service Award in 2002. At the University of Utah, John was a USTAR professor and was the executive director of the Brain Institute, an interdisciplinary institute that spanned the medical school, life sciences, and the school of engineering. Prof White has used engineering approaches to better understand how information is processed in the brain. Combining computational modeling, electrophysiological and optical techniques, and imaging methods, he has worked to advance new biomedical devices to treat memory disorders and epilepsy. Supported by more than \$50 million in funding from the NIH, National Science Foundation and other sources, he has published over 70 peer-reviewed papers, is a Fellow of the American Institute for Biological and Medical Engineering and of the Biomedical Engineering Society, and has served as meeting chair for the Biomedical Engineering Society Fall Meeting in 2014 and Visiting Fellow at the University of Washington in Seattle and at research institutions in Germany. John received his PhD in Biomedical Engineering from Johns Hopkins University in 1990.



JOHN NGO

Dr. Ngo received his PhD in Biochemistry and Molecular Biophysics in 2011 from the California Institute of Technology, then did a Post Doc with Dr. Roger Tsein at UCSD. Dr. Ngo's research focuses on two areas, biomaterials design and neuronal cell biology. He uses visible and infrared light to construct biomaterials and engineers self-destructing proteins and polymers that cleave themselves at tunable rates for controlling the half-life of macromolecules in vivo. He will also be developing molecular tools for electron microscopy that will be broadly applicable in cell biology but specifically useful in his work on determining if translation occurs in axons and presynaptic axon terminals of adult neurons.

**FACULTY AWARDS, HONORS
AND SIGNIFICANT EVENTS
2014-2015 ACADEMIC YEAR**

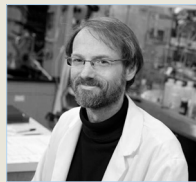
EDWARD DAMIANO, CATHERINE KLAPPERICH AND MUHAMMAD ZAMAN were promoted to Professor of Biomedical Engineering.



EDWARD DAMIANO gave the 2015 University Lecture - Creating a Bridge to Cure Diabetes



CHARLES DELISI presented the College of Engineering with a monetary gift to fund a Distinguished Lecture Series.



MARK GRINSTAFF received the inaugural Charles Delisi Award and Lecture, titled Design of Biomaterials for Clinical Applications.



XUE HAN received a Presidential Early Career Award for Scientists and Engineers, presented by President Obama in Washington DC.

AHMAD (MO) KHALIL was selected as one of 77 innovative early-career educators to participate in the National Academy of Engineering's (NAE) sixth Frontiers of Engineering Education (FOEE) symposium on October 26-29 in Irvine, California.



CATHERINE KLAPPERICH was selected by Dean Lutchen as the College of Engineering Associate Dean for Research.



DARREN ROBLER received a DOD Breast Cancer Research Program Era of Hope Scholar Award, 5 year \$4M grant.



HERB VOIGT received a Fulbright Scholar grant to work at the Pontifical Catholic University of Peru (PUCP) during the 2014-2015 academic year.



JOYCE WONG was selected as an inaugural Distinguished Professor of Engineering.



MUHAMMAD ZAMAN

was selected as a HHMI Professor; elected as a 2015 AIMBE Fellow (30 BME Faculty are elected fellows of AIMBE); and received a \$2M Saving Lives at Birth: A Grand Challenge for Development Grant for PharmaChk, a user-friendly, low-cost, portable, fast and accurate detector for screening counterfeit and substandard medicines.



BME Senior Project Team of Poling Yeung, Michaelina Dupnik and William Moik under the guidance of Assistant Professor Jason Ritt took second place in the National Institute of Biomedical Imaging and Bioengineering (NIBIB) **Design by Undergraduate Biomedical Engineering Teams (DEBUT) competition**. The BME team's entry, a "Sensory Substitution Glove for the Visually Impaired," is designed to enable users to detect obstacles at head-height as well as sudden drop-offs, and do so early enough to change course and prevent injury. The team received \$15,000 at a ceremony at the Biomedical Engineering Society (BMES) conference in October.

Jonathan Rosen, Sr Lecturer in BME, has developed a yearlong 8-credit course in Advanced Biomedical Design and Development. A required sequence for students enrolled in the BME Master of Engineering program, students will work with leading clinicians to observe and identify unmet clinical challenges, design and develop innovative engineering solutions to those challenges, and explore the regulatory, intellectual property, and reimbursement pathways that will ultimately advance the standard of patient care through the deployment of their innovations.

College of Engineering alumni from across the country converged on Cummington Mall on September 18-20 to celebrate **the College's first 50 years** with faculty and students. They learned about high-impact ENG research and entrepreneurial achievements, toured new facilities, participated in a design challenge and engaged in spirited conversations about the past and future of the College.

As reported on the BME web Site, Internationally recognized and well loved professor **David Mountain** passed away on November 5, 2014. [http://www.bu.edu/bme/2014/11/14/david-mountain-dies/MS Specializations and MENG internships](http://www.bu.edu/bme/2014/11/14/david-mountain-dies/MS%20Specializations%20and%20MENG%20internships).

The 2015 North East Bioengineering Conference (NEBEC) senior design competition awarded the BME team of Courtney Ellenson, Gil Covarrubias, Jr., Danielle Conneely and Nelson Boland, second prize on April 17 at Rensselaer Polytechnic Institute in New York. Advised by Professor Catherine Klapperich, the team developed a credit card-sized, microfluidic chip with molecular diagnostic capabilities that promises to improve diagnosis of gonorrhea in any health setting. The competition fielded entries from 79 teams based at 19 different universities.

**THE BME
DEPARTMENT
RETURNED TO
TOP 10
IN THE RANKINGS
OF BIOMEDICAL
ENGINEERING
DEPARTMENTS
NATIONALLY BY
U.S. NEWS AND
WORLD REPORT.**

PRIMARY FACULTY



TIMOTHY BARBARI
Professor, Biomedical Engineering;
Associate Provost for Graduate Affairs
PhD, Chemical Engineering, University of Texas at Austin
 bu.edu/provost/about/administration/timothy-barbari/
 Biomaterials, hydrogels, membranes, biomolecular transport and binding, biosensors



MICAH DEMBO
Professor, Biomedical Engineering
PhD, Biomathematics, Cornell University
 Cellular and Sub-cellular Mechanics Lab
 bu.edu/bme/research/labs/csm
 Statistical mechanics in biological systems; cell information processing and signal transduction; thermodynamics and mechanics of cell adhesion; biophysics of cell deformation, active motility.



IRVING J. BIGIO
Professor, Biomedical Engineering;
Electrical and Computer Engineering; and Physics
PhD, Physics, University of Michigan
 Biomedical Optics Lab
 bu.edu/research/labs/bo
 Medical applications of optics, lasers and spectroscopy; biomedical optics and biophotonics; biomolecular dynamics; applied spectroscopy, especially to biomedical problems; nonlinear optics, quantum electronics and laser physics.



ALLISON M. DENNIS
Assistant Professor, Biomedical Engineering
PhD, Bioengineering, Georgia Institute of Technology
 Dennis Lab
 Nanobiotechnology; fluorescent biosensing; fluorescence resonance energy transfer (FRET); quantum dot chemistry; fluorescence microscopy; single molecule sensing/imaging



CHRISTOPHER S. CHEN
Professor, Biomedical Engineering
MD, Harvard University, PhD, Medical Engineering, MIT
Tissue Microfabrication Lab
 http://sites.bu.edu/chenlab/
 My laboratory seeks to understand how cells interact with their environment, and to use this knowledge to control cell function. In particular, we are studying the cooperation between adhesive, mechanical and biochemical signaling in the regulation of angiogenesis and stem cell biology.



SOLOMON EISENBERG
Professor, Biomedical Engineering;
Professor, Electrical and Computer Engineering;
Senior Associate Dean for Academic Programs,
College of Engineering
ScD, Electrical Engineering, MIT
 Fields and Tissues Lab
 Electrically mediated phenomena in tissues and biopolymers; cartilage biomechanics; computational modeling of electric field distributions in the human thorax and heart during defibrillation; transcranial magnetic stimulation.



H. STEVEN COLBURN
Professor, Biomedical Engineering;
Director, Hearing Research Center
PhD, Electrical Engineering, MIT
 Binaural Hearing Lab
 bu.edu/bme/research/labs/bh
 Measurement and modeling of binaural hearing performance. Modeling the activity of auditory brainstem neurons and measurement and modeling of spatial attributes of sound perception.



MAXIM D. FRANK-KAMENETSKII
Professor, Biomedical Engineering
PhD, Biophysics, Moscow Physical-Technical Institute, ScD (IVth degree), Physical and Mathematical Sciences, Institute of Chemical Physics, USSR
 bu.edu/bme/people/primary/frankkamenetskii/
 DNA structures; DNA topology; DNA functioning, PNA (peptide nucleic acid)



EDWARD DAMIANO
Professor, Biomedical Engineering
PhD, Applied Mechanics, RPI
 Vascular Interface and Microhemofluidics Lab
 bu.edu/bme/people/primary/damiano
 Integrated cellular and extracellular biomechanics; biofluid dynamics; microhemofluidics; microcirculation; vestibular biomechanics; non-Newtonian rheology; closed-loop blood-glucose regulation.



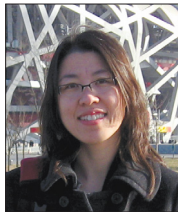
JAMES GALAGAN
Associate Professor, Biomedical Engineering and Microbiology;
BUSM;
Associate Director, Systems Biology of Infectious Disease Core NEIDL
PhD, Computational Neuroscience, MIT
 National Emerging Infectious Diseases Laboratory
 bu.edu/neidl
 Develop efficient and accurate methodologies for the analysis of genomic data, with a particular focus on infectious diseases.



CHARLES DELISI
Metcalf Professor of Science and Engineering;
Dean Emeritus, College of Engineering
PhD, Physics, New York University
 Biomolecular Systems Lab
 bu.edu/bme/research/labs/bmolec
 Developing and applying computational/mathematical methods, and high throughput experimental methods for inferring the structure and function of protein networks.



MARK GRINSTAFF
Professor, Biomedical Engineering and Chemistry
PhD, University of Illinois at Urbana-Champaign;
 bu.edu/bme/people/primary/grinstaff/
 Biomaterials, tissue engineering, drug delivery, macromolecular chemistry and engineering, self-assembly, nanodevices.

**XUE HAN**

Assistant Professor, Biomedical Engineering
PhD, Physiology, University of Wisconsin-Madison;
 Neuroengineering Lab
bu.edu/neuroengineering
 Neurotechnology, optical neural modulation, optogenetics, neural prosthetics, neural network dynamics, brain rhythms, neurological and psychiatric diseases, cognition.

**JEROME MERTZ**

Professor, Biomedical Engineering & Physics
PhD, Physics, Université Paris VI & University of California, Santa Barbara,
 Biomicroscopy Lab
bu.edu/bme/research/labs/bl
 Development and application of new optical microscopy techniques to biological imaging.

**ANDREW C. JACKSON**

Professor, Biomedical Engineering
PhD, Biophysics and Physiology, University of Mississippi Medical School
 Respiratory Research
bu.edu/bme/research/labs/rr
 Respiratory physiology; respiratory mechanics, role of airway closure in asthma.

**JOHN NGO**

Assistant Professor, Biomedical Engineering
PhD, Biochemistry and Molecular Biophysics California Institute of Technology
 Ngo Lab
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 Fluorescence imaging, electron microscopy, protein and biomolecular engineering, localized translation, directed evolution

**SIMON KASIF**

Professor, Biomedical Engineering
PhD, Computer Science, University of Maryland
 Computational Genomics
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 Bioinformatics, Computational Genomics, Algorithm Design, Artificial Intelligence, High Performance Systems.

**JASON RITT**

Assistant Professor, Biomedical Engineering
PhD Neuroscience Boston University
 Ritt Lab
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 Neuroscience of sensorimotor behaviors; biological active sensing; role of embodiment in neural computation; brain machine interfaces; sensory prosthetics.

**AHMAD (MO) KHALIL**

Assistant Professor, Biomedical Engineering
PhD, Mechanical Engineering, MIT
bu.edu/khalillab/
 Synthetic biology; systems biology; programmable microfluidics; transcription regulation, mechanobiology; single-cell analysis; single-molecule biophysics,

**DARREN ROBLYER**

Assistant Professor, Biomedical Engineering.
PhD Bioengineering, Rice University;
 Biomedical Optical Technologies Lab
<http://www.bu.edu/botlab/>
 Optical Functional Imaging, Diffuse Optics, Near Infrared Spectroscopy, Monitoring of Emerging Targeted and Cytotoxic Therapies in Oncology, Non-Invasive Monitoring of Tumor Metabolism.

**CATHERINE KLAPPERICH**

Professor, Biomedical Engineering
PhD, Mechanical Engineering, UC, Berkeley
 Biomedical Microdevices and Microenvironments
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 Design of new molecular diagnostics and appropriate technologies for healthcare.

**KAMAL SEN**

Associate Professor, Biomedical Engineering; Hearing Research Center
PhD, Physics, Brandeis University
 Natural Sounds and Neural Coding
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 Electrophysiological recording of neural responses in auditory processing. theoretical methods to characterize neuronal encoding. computational models of natural sound processing.

**KENNETH R. LUTCHEN**

Professor, Biomedical Engineering; Dean, College of Engineering
PhD, Biomedical Engineering, Case Western Respiratory and Physiological Systems Identification
bu.edu/bme/research/labs/rpsi
 Airway and lung tissue mechanics and ventilation; Computational modeling of structure-function relations in the lung; Mechanical ventilation; Integrated biomechanics of the lung; linear and nonlinear systems identification, blood-glucose regulation.

**BARBARA G. SHINN-CUNNINGHAM**

Professor, Biomedical Engineering
PhD EE and Computer Science, MIT
 Auditory Neuroscience
bu.edu/bme/research/labs/ans
 Binaural and spatial hearing, perceptual effects of echoes and reverberation, speech and signal intelligibility in noise and reverberation, source segregation, auditory and cross-modal attention, plasticity and learning in spatial perception.

PRIMARY FACULTY CONTD



MICHAEL L. SMITH
Associate Professor, Biomedical Engineering
PhD, Biomedical Engineering, University of Virginia, 2004
 Michael Smith Lab
bu.edu/bme/people/primary/smithm
 Cellular mechanotransduction through the extracellular matrix; fibronectin structural biology; and microfabricated surfaces for engineering cell function.



HERBERT F. VOIGT
Professor, Biomedical Engineering; Associate Research Professor, Otolaryngology, School of Medicine
PhD, Biomedical Engineering, Johns Hopkins University
 Auditory Neurophysiology Lab
bu.edu/bme/research/labs/anp
 Auditory neurophysiology; neural circuitry; neural modeling.



DIMITRIJE STAMENOVIĆ
Associate Professor, Biomedical Engineering
PhD, Mechanics, University of Minnesota
 Cell and Tissue Mechanics Lab
bu.edu/bme/research/labs/ctm
 Respiratory mechanics; cell mechanics; rheology of soft tissues; mechanics of foam-like structures.



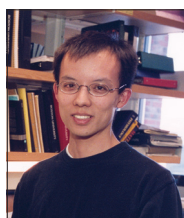
JOHN WHITE
Professor and Chair, Biomedical Engineering
PhD, Biomedical Engineering, Johns Hopkins University
 White Lab
bu.edu/bme/people/primary/white
 Mechanisms of Episodic Memory; Pathophysiology of Epilepsy; Computational Neuroscience; Design of Real-Time Instrumentation; Imaging of Activity in Neurons and Astrocytes



BÉLA SUKI
Professor, Biomedical Engineering
PhD, Biomechanics, Jozsef Attila University, Szeged (Hungary)
 Cell and Tissue Mechanics Lab
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 Mechanical properties of living tissues; modeling the dynamic and nonlinear behavior of complex biological systems; pulmonary physiology.



JOYCE WONG
Professor, Biomedical Engineering
PhD, Materials Science and Engineering, Program in Polymer Science and Technology, MIT
 Biomimetic Materials Engineering Lab
bu.edu/bme/research/labs/wong
 Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions.



JOE TIEN
Associate Professor, Biomedical Engineering
PhD, Physics, Harvard University
 Tien Lab bu.edu/bme/research/labs/tien-lab
 New techniques to vascularize biomaterials; focus on synthesis of microfluidic biomaterials (materials that contain open channels for perfusion), the quantitative physiology of engineered microvessels, and the computational design of vascular systems.



WILSON WONG
Assistant Professor, Biomedical Engineering
PhD, University of California Los Angeles
bu.edu/wilsonwonglab/
 Synthetic and Systems Biology in immune cells



LUCIA M. VAINA
Professor, Biomedical Engineering and Neurology
MS, U. Timisoara and Urbino; PhD Mathematical Logic, Sorbonne, Doctorat d'Etat ès Sciences & Médecine (Neurologie), Human & Computational Vision, Institut National Polytechnique de Toulouse
 Brain and Vision Lab bu.edu/bme/research/labs/bv
 Computational visual neuroscience; biological and computational learning; functional and structural neuroimaging.



MUHAMMAD ZAMAN
Associate Professor, Biomedical Engineering
PhD, Physical Chemistry University of Chicago
 Lab for Engineering Education & Development
bu.edu/leed
 Comprehensive and quantitative approaches to develop a multiscale understanding of cell-matrix interactions for fundamental biological and applied clinical research.



SANDOR VAJDA
Professor, Biomedical Engineering
PhD, Chemistry, Hungarian Academy of Science
 Structural Bioinformatics bu.edu/bme/research/labs/sb
 Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design.

SENIOR LECTURER



JONATHAN ROSEN
Senior Lecturer, Biomedical Engineering
PhD, Biomaterials Engineering, Case Western Reserve University
 Director, Innovation Programs COE
bu.edu/people/primary/rosen
 Medical technologies for global health; pediatric and neonatal surgery systems

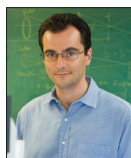
RESEARCH FACULTY



DIMITRI BEGLOV
Research Assistant Professor,
Biomedical Engineering
PhD, Molecular Biophysics, Moscow Physical and Technical Institute
 Computational chemistry and biology; protein structure and function; computational characterization and prediction of biomolecular interactions.



NATALIA BROUDE
Research Professor,
Biomedical Engineering
PhD, Organic Chemistry, DSci Molecular Biology, Institute of Bioorganic Chemistry
 Functional genomics, structure/function relationships in nucleic acids, development of advanced methods for genomic studies.



MARIO CABODI
Research Assistant Professor,
Biomedical Engineering
PhD Cornell University,
 Microfluidic devices; tissue engineering, and biomaterials.



JAMES J. COLLINS, PHD
Research Professor;
Biomedical Engineering
PhD Mechanical Engineering University of Oxford
 Synthetic biology, systems biology, engineering gene networks



DANIEL EHRLICH
Research Professor,
Biomedical Engineering
PhD Optical Engineering, University of Rochester
 Optics, lithography, biosensors and biomolecular assays, with a current emphasis on microfluidic instruments for high-content, high-throughput cell-based assays and deep-UV imaging.



EVAN EVANS
Research Professor,
Biomedical Engineering
PhD, Engineering Science, University of CA at San Diego
 Nano-microscale biomechanics; ultra-sensitive force probes, extreme resolution optical techniques; material properties of cellular structure; role of structural forces in cell biochemistry.



FERNANDO FERNANDEZ, PHD
Research Assistant Professor;
Biomedical Engineering
PhD, Neuroscience, University of Calgary
 Electrophysiology, biophysics and computational neuroscience; understanding the underlying mechanisms of neuronal electrical activity and its implications for synaptic integration and spike output modulation in cortical circuits.



ODED GHITZA
Research Professor,
Biomedical Engineering
PhD Electrical Engineering, Tel Aviv University
 Dr. Ghitza's current research focuses on the formulation of cortical computation principles that underlie the speech decoding process and that are capable of predicting human performance in speech perception tasks.



DMYTRO KOZAKOV
Research Associate Professor,
Biomedical Engineering
PhD Biomedical Engineering, Boston University
 Development of protein-protein and protein-ligand docking algorithms, fast and efficient scoring functions for screening large number of potential docked complexes, protein homology models suitable for docking.



AMIT MELLER, PHD
Research Professor;
Biomedical Engineering
PhD Physics, Weizmann Institute of Science
 Nanoforce Spectroscopy of RNA folding kinetics, DNA switches and transcription initiation kinetics, RNA helicase activity, transcription factor DNA/interaction ultra fast DNA sequencing, optical methods for single molecule detection.



IRINA V. SMOLINA
Research Associate Professor,
Biomedical Engineering
PhD in Molecular Biology, Institute of Bioorganic Chemistry, Russian Academy of Science, Moscow, Russia
 Development of novel sensitive and selective techniques for molecular diagnostics; exploring the possible use of biological and synthetic DNA analogs for applications in bioengineering, molecular imaging and single-molecule analysis; new methodologies for multiplexed detection and target quantification.



BRIAN SNYDER
Research Professor,
Biomedical Engineering
MD and PhD, Biomechanics, University of Pennsylvania
 Basic and applied research in musculoskeletal biomechanics, cellular processes, and gene expression



THOMAS L. SZABO
Research Professor,
Biomedical Engineering
PhD, Physics, University of Bath, UK;
 Medical imaging, diagnostic ultrasound, tissue characterization, transduction, biomedical signal processing, wave propagation, nonlinear acoustics.

EMERITUS



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PROFESSOR OF PRACTICE



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AFFILIATED FACULTY



DAVID CENTER, MD
Professor of Pulmonary Medicine, Medicine, and Biochemistry, Chief of Allergy, Pulmonary and Critical Care Medicine
BUSM



CHRISTOPHER CONNOR, MD, PHD
Assistant Professor;
Anesthesiology
BUSM



DOUGLAS DENSMORE, PHD
Assistant Professor; Electrical and Computer Engineering



THOMAS EINHORN, MD
Chairman; Orthopedic Surgery, Professor; Orthopedic Surgery
BUSM



SHYAMSUNDER ERRAMILI, PHD
Professor; Physics



TIMOTHY GARDNER, PHD
Assistant Professor; Biology



CAROLINE ATTARDO GENCO, PHD
Professor of Medicine and Microbiology
BUSM



BENNETT GOLDBERG, PHD
Professor; Physics



LEE GOLDSTEIN, MD, PHD
Associate Professor; Psychiatry, Neurology, Ophthalmology, Pathology and Laboratory Medicine
BUSM



STEPHEN GROSSBERG, PHD
Professor; Mathematics, Psychology



FRANK GUENTHER, MS, PHD
Associate Professor; Sargent College, Speech Language and Hearing Science



JAMES A. HAMILTON, PHD
Professor; Physiology and Biophysics
BUSM



ALLYN E. HUBBARD, PHD
Professor; Electrical and Computer Engineering



LAERTIS IKONOMOU, PHD
Assistant Professor; Medicine
BUSM



W. CLEMENT KARL, PHD
Professor; Electrical and Computer Engineering



NANCY KOPELL, PHD
Professor; Mathematics



ELISE F. MORGAN, PHD
Associate Professor;
Mechanical Engineering
BUSM



S. HAMID NAWAB, PHD
Professor; Electrical and Computer Engineering



GEORGE O'CONNOR, MD, MS
Professor of Medicine
BUSM



IOANNIS PASCHALIDIS, PHD
Professor; Electrical and Computer Engineering



TYRONE M. PORTER, PHD
Associate Professor;
Mechanical Engineering



DANIEL SEGRÈ, PHD
Associate Professor;
Biology



SATISH K. SINGH, MD
Assistant Professor;
Gastroenterology
BUSM



H. EUGENE STANLEY, PHD
Professor; Physics, Chemistry



MARTIN STEFFEN, PHD
Assistant Professor;
Pathology & Laboratory Medicine
BUSM



CARA STEPP, PHD
Assistant Professor;
Sargent College, Speech, Language & Hearing Science



M. SELIM ÜNLÜ, PHD
Professor; Electrical and Computer Engineering



DAVID WAXMAN
Professor;
Biology and Bioinformatics and Medicine



KATHERINE YANHANG ZHANG, PHD
Associate Professor;
Mechanical Engineering

POSTDOCS

POSTDOCTORAL ASSOCIATES

Alimperti, Stella (Chen)
Andreson, Brett (Meller)
Andesari, Vivi (Zaman)
Assad, Ossama (Meller)
Bano, Ishrat (Zaman)
Barakov, Roman (Mertz)
Bashor, Caleb (Collins)
Belenky, Ryan (Collins)
Bellas, Evangelia (Chen)
Burrill, Devin (Collins)
Calabro, Finnegan (Vaina)
Cameron, Ewen (Collins)
Chan, Clement (Collins)
Choi, Colin (Chen)
Chopra, Anant (Chen)
Cohen, Nadia (Collins)
Daringer, Nichole (Collins)
Desai, Darash (Zaman)
Furuta, Yoshikazu (Collins)
Gritton, Howard (Han)
Gutierrez, Arnaud (Collins)
Hayashi, Gosuke (Collins)
Heydrick, Stanley (J Wong)
Keung, Albert (Khalil)
Kohman, Richard (Han)
Kondabolu, Krinsnakanth (Han)
Kumar, Roshan (Collins)
Kutys, Matthew (Chen)
Lee, Elaine (Wong)
Lee, Jeong Wook (Collins)
Linnes, Jaqueline (Klapperich)
Mak, Michael (Zaman)
Mamonov, Artem (Vajda)
Meylan, Sylvain (Collins)
Mirabella, Teodelinda (Chen)
Nahhas, Michael (Vaina)
Oliviera Nunes, Claudio (Suki)
Pardee, Keith (Collins)
Perrone, Benjamin (Ritt)
Polacheck, William (Chen)
Porter, Caroline (Collins)
Shapiro, Rebecca (Collins)
Slomovic, Shimyn (Collins)
Spill, Fabian (Zaman)
Squires, Allison (Meller)
Takahashi, Ayuko (Suki)
Tseng, Hua-an (Han)
Walsh, Anthony (W Wong)
Wellman, Tyler (Suki)
Wong, Sharon (Klapperich)
Wu, Gravce (Zaman)
Yang, Jason (Collins)
Zhou, Jiamin (Han)

SENIOR POSTDOCTORAL ASSOCIATES

Baker, Brendon (Chen)
Eyckmans, Jeroen (Chen)
Fan, Andy (Klapperich)
Parameswaran, Harikrishnan (Lutchen)
Trappmann, Britta (Chen)

ADJUNCT FACULTY

SYLVAN GIOUX, PHD

Adjunct Assistant Professor,
Biomedical Engineering,
Beth Israel Deaconess Medical Center
for Molecular Imaging

HERNAN JARA, PHD

Adjunct Associate Professor,
Biomedical Engineering,
Associate Professor of Radiology,
Boston University School of Medicine

MARCOS VIDAL MELO, MD, PHD

Adjunct Associate Professor,
Biomedical Engineering,
Massachusetts General Hospital

TILO WINKLER, PHD

Adjunct Assistant Professor,
Biomedical Engineering,
Massachusetts General Hospital

RESEARCH STAFF

RESEARCH TECHNICIANS

Chen, Li-Yang (Leon) (Vaina)
Chinnala, Jyothsna (Unlu)
Fernandes, Andrea (Zaman)
Guerra, Kevin (Han)
Gungordo, Hatice (Zaman)
Imada, Alicia (Ritt)
Irani, Atena (Zaman)
Istfan, Raef (Roblyer)
Kelleher-Tang, Laurie (Chen)
MacDonald, Cody (Collins)
McKeon, Katherine (Damiano)
Palmiere, Michael (Ritt)
Quintero-Cadena, Porfirio (Collins)
Schwarz, Eric (Collins)
Selagamsetty, Rajenranath (Damiano)
Telian, Greg (Ritt)
Ye, Jonathan (Collins)

RESEARCH SCIENTISTS

Atas, Evrim (Meller)
Beg, Qasim (Segre)
Buczek-Thomas, Joann (Wong, J)
Dreyfuss, Jonathan (Kasif)
Haddock, Traci
Jiang, John (Damiano)
Kuznetsov, Igor (Evans)
Mineava, Olga (Goldstein)
Molla, Michael (Kasif)

RESEARCH ENGINEERS

Andreson, David (Colburn)
Brughera, Andrew (Colburn)
Studer, Roger (Martin)
Voysey, Graham (Colburn)
Zosuls, Alex (Colburn)

SENIOR RESEARCH SCIENTISTS

A'amar, Ousama (Bigio)
Bartolak-Suki, Elizabeth (Suki)
Cariani, Peter (Colburn)
Delhorne, Lorraine (Colburn)
Dwyer, Dan (Collins)
El-Khatib, Firas (Damiano)
Ramey, Kirk (Damiano)
Scolnick, Scott (Damiano)

EXTERNAL RESEARCH FUNDING

The Biomedical Engineering Department maintains a vibrant research program in its approximately 73,000 square feet of space at 24-44 Cummington St., on Boston University's Charles River Campus. We are comprised of 31 separate research laboratories and 6 research centers. The research can be characterized by a combination of:

- Empirical and theoretical work with an attention to explicit mathematical models for the phenomena under study
- Intensive computer use for experimental and theoretical work
- A basic scientific flavor to the fundamental questions being asked
- An attention to the applications of the work to the improvement of health care, and a thorough understanding of the underlying physiological processes

RESEARCH AREAS IN BME

Synthetic Biology and Quantitative Systems Biology

Neuroengineering & Hearing Research

Cellular, Subcellular & Systems Biomechanics

Molecular Bioengineering

Biomedical applications of Nanotechnology

Biomedical Optics & Imaging

Biomaterials, Tissue Engineering & Regenerative Medicine

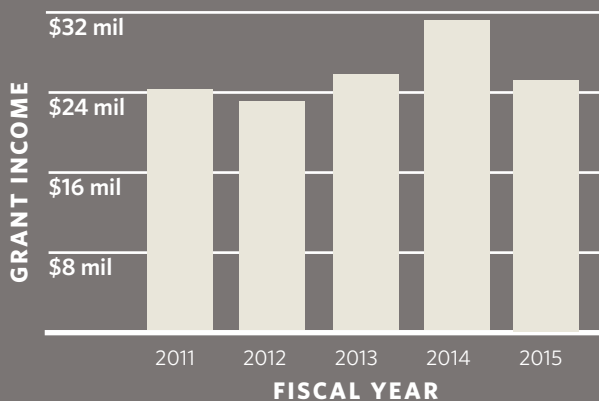
Engineering Global Health

BU faculty received

\$25,556,223

in new research funding (7/1/2014 - 6/30/2015)

BME FACULTY ANNUAL TOTAL GRANT FUNDING



77

NEW AND CONTINUING FUNDING AWARDS.

OVER \$ **160M**

IN RESEARCH PROPOSALS SUBMITTED.

BME's largest funding source is **NIH (68%)** followed by **NSF (9%)**, then **DOD (8%)**, **Foundations (6%)**, **industry (3%)** and **other Government Sources (2%)**. 4% of the funding received in FY13 was dedicated to **graduate student funding** through 3 training grants and funding from local area hospitals and universities.

BME GRADUATE STUDENT TRAINING GRANTS:

Quantitative Biology and Physiology (NIH, Bigio PI)

7 STUDENTS

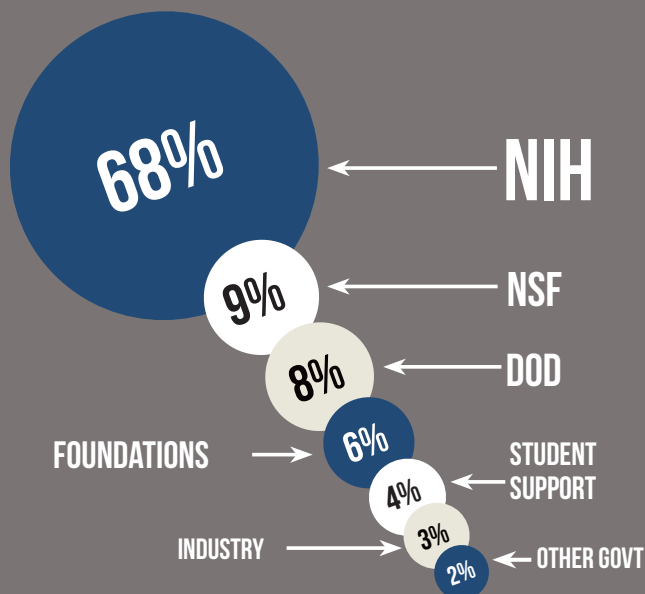
Translations Research in Biomaterials (NIH, Grinstaff PI)

2 STUDENTS

Training in Computational Neuroscience (NIH, Mountain PI)

1 STUDENT

BME GRANT FUNDING BY AGENCY



NIH AWARDS

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	INSTITUTE	AMOUNT
BAKER	MECHANICS OF FIBROSIS IN 3D BIOMIMETIC EXTRACELLULAR MATRICES	NHLBI	130,356
BIGIO	OPTICAL IMAGING OF CHEMOTHERAPY FOR BRAIN TUMORS (SUB COLUMBIA U)	NCI	72,740
CHEN	ALLIANCE CHALLENGE PROJECT: THE EMP TUMOR METASTASIS MODEL SYSTEMS (SUB JOHNS HOPKINS)	NCI	32,740
CHEN	STIFFNESS, CADHERINS, AND INTEGRINS IN MECHANO-CHEMICAL SIGNALING (SUB UPENN)	NHLBI	138,403
CHEN	APOE HDL, ARTERIAL BIOMECHANICS AND CARDIOVASCULAR DISEASE (SUB UPENN)	NHLBI	74,087
CHEN	RESBIO: THE TECHNOLOGY RESOURCE FOR POLYMERIC BIOMATERIALS (SUB RUTGERS)	NIBIB	112,469
CHEN	INTEGRATED HEART-LIVER-VASCULAR SYSTEMS FOR DRUG TESTING IN HUMAN HEALTH AND DISEASE (SUB WYSS)	NIBIB	242,129
CHEN	A VASCULARIZED 3-D BIOMIMETIC FOR ISLET FUNCTION AND PHYSIOLOGY (SUB UPENN)	NIDDK	202,629
COLBURN	CORE CENTER GRANT	NIDCD	461,924
COLLINS	CHROMATIN-BASED CELLULAR MEMORY AND SPATIAL GENOMIC REGULATION	NIGMS	54,194
DAMIANO	TRANSLATIONAL STUDIES OF A BIONIC PANCREAS FOR OUT-PATIENT DIABETES MANAGEMENT	NIDDK	593,701
DAMIANO	A MULTICENTER OUTPATIENT TRIAL OF A BI-HORMONAL BIONIC PANCREAS	NIDDK	1,440,000
DELISI	VISANT-PREDICTOME: A SYSTEM FOR INTEGRATION, MINING, VISUALIZATION AND ANALYSIS	NIGMS	750,810
EVANS	KINETIC AND MECHANICAL PROPERTIES OF ALB2 INTEGRIN (SUB GA TECH)	NIH	76,452
GALAGAN	SYSTEMS BIOLOGY OF THE CIRCADIAN CLOCK OUTPUT NETWORK (SB TEXAS A&M)	NIGMS	151,445
GALAGAN	GLOBAL MAPPING AND ANALYSIS OF BACTERIAL TRANSCRIPTIONAL REGULATORY NETWORK	NIGMS	570,271
GRINSTAFF	SYNTHESIS, CHARACTERIZATION, AND EVALUATION OF POLYMERIC TISSUE LUBRICANTS	NIAMS	745,269

NIH AWARDS CONT.)

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	INSTITUTE	AMOUNT
GRINSTAFF	CHARACTERIZING ELECTROSTATIC INTERACTIONS BETWEEN GLYCOSAMINOGLYCANS AND CATIONIC SMALL MOLECULES	NIH	274,341
HAN	CAUSAL ANALYSIS OF ELECTRICALLY CONNECTED NEURAL NETWORKS	NINDS	320,314
HAN	LIGHT CONTROLLABLE NANOROBOT FOR UNCAGING ARBITRARY BIOACTIVE MOLECULES	NINDS	491,100
KASIF	DIABETES RESEARCH CENTER-GENOMICS CORE (SUB JOSLIN)	NIDDK	236,689
KASIF	EXPANSION OF THE DIABETES RESEARCH CENTER'S PILOT AND FEASIBILITY PROGRAM (SUB JOSLIN)	NIDDK	99,999
KLAPPERICH	BACTERIAL DRUG SUSCEPTIBILITY IDENTIFICATION BY SURFACE ENHANCED RAMAN MICROSCOPY (SUB FRAUNHOFER)	NIAID	68,000
KLAPPERICH	RAPID MOLECULAR DIAGNOSTS FOR CHLAMYDIA AND GONORRHEA AT THE POINT-OF-CARE	NIAID	547,484
KLAPPERICH	CENTER FOR INNOVATION IN POINT OF CARE TECHNOLOGIES FOR THE FUTURE OF CANCER CARE	NIBIB	1,783,107
KLAPPERICH	CENTER FOR INNOVATION IN POINT OF CARE TECHNOLOGIES FOR THE FUTURE OF CANCER CARE	NIBIB	1,810,561
KLAPPERICH	PAPER MICROFLUIDIC CHIP FOR ISOTHERMAL AMPLIFICATION AND LATERAL FLOW DETECTION OF HPV DNA (SUB MGH)	NIBIB	139,425
KLAPPERICH	A RAPID INSTRUMENT FREE MOLECULAR DIAGNOSTIC FOR B. PERTUSSIS	NIAID	57,962
MERTZ	HIGH RESOLUTION PHASE CONTRAST ENDOSCOPY	NCI	345,234
PARAMESWARAN	EXTRACELLULAR DETERMINANTS OF AIRWAY SMOOTH MUSCLE FORCE: A NEW PARADIGM FOR SUSTAINED AIRWAY CONSTRICTION	NHLBI	113,724
RITT	MULTI-REGION, EXTENDED-DEPTH IMAGING OF NEURAL ACTIVITY VIA A NOVEL NEEDLE MICROENDOSCOPE	NIBIB	245,550
SHINN-CUNNINGHAM	TRAINING IN COMPUTATIONAL NEUROSCIENCE: INTEGRATING EXPERIMENT, THEORY, AND TECHNOLOGY	NIDA	328,021
SHINN-CUNNINGHAM	INDIVIDUAL DIFFERENCES IN SUPRA-THRESHOLD SOUND ENCODING	NIDCD	347,863
SMOLINA	THE DEVELOPMENT OF MULTIPLEXED, LABEL-FREE ISOTHERMAL DIAGNOSTIC FOR RAPID IDENTIFICATION OF BACTERIAL PATHOGENS	NIAID	245,550
SUKI	ENDOGENOUS SURFACTANT THERAPY FOR THE DEVELOPING LUNG	NHLBI	486,935
SUKI	PERSONALIZED MECHANICAL VENTILATION FOR THE INJURED LUNG (SUB UVM)	NHLBI	435,398
TIEN	IN VIVO MICROSURGICAL ANASTOMOSIS OF PREVASCULARIZED TISSUES	NIBIB	163,700
VAJDA	A MULTISTAGE APPROACH TO PROTEIN-PROTEIN DOCKING	NIGMS	269,015
VAJDA	COMPUTATIONAL MAPPING OF PROTEINS FOR THE BINDING OF LIGANDS	NIGMS	372,783
WONG J	MODELS TO PREDICT PROTEIN BIOMATERIAL PERFORMANCE (SUB TUFTS)	NIBIB	193,062
WONG J	MECHANICAL CONDITIONING OF TISSUE ENGINEERED BLOOD VESSELS FOR ATHEROSCLEROSIS (F32 NRSA)	NHLBI	54,194
WONG J	BIOMECHANICAL DETERMINANTS OF LUNG CELL FATE IN PLURIPOTENTSTEM CELLS	NHLBI	812,361
WONG W	SYNTHETICALLY REENGINEERED T CELLS AS THE NEXT GENERATION OF SMART CANCER THERAPY	NCI	491,100
ZAMAN	MODELING BI-DIRECTIONAL SIGNALING AND CYTOSKELETAL DYNAMICS IN 3D CELL MIGRATION	NCI	609,098
ZAMAN	PHYSICS OF COLLECTIVE CELLULAR MIGRATION IN LUNG HEALTH AND DISEASE (SUB HARVARD SPH)TESTS	NHLBI	196,440

NSF AWARDS

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	DIRECTORATE	AMOUNT
CHEN	COLLABORATIVE RESEARCH: THE EFFECTS OF EXTRACELLULAR MATRIX ALIGNMENT OF CELLULAR MECHANOTRANSDUCTION IN 3D ARCHITECTURES	ENGINEERING (ENG)	300,000
GRINSTAFF	SUSCHEM: ENVIRONMENTALLY FRIENDLY MICROFIBER POLYCARBONATE MESHES FOR CONTINUOUS OIL RETRIEVAL	MATHEMATICAL AND PHYSICAL SCIENCES (MPS)	420,000
KHALIL	CAREER: EVOLUTION AND ENGINEERING OF CELLULAR BET-HEDGING DEVICES	BIOLOGICAL SCIENCES (BIO)	146,685
MERTZ	UNS: FLUORESCENCE LIGHT-FIELD IMAGING WITH A LENSLESS FLEXIBLE FIBER BUNDLE	ENGINEERING (ENG)	299,997
SMITH	CAREER: REGULATION OF MULTICELLULAR BEHAVIOR WITH AN EXTRACE	ENGINEERING (ENG)	90,000
STAMENOVIC	MAINTENANCE OF MECHANICAL TENSION FOR NORMAL TISSUE FUNCTION REQUIRES INTERCELLULAR COOPERATION	ENGINEERING (ENG)	387,061
VAJDA	ABI DEVELOPMENT: UTILIZATION OF DIVERSE DATA IN EXPLORING PROTEIN-PROTEIN INTERACTIONS	BIOLOGICAL SCIENCES (BIO)	605,088
WONGJ	I-CORPS: TISSUE-ENGINEERING VASCULAR GRAFTS USING AUTOLOGOUS CELL SHEETS	ENGINEERING (ENG)	50,000

AWARDS FROM FOUNDATIONS

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	FOUNDATION	AMOUNT
CHOPRA	EFFECT OF MECHANICAL LOAD ON THE STRUCTURE AND FUNCTION OF ENGINEERED-3D HUMAN STEM CELL DERIVED CARDIAC TISSUES	AHA	42,300
DAMIANO	AN OUTPATIENT FEASIBILITY STUDY OF AN INSULIN-ONLY BIONIC PANCREAS	HELMSLEY TRUST	775,061
EISENBERG	COULTER FOUNDATION TRANSLATIONAL PARTNERS IN BIOMEDICAL ENGINEERING	WALLACE H. COULTER FOUNDATION	500,000
FURUTA	MULTI-OMICS ANALYSIS OF ADAPTIVE EVOLUTION	TAKEDA SCIENCE FOUNDATION	7,623
ROBLYER	PERSONALIZED CHEMOTHERAPY THROUGH RAPID MONITORING WITH WEARABLE OPTICS	ACS	194,000
ZAMAN	THE DEVELOPMENT OF A RELIABLE AND ROBUST OXYGEN CONCENTRATOR PLATFORM FOR USE IN LOW-RESOURCE SETTINGS	BILL AND MELINDA GATES FOUNDATION	97,946

AWARDS FROM DOD

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	GRANTING AGENCY	AMOUNT
COLBURN	PRIMARY AUDIOGRAMS OF HEARING IN BALEEN WHALES: A MODEL SYSTEM FOR MITIGATING SOUND IMPACTS (SUB WHOI)	DOD/NAVY	33,863
COLLINS	UTILIZING SYNTHETIC BIOLOGY TO CREATE PROGRAMMABLE MICRO-BIO-ROBOTS	DOD/ONR	1,100,000
COLLINS	SYNTHETIC MAMMALIAN GENE REGULATORY CIRCUITS FOR IN VIVO BIOMEDICAL APPLICATIONS	DOD/ARO	595,000
GHITZA	CASCADING OSCILLATORS IN DECODING SPEECH: REFLECTION OF A CORTICAL COMPUTATION PRINCIPLE	DOD/AFOSR	252,651

AWARDS FROM OTHER GOVERNMENT AGENCIES

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	GRANTING AGENCY	AMOUNT
ZAMAN	DEVELOPING SUPERIOR SCREENING TECHNOLOGY FOR MEDICINE QUALITY CONTROL IN LOW RESOURCE COUNTRIES (SUB USPC)	USAID	250,000
ZAMAN	IMPLEMENTATION OF PHARMACHECK TO ASSURE THE QUALITY OF IMCIDRUGS IN INDONESIA (SUB U INDONESIA)	USAID	40,000
ZAMAN	PHARMACHK: SUBSTANDARD AND COUNTERFEIT MEDICINES RAPID DETECTION AND SCREENING PLATFORM	USAID	234,734

AWARDS FROM INDUSTRY

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	GRANTING AGENCY	AMOUNT
CHEN	BIOENGINEERING OF FIBROSIS	BIOGEN IDEC	327,400
ZAMAN	NEW AWARDS FOR SCIENCE EDUCATION TO HHMI PROFESSORS	HHMI	200,000
DAMIANO	METHOD AND SCHEDULING FOR TESTING GLUCAGON PK, AND STABILITY IN DIABETIC SWINE MODELS	LATITUDE PHARMACEUTICALS INC.	29,621
HAN	ANALYSIS OF BIODESIGN AS DRUG PERMEABLE DURAL REPLACEMENT IN BLOOD-BRAIN BARRIER PERMEABILIZING MUCOSAL GRAFT RECONSTRUCTION OF THE SKULL BASE	MEEI	5,000
GRINSTAFF	DOWNHOLE LI-ION BATTERIES BASED ON NETWORK IONIC LIQUIDS	UNIVERSITY OF TEXAS	149,999

AWARDS FROM STUDENT FUNDING

PRINCIPAL INVESTIGATOR	TITLE OF PROJECT	GRANTING AGENCY	AMOUNT
ANGELO	PREDOCTORAL FELLOWSHIP (F31 NRSA)	NIDDK	30,953
BIGIO	FUNDING FOR GRADUATE STUDENT (MGH)	NIBIB	43,657
BIGIO	TRAINING PROGRAM IN QUANTITATIVE BIOLOGY AND PHYSIOLOGY (T32)	NIGMS	319,295
COLLINS	FUNDING FOR GRADUATE STUDENT (HARVARD)	NSF	73,173
COLLINS	FUNDING FOR GRADUATE STUDENT (HARVARD)	NSF	73,173
DELISI	FUNDING FOR GRADUATE STUDENT (U MASS)	U MASS	182,430
KASIF	FUNDING FOR GRADUATE STUDENT (JOSLIN T32)	NIDDK	28,320
KHALIL	FUNDING FOR GRADUATE STUDENT (HARVARD)	HARVARD MEDICAL SCHOOL	35,355
MERTZ	FUNDING FOR GRADUATE STUDENT (MGH)	MASSACHUSETTS GENERAL HOSPITAL	3,466
SEN	FUNDING FOR GRADUATE STUDENT (MEEI)	MEEI	35,355
STAMENOVIC	FUNDING FOR GRADUATE STUDENT (BIDMC)	DOD	42,268
VAINA	FUNDING FOR GRADUATE STUDENT (DRAPER)	DRAPER LABORATORY, INC.	58,038
WONG J	FUNDING FOR GRADUATE STUDENT (MGH)	MASSACHUSETTS GENERAL HOSPITAL	35,355
WONG J	FUNDING FOR GRADUATE STUDENT (CHB)	CHILDREN'S HOSPITAL BOSTON	72,726

COULTER FOUNDATION

TRANSLATIONAL PARTNERSHIP

For the past nine years, the mission of the Coulter Translational Partnership (CTP) program has been to promote, develop, and support translational research collaborations between biomedical engineers and clinicians in order to accelerate the successful translation of appropriate innovations to improve patient care. For the past 4 years the Coulter Foundation commitment provides \$500,000 per year with an equivalent cost share provided by the university.



Funding was provided to the following projects for 2014-2015:

- Interpenetrating Phase Ceramic Matrix Composite for Dental Implant Structures (R. Giordano/X. Lin)
- Novel Sternal Approximation Device (J. Rosen/K. Karlson)
- A dissolvable, hydrogel-based aerosolized sealant dressing for the treatment of superficial to deep-second degree burns (M. Grinstaff/E. Rodriguez/ A. Nazarian)
- Specialized Breast Biopsy Introducer – Pilot Clinical Study (J. Brooks/ J. McDaniel)

For the 2015-2016 funding year, a total of 19 projects were evaluated, 13 projects were invited to submit full proposals to the Coulter Oversight Committee and 8 projects were invited to make an oral presentation. The new projects selected for funding include:

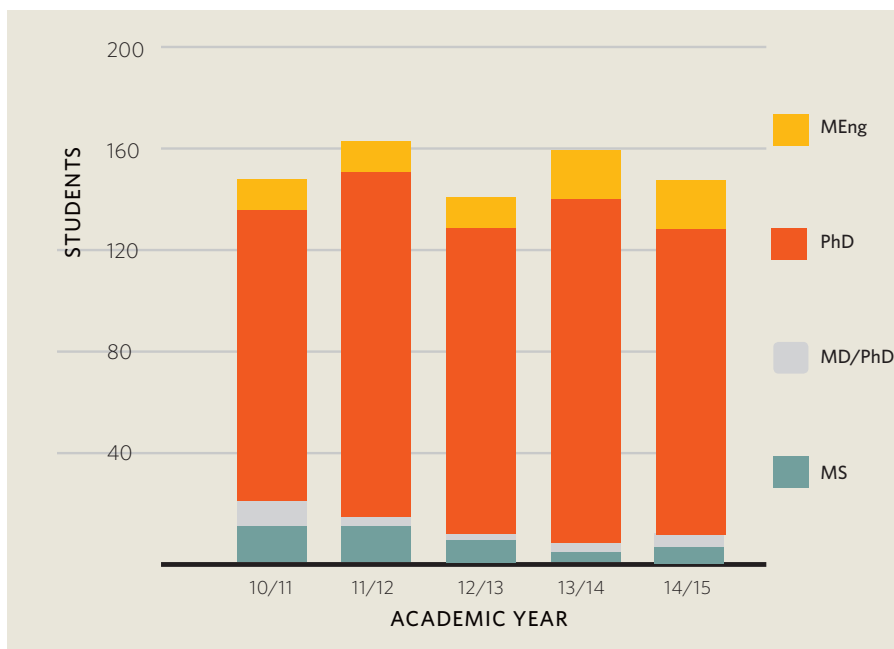
- Effectiveness of home-based electronic cognitive therapy in Alzheimer's disease, C. Stepp, and A. Budson
- Next-generation, cartilage-lubricating injectable device, M. Grinstaff and B. Snyder
- Non-invasive neutrophil counts to improve chemotherapy delivery in lymphoma patients, J. Mertz and E. Hochberg
- Individualized hearing-aid signal processing strategies for listeners with "hidden" hearing loss, B. Shinn-Cunningham and S. Kujawa

GRADUATE ENROLLMENT

ENROLLMENT FOR AY 2014-2015

	USA		INTERNATIONAL		TOTAL
	♀	♂	♀	♂	
MENG	6	10	1	2	19
MS	1	4	1	2	8
PHD	30	48	20	21	119
MD/PHD	0	4	0	0	4
TOTAL	37	66	22	25	150

GRADUATE PROGRAM POPULATION

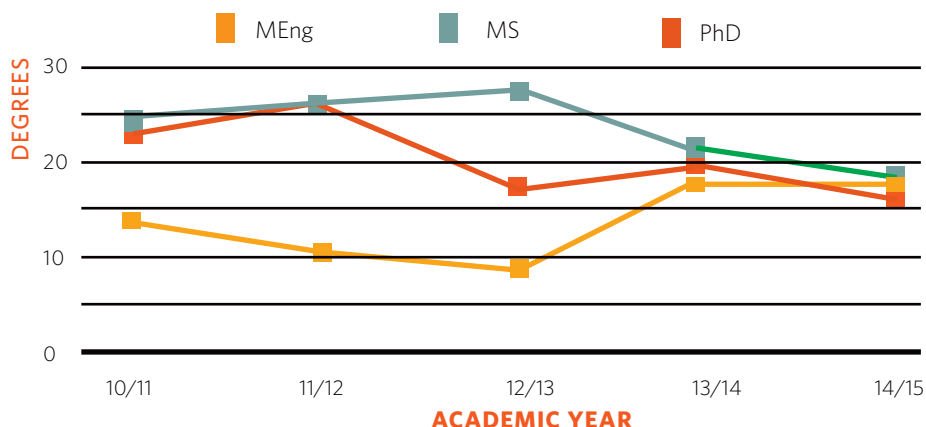


GRADUATE FUNDING AY 2014-2015

Research Assistants	67
BME Distinguished Fellowships	20
Dean's Fellowships	1
NIH Quantitative Biology and Physiology Training Grant	7
NIH Biomaterials Training Grant	2
NIH Training Grant at BUSM	4
NSF Fellowship	9
NSF XTNC Training Grant	2
NSERC Fellowship	1
Lawrence Livermore National Laboratory Fellowship	1
HHMI Fellowship	1
BU-BWH Imaging Fellowship	2
Genzyme	1
LOA	1
TOTAL	119

GRADUATE DEGREES AWARDED

DEGREES AWARDED



16
PHD

17
MENG

18
MS

ADMISSION RESULTS FOR AY 2014-2015

	APPLICANTS				MATRICULATIONS			
	MEng	MS	PhD	Total	MEng	MS	PhD	Total
US ♂	39	31	152	222	6	1	8	15
♀	34	24	94	152	6	0	4	10
URM	9	4	26	39	2	0	2	4
INT'L ♂	16	31	84	131	2	1	7	10
♀	17	28	74	119	1	0	6	7
TOTAL	106	114	404	624	15	2	25	42

ADMISSION PROJECTIONS FOR FALL 2015

	APPLICANTS				ACCEPTED OFFERS			
	MEng	MS	PhD	Total	MEng	MS	PhD	Total
US ♂	46	41	102	189	11	5	7	23
♀	31	25	100	156	3	3	9	15
URM	7	4	18	29	0	0	1	1
INT'L ♂	19	33	85	137	2	2	8	12
♀	24	43	94	161	1	3	3	7
TOTAL	120	142	381	643	17	13	27	57

PH.D GRADUATES 2015

THESIS TITLE & ADVISOR(S)

SEPTEMBER 25, 2014

Paul C Iazzetti

(James Galagan, advisor)
"High-throughput Binding Characterization of Bacterial Transcription Factors"

Suma Jaini

(James Galagan, advisor)
"Methods for Functional Characterization of Transcription Factor Binding Sites in Bacteria"

Jason Paul Keller

(James Galagan and Catherine Klapperich, advisors)
"A Microfluidic Platform for Quantitative Analysis of Single Mycobacteria Cells"

Elizabeth Sloan Peruski

(Michael Smith and Dimitrije Stamenovic, advisors)
"Multiscale Regulation of Cellular Mechanical Properties"

Rachel Christine Stewart

(Mark Grinstaff, advisor)
"A Diagnostic Imaging Technique and Therapeutic Strategy for Early Osteoarthritis"

Raphael Turcotte

(Charles Lin {Harvard Medical School, Dermatology} and Jerome Mertz, advisors)
"An Integrated Optical Platform for Micromanipulation of Cells and Tissues in Live Animals"

Hao Wang

(Jerome Mertz and Guillermo Tearney {Harvard Medical School, Pathology}, advisors)
"Near Infrared Autofluorescence Augmentation of Optical Coherence Tomography for Diagnosis of Coronary Atherosclerosis"

Xirui Zhang

(M. Selim Unlu, advisor)
"Dual-Spectral Interferometric Sensor for Quantitative Study of Protein-DNA Interactions"

JANUARY 25, 2015

Benjamin Alan Lakin

(Mark Grinstaff, Advisor)
"Developing a Cationic Contrast Agent for Computed Tomographic Imaging of Articular Cartilage and Synthetic Biolubricants for Early Diagnosis and Treatment of Osteoarthritis"

Zhuting Li

(Xue Han and Shelley Russek, Advisors)
"Activity-Dependent Gene Regulation in Neurons: Energy Coupling and a Novel Biosensor"

Joseph Stefano Maffei

(Muhammad Zaman, Advisor)
"Analysis of Matrix Metalloproteinases in Cancer Cell Signaling and Extracellular Behavior"

Tuan Anh Pham

(James Hamilton and Joyce Wong, Advisors)
"Early Detection and Treatment Strategies for Vulnerable Atherosclerotic Plaques"

MAY 17, 2015

Daniel Edwin Backman

(Joyce Wong, Advisor)
"Biomechanics of Aligned Cell Sheets for Arterial Tissue Engineering"

Oliver Bates

(Peter Spector and Bela Suki, Advisors)
"Studies on the Dynamics of Chaotic Multi-Wavelet Reentrant Propagation using a Hybrid Cellular Automation Model of Excitable Tissue"

Timothy M Jackman

(Elise Morgan, Advisor)
"Prediction of Vertebral Fractures Under Axial Compression and Anterior Flexion"

Samuel J Pevzner

(Jim Collins, Advisor)
"Protein Interactions Across and Between Eukaryotic Kingdoms: Networks, Inference Strategies, Integration of Functional Data and Evolutionary Dynamics"

GRADUATE STUDENT AWARDS AND HONORS

Angelo, Joseph

- NIH F31 Training Fellowship

Bernstein, David

- NSF Graduate Research Fellowship Honorable Mention

Bonacci, Lia

- NIH Computational Neuroscience Fellowship

Deng, Yuqi

- NIH Computational Neuroscience Fellowship

Hansen, Kyle

- NSF Graduate Research Fellowship

Hu, Dongjian

- Poster of Distinction Award from Massachusetts General Hospital Scientific Advisory Council

Kwasa, Jasmine

- NSF Graduate Research Fellowship
- The Ford Fellowship Foundation Pre-doctoral Fellowship

Mangano, Lauren

- NSF GROW (Graduate Research Opportunities Worldwide) Award

Teodorescu, Debbie

- Gates Millennium Scholarship
- GWISE Professional Development Grant
- CFTCC Cancer Hackathon 2nd Place
- AAUW Selected Professions Fellowship

Thommes, Meghan

- BU-CIRTL (Center for the Integration of Research, Teaching, and Learning) Teaching as Research Fellowship

Weber, Timothy

- NSF Graduate Research Fellowship Honorable Mention

MENG GRADUATES

9/25/2014

Karina Mae Kidd

1/25/2015

Dana Michele Daukss

Rui Sun

Yu Zuo

GRADUATE STUDENT FELLOWSHIPS

NSF Fellowships

Angelo, Joseph
Cheng, Daniel
Ekladios, Iriny
Israni, Divya
Jain, Saloni
Mangano, Lauren
Reynolds, Daniel
Wang, Julia
Weinberg, Benjamin

NIH Fellowships

Blaha, Laura
Kwong, George
Meisel, Cari
Ramirez, Alfred

XTNC Fellowships

(Cross- disciplinary
Training in
Nanotechnology for
Cancer)
Chiu, Joanna
Vargas Arango, Diego

NIH Quantitative Biology and Physiology Fellowships

Acevedo, Andrew
Gormley, Catherine
Hansen, Kyle
Istfan, Raef
Kwasa, Jasmine
Seager, Robert
Zollinger, Alicia

NIH Translational Research in Biomaterials Fellowship

Cha, Susie
Kim, Jessica

BU-BWH Imaging Fellowship

Lough, Emily
Zhao, Yanyu

HHMI Fellowship

Rim, Nae Gyune

Canadian CHIR Fellowship

Mee, Michael

Lawrence Livermore National Lab Fellowship

Fong, Erika

Dean's Fellowship

Weber, Timothy

BME Distinguished Fellowship

Balijepali, Anant
Bonacci, Lia
Bou Jawde, Samer
Deng, Yuqi
Huang, Shuo
Karrobi, Kavon
Law, Billy
Li, Xuanyue
Nazari, Navid
Nykyforchyn,
Christine
Padhorny, Dimitry
Porter, Kathryn
Roberts, Eric
Stettner, Arion
Sun, Zhuyezi
Wang, Peijiang
Wong, Meng Li
Nicole
Xu, Han
Zeng, Jialiu
Zhang, Kehan

5/17/2015

Ahmed Yahya A Aljefri
Adam Debosier
Jonathan Zachary Egan
Jennifer Si He
Brian Allen Hemmat
Sten Kaeding
Savitha Koushik
Mikel Douglas Lipschitz
Bissrat Melakeberhan
Eric Richard Meyer
Lauren Elizabeth
Styskal
Debbie Teodorescu
Tyler Winston

MS GRADUATES 2015

THESIS TITLE & ADVISOR(S)

SEPTEMBER 25, 2014

Joseph Paul Angelo

(Irving Bigio, advisor)

"Real-time Tissue Viability Assessment
Using Near-infrared Light"

Ali Hussein Badreddine

(Irving Bigio, advisor)

"Using Birefringence to Track Action
Potentials in Brain Tissue"

Christopher David Hartman

(Joyce Wong, advisor)

"The Role of Extracellular Matrix
Composition in Vascular Smooth Muscle
Cell Durotaxis"

Anna Katz Hawes

(Jason Ritt, project advisor)

"Experimental Dissociation of Active
Sensing Strategies during Tactile
Discrimination"

Nga Thuy Ho

(Muhammad Zaman, advisor)

"Multiplexed, Affordable and Portable
Platform for Real Time Quantitative
Detection of Substandard and
Counterfeit Pharmaceuticals"

Yu-An Lien

(Cara Stepp, advisor)

"Optimization and Automation of
Relative Fundamental Frequency
for Objective Assessment of Vocal
Hyperfunction"

Lauren Michelle Mangano

(Elise Morgan, advisor)

"Non-invasive Assessment of
Cartilaginous Tissues in Small Animal
Models of Injury and Disease"

Carlos Segura

(Irving Bigio and Bryan McLaughlin
{Draper Laboratory}, advisors)

"Development of an Optrode for
Characterization of Tissue Optical
Properties at the Neural
Tissue-Electrode Interface"

JANUARY 25, 2015

Laura Catherine Blaha

(Mario Cabodi and Joyce Wong, Advisors)

"A Microfluidic Platform to Examine
Competition in Soluble Signaling in the
Extravasation Microenvironment"

Junzi Dong

(Steve Colburn and Kamal Sen, Advisors)

"Neural Network Model of Spatial Sound
Source Segregation"

Andrew Michael Fisher

(Lee Goldstein, Advisor)

"Animal Model of Acute and Chronic
Effects of Blast Traumatic Brain Injury"

George Kwong

(Joyce Wong, Advisor)

"Double-Reporter Induced Pluripotent
Stem Cells for Vascular Cell Sheet
Engineering"

Emily Anne Lough

(Tyrone Porter, Advisor)

"Co-Delivery of Cisplatin and Paclitaxel
in Targeted Lipid-Polymer Hybrid
Nanoparticle"

Derin Deniz Sevenler

(Selim Unlu, Advisor)

"Identification of Rare Genetic Mutations
in Heterogeneous Tumors with Digital
Melting Analysis"

Ruei-Jr Wu

MS with Engineering Practice

MAY 17, 2015

Dustin Christopher Clark

(Patrick McNamara, Project Advisor)

"Mapping the Effective Connectivity
in Parkinson's Disease with Canonical
Granger Causality"

Elizabeth Marie Shenk

(Neil Ganem and Tyrone Porter, Advisors)

"Identifying and Targeting the Adaptive
Mechanisms Made by ALT-Positive Near-
Tetraploid Tumor Cells"

Billy Law

MS with Engineering Practice

UNDERGRADUATE ENROLLMENT

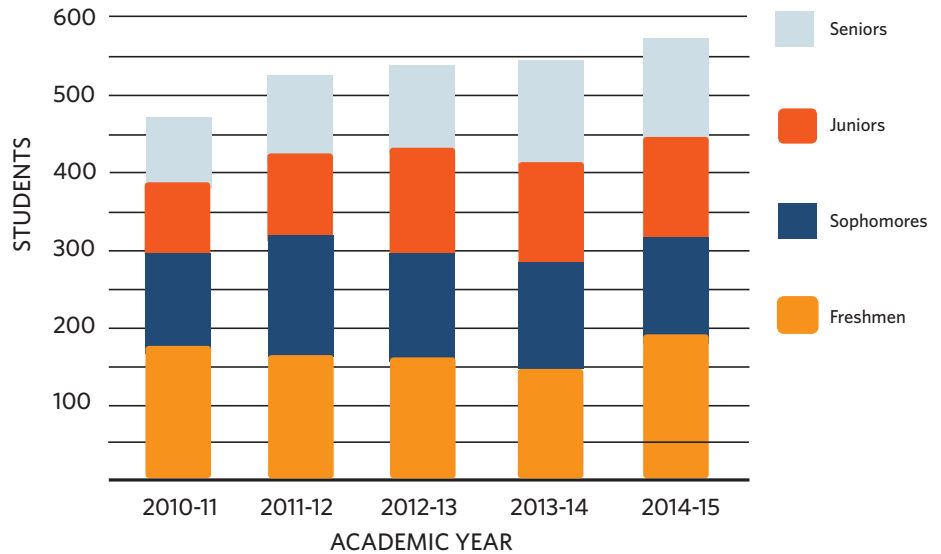
573 STUDENTS

The BME Department had 573 students enrolled this year, 37% of the total enrollment of the College of Engineering. The percent of female and male students was 43% and 57%, respectively.

ENROLLMENT FOR AY 2014-2015

		♀	♂	TOTAL		♀	♂	TOTAL
FRESHMAN	BIOMEDICAL ENGINEERING	83	109	192	COLLEGE OF ENGINEERING	137	301	438
SOPHOMORE		58	70	128		124	271	395
JUNIOR		52	76	128		97	277	374
SENIOR		53	72	125		94	235	329
TOTAL		246	327	573		452	1084	1536

BME ENROLLMENT HISTORY



TRACKING ALUMNI

STATUS OF 2014-2015 BME GRADUATES

In an effort to obtain reliable statistics regarding the immediate career plans of our graduating seniors, the College of Engineering conducts an exit survey of all such graduating students in late April/early May. The results of these interviews are shown at left.

EMPLOYED	30%
GRADUATE SCHOOL	28%
TRANSITIONAL/OTHER	26%

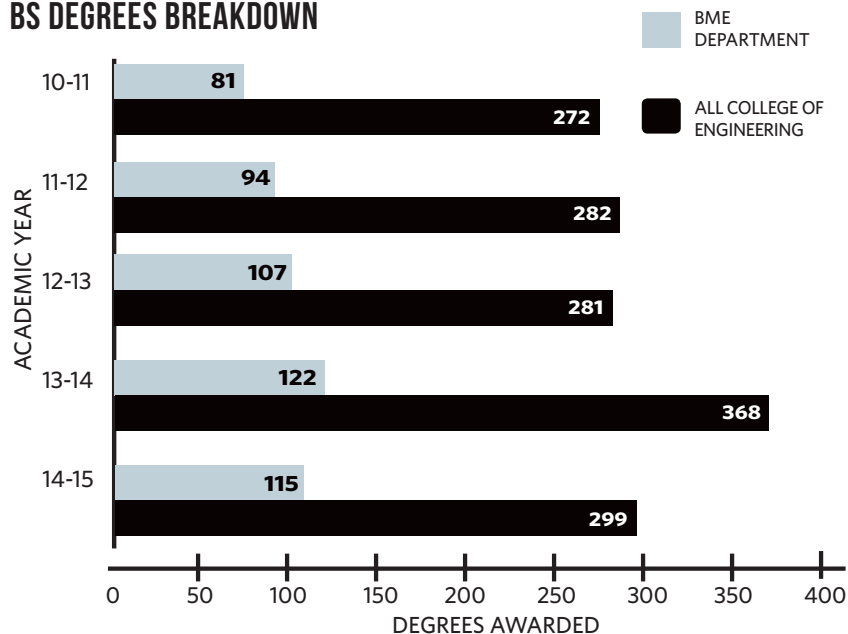
UNDERGRADUATE DEGREES AWARDED

THE DEPARTMENT AWARDED

115 BACHELOR OF SCIENCE DEGREES THIS ACADEMIC YEAR,

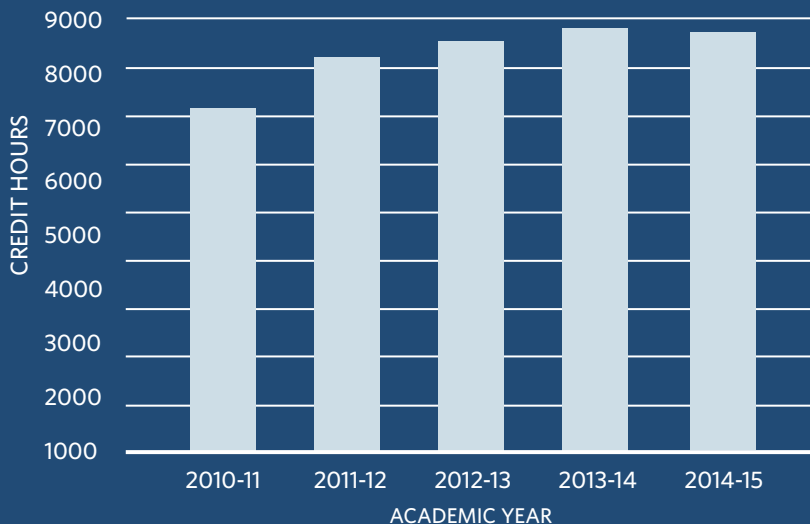
38% OF ALL THE BS DEGREES AWARDED BY THE COLLEGE THIS ACADEMIC YEAR.

BS DEGREES BREAKDOWN



BME TEACHING HISTORY

The BME department was responsible for teaching 66 courses during the AY 2014-15. The student credit hours for these courses total 8,698. The general trend in annual credit hours taught over the past 5 years is illustrated below.



MMEDIC

The MMEDIC program is an early selection program that leads to a BS in Engineering and an MD from the Medical School. This program is offered and administrated in collaboration with our School of Medicine and is designed to train biomedical engineers who have the MD as their ultimate degree objective. MMEDIC admits to the School of Medicine a small number of highly qualified students who have completed two years of the premedical option of the biomedical engineering curriculum. The program is not designed to accelerate the engineering or the medical training but rather to effect a better transition from undergraduate engineering study to graduate medical training. The BS in Biomedical Engineering is normally earned after 4 years of undergraduate study and the MD after an additional 4 years of study at the Boston University Medical School.

**UNDERGRADUATE
AWARDS**

In 2015, several of the BME seniors were recognized for achievements and contributions to the Boston University community and BME profession.

**ADAM M. MILLER MEMORIAL
AWARD:**

Awarded by the Biomedical Engineering Department to the graduating senior who has best advanced the reputation and prestige of the department through his/her involvement in department, college, university, professional activities, or organizations, as well as through the academic and senior project programs. This year the award was presented to **Courtney Ellenson.**

**ENGINEERING ALUMNI
ASSOCIATION STUDENT LEADER
AWARD:**

Presented to seniors who have made outstanding contributions to the College and University through their involvement in activities and organizations. Among the six award winners this year were BME seniors **Jeray Thelwell, Jennifer Larbi, and Kayla Duval.**

**GING S. LEE COMMUNITY
SERVICE AWARD:**

Presented to a graduating senior in the College of Engineering to recognize outstanding community service. This year the award was presented to **Ryan Paul Schoeplein.**

**OUTSTANDING SENIOR PROJECT
AWARD:**

The team of **Kayla Duval and Dennis Marquis** were recognized with the Department's 2015 Outstanding Senior Design Project Award for their project "Application of Multi-Photon Microscopy to Assess the Microscopic Impact of Stretch on Airway Wall Mechanics" under the supervision of Dean Kenneth Lutchen.

STUDENT ADVISOR AWARD:

Among the 19 ENG winners for outstanding assistance in advising this year, the following BME seniors were recognized: **Bradley Chiga, Michael Chin, Danielle Conneely, Gil Covarrubias, George Jiao, Shireen Kheradpey, James Kugler, Olivia Joy Lutz, Dennis Marquis, Ryan Paul Schoeplein, Jeray Anthony Thelwell, and William Yanli Wang.**

STUDENT ORGANIZATIONS

BOSTON UNIVERSITY STUDENT CHAPTER OF THE BIOMEDICAL ENGINEERING SOCIETY

The purpose of the Biomedical Engineering Society is: "To promote the increase of biomedical engineering knowledge and its utilization." The student chapter at Boston University works towards this goal in all of its activities. The Biomedical Engineering Society provides a focus for community building among BME students with activities which strengthen their understanding of and interest in Biomedical Engineering. The Society provides students with literature, field trips, films and guest lectures, which provide them with a "resource center" concerning such vital areas as career opportunities and graduate study in Biomedical Engineering.

BMES OFFICERS AY 2014-15

President - Ronak Nair '15

Vice President - Julianne Tefft '15

Corresponding Secretary - Ryan Schoeplein '15

Recording Secretary - Courtney Ellenson '15

Treasurer - Hallie Thorp '15

Social Chair - Willaim Wang '15



ALPHA ETA MU BETA BIOMEDICAL ENGINEERING HONOR SOCIETY

Alpha Eta Mu Beta is the honor society for Biomedical Engineering. The society promotes an understanding of the profession and recognizes and encourages excellence within the field. The purpose of the society is to bring into closer union and to mark in an outstanding manner those biomedical engineers who have manifested a deep interest and marked ability in their chosen life work so as to promote an understanding of their profession and to develop its members professionally.

AEMB OFFICERS AY 2014-2015

President - Courtney Ellenson '15

Vice President - Shreya Deshmukh '15

Secretary - Nelson Boland '15

Treasurer - Keith George '15



RESEARCH ACTIVITIES FOR UNDERGRADUATES

The BME Department, College of Engineering and Boston University have several programs that allow undergraduates to participate in research activities.

Under the Bell, FIRST and Trustee Scholarships the recipients are eligible for research funding for up to 10 hours of research a week for one semester.

The Presidential/Engineering Scholars Program (Presidential/ENG Scholars) is a merit award given to students at the time of admission to Boston University. Presidential/Engineering Scholars receive a package of benefits, including a half-tuition scholarship to Boston University. Scholarships are renewable for up to eight semesters, provided a 3.20 GPA is maintained. Additionally, students receive funding for up to 10 hours of research per week for one semester during the academic year, and automatic admission to a Boston University College of Engineering Master's in Engineering program (provided students maintain a 3.40 grade point average).

Each year, 10 Lutchen Fellows from the Kenneth R. Lutchen Distinguished Fellowship Program spend the summer engaged in a transformative research experience under the guidance of a faculty member. Students must maintain a 3.0 average to be eligible for the fellowship, and may conduct their projects during the summer following either their sophomore or junior year.

College of Engineering undergraduates engaged in faculty-mentored full-time research experiences during the summer may apply for the Summer Term Alumni Research Scholars (STARS) program. STARS participants will receive 10 or 12 weeks of housing in a Boston University residence hall OR up to \$2750 towards off-campus housing costs (reimbursement is for actual cost of housing). To be eligible, students must receive a weekly stipend from an engineering faculty mentor to participate in full-time research during the summer (summer courses are not allowed).

The College of Engineering Supplemental Undergraduate Research Funds (SURF) program encourages faculty to involve undergraduates in their research programs during the academic year by providing matching funds for undergraduate students who are working on faculty-sponsored research. Requests for SURF funds are made by individual students when they have found positions in faculty labs.

The Undergraduate Research Opportunities Program (UROP) is a University-wide academic program which promotes participation by Boston University undergraduates in faculty-mentored research across all disciplines and throughout the calendar year.

LUTCHEN FELLOWS SUMMER 2014

Yash Agarwal
Timothy Chong
Samantha Chua
Young Guang
Thomas Lozanoski
Shane McCormack
Samantha Pipe
Jarrod Risley
Jordan Sweer

STARS SUMMER 2014

Erin Chang
Cameron Curtiss
Aubrey Glasson
Katherine Girouard
Anna Hughes
Zachary King
Nikita Patil
Shikha Sharma
Joshua Shelofsky
Maria Torres

SURF AY 2014-2015

Esmael Moona
Alexander O'Donovan
Shaheer Piracha
William Wang
Aubrey Giasson
Andrew Colletta
Allison Durkan
Angela Voss
Maciej Walkosz
Gil Covarrubias
Wanwen Li
Mazya Mowlood
Deana Novin
Danielle Stonely
Katherine Truelson
Kyle Mitchell
Veena Dali
Deana Novin
Jeffrey Baker
Leo Shapiro

UROP FALL 2014

Yash Agarwal
Callen Bragdon
Pin-Hao Chao
Phuong Diep
Leticia Kim
Adrienne Lee
Bauer LeSavage
Raleigh Linville
Ryan McNoughton
Bethany Moore
Charina Ortega
Alan Pacheco
Abha Patil

Amir Soltanianzadeh
Rebecca Thompson
Micaela Trexler
Maciej Walkosz
William Wang
Alec Wong
Zhengyang Zhang

UROP SPRING 2015

Yash Agarwal
Davis Borucki
Pin-Hao Chao
Max Cotler
Kayla Duval
Samuel Ghilardi
Jaclyn Grode
Kathryn Hardin
Tadafumi Ikezu
Rishi Jain
Leticia Kim
Adrienne Lee
Raleigh Linville
Thomas Lozanoski
Ryan McNoughton
Charina Ortega
Alan Pacheco
Shaheer Piracha
Amir Soltanianzadeh
Maciej Walkosz
Monica Weitekamp
Alec Wong
Zhengyang Zhang

UROP SUMMER 2015

Davis Borucki
Matthew Brown
Jeffery Chen
Cameron Curtiss
Kamila Drezek
Emily Fitzgerald
Aubrey Glasson
Katherine Girouard
Kevin Huang
Raleigh Linville
Emily Margolis
Emily Misnick
Lisa Nguyen
Sanjana Pannem
Nikita Patil
Abha Patil
Shaheer Piracha
Kathleen Ryan
Wali Subuhi
Nicholas Salvador
Shikha Sharma
John Viola
Maciej Walkosz
Patrick Williamson
Jing Xu
Zhengyang Zhang
Kavin Zhu

SENIOR DESIGN PROJECT

The Senior Design Project continues to be a major strong point of our undergraduate program. Every BME senior is required to develop a project proposal with an individual faculty member, local area scientific mentor, or even a bioengineering corporate technical advisor (with a BME faculty co-supervisor). The project is then carried out with the guidance of the student's technical advisor. This brings together elements of engineering science and engineering design. In coordination with the technical work, this course includes experience in planning, establishing priorities and formal training in technical communication including proposal, abstract, progress reports and oral and written presentations of the final work. In conjunction with the BME Department's Visiting Committee, we have additional lectures from our industry partners to expose the students to elements of entrepreneurship, business plans, intellectual property, marketing, and clinical regulatory issues. The project continues over the full academic year and culminates in a Senior Design Project Conference that is attended by students, faculty, and representatives from BME industry, hospitals and other academic institutions. The proceedings cover is shown above and the companies that registered for this year's conference are listed below, followed by a listing of the project presentations.



REGISTERED COMPANIES

3M
Accenture Life Sciences
Advanced Instruments, Inc.
AltraBio
Altran
Applied Medical Resources
ArQule, Inc.
Atrium Medical
Avedro, Inc.
BD Medical
BD Advanced Diabetes Care
Beth Israel Deaconess Medical Center
BioTrove, Inc.
Biotronik
Bioventus LLC
Boston Engineering
Boston Medical Center, Department of
Clinical Engineering
Boston Scientific
Boston University School of
Management
Boston University School of Public
Health
Brandeis University
Brigham and Women's Hospital
Broad Institute
Bruker Daltonics
CAE Healthcare
CBS Local
Center for Global Health and
Development
Charles Stark Draper Laboratory
Children's Hospital Boston
CIMIT
CKD Associates
Clark & Elbing LLP Cleveland Clinic
Codman Neuro, Johnson & Johnson
Colorado Nepal Alliance—Department
of Veterans Affairs
Columbia University,
College of Physicians and Surgeons
Comprehensive Health Management Inc.
ConforMIS, Inc.
Consult and Design
Covidien
CSA Medical
Cynosure
Daval - C.R. Bard, Inc.
Decision Resources
DEKA Research and Development
Corporation
DePuy Spine, Inc.
DocBox, Inc.
Draeger Medical Systems, Inc.
Eastman Kodak Company
Eaton-Peabody Laboratory
Elm Electrical & Automation EndoCore
Enumeral Biomedical Holdings, Inc.
Essex Orthopedics & Optima Sports
Medicine
Fellers Snider et al.
Ferrotec Corporation
Foundation Medicine Fraunhofer
USA-CMI
GE Healthcare
Gems Sensors
Genzyme Corporation
GlobalData Healthcare
Grant Street Group
Goodyear-Veyance Technologies, Inc.
Harvard Business School
Harvard Medical School
Harvard University
Harvard-MIT Division of Health
Sciences and Technology
Hologic
Iandiorio Teska & Coleman
IDEXX Laboratories
Image Stream Medical Integra
LifeSciences
Ironwood Pharmaceuticals
iWorx Systems, Inc.
JH Technologies
Johnson & Johnson Lux Research
Massachusetts Eye and Ear Infirmary
Massachusetts General Hospital
Massachusetts Institute of Technology
Medtronic, Inc.
METI
Minnesota State University,
Mankato National Instruments
Motility Biomedical, Inc.
Navinet
Neuroptix Corporation
New Health Sciences
NuOrtho Surgical, Inc.
Optasia Medical, Inc.
O'Shea Getz PC
Olympus Surgical Technologies
America
Oregon Health & Science University
Parexel
Perceptive Informatics
PerkinElmer
Pfizer Biotherapeutics
Philips Healthcare
Philips Ultrasound
Praxis Advisors LLC
Pulmatrix, Inc.
Raytheon
Regeneron Pharmaceuticals
Respiratory Motion, Inc.
Sanofi
Sapient
Veterans Affairs Boston Healthcare
System
Worcester Polytechnic Institute
Wyss Institute for Biologically
Inspired Engineering
Xcellerex

SENIOR DESIGN PROJECT

CONFERENCE

30TH ANNUAL SENIOR DESIGN PROJECT CONFERENCE FRIDAY, MAY 1, 2015

Session I

TISSUE ENGINEERING & DRUG DELIVERY

Chair: Prof. Catherine Klapperich

Dextran Fiber-Hydrogel Composite to Study Angiogenesis

James Kugler and William Wang

Device for Uniformly Loading a Scaffold with Osteogenic Protein

Zachary Decker, Alex Heubeck, Bethany Moore, and Eric Schmidt

Design of an Airway Tree to Test a Smart Inhaler for Targeted Drug Delivery

Mike Basile, Ishaan Puranam, and Adam Sonnenberg

In Vitro Culture Conditions for Bioprinting of iPSC-derived Human Hepatocytes

Namrita George, Ruohan Wang, and Zhe Zhong (Monica)

Positioning System and 3-D Printed Mouse Phantom for Accurate and Precise Animal MRI Scanning

Phuong Diep, Shrinjoy Sahoo, Yong Song, and Evan Vincent

P-glycoprotein Regulation in Primary Nasal Epithelial Cell Cultures

Chris Simons, Amy Singleton

Session IIa

DIAGNOSTICS

Chair: Prof. Ahmad Khalil

Detection of Serum Circulating miRNAs for Lung Cancer Diagnostics Using Rolling Circle Amplification and Nanoparticle Signal Enhancement

Alejandra Cambonchi and Andrea Szabo

Detecting Antibiotic-Resistant Meningitis with Technology Adapted for Developing Countries

Leticia Kim, David Lin, Kimberly Lu

Optimization of a Quantum Dot Point-of-Care Diagnostic

Carlos Diclear, Jay Ishimaru, Carolina Mesa, and Thuy Nguyen

Optical Spectroscopic System for Obtaining Fetal DNA for Prenatal Diagnosis

Tanzima Arif, Rhonda Silva, Adrian Tanner

Expanding Access to Diagnosis of Drug Resistant Tuberculosis with a Compact DNA Extraction Device

Declan Bowman, Shreya Deshmukh, and Garrett Moore

Fabrication of Functionalized Nanoparticles for Increased Specific Immunoprecipitation

Hersh Bendre, Keith George, and Shivem Shah

A Novel Point-of-Care Diagnostic for Sexually Transmitted Infections

Nelson Boland, Danielle Conneely,

Gil Covarrubias, and Courtney Ellenson

Session IIb

IMAGING

Chair: Prof. Irving Bigio

Innovating an Ultrasound Bone Healing System to Provide Consistently Accurate Alignment with a Fracture Site

Michelle Barton, Kara Le Fort, James Parsons, and Jenny Tran

Application of Multi-Photon Microscopy to Assess the Microscopic Impact of Stretch on Airway Wall Mechanics

Kayla Duval and Dennis Marquis

Modeling Biopsies in a Lung Cancer Spheroid

Sabrina Barbas, Ryan Cecchi, Andres Ortiz, and Jeray Thelwell

Developing a Platform for Imaging Cellular Inflammatory Phenotype on Strained Fibrillar Fibronectin

Claire Bridges, Michael Chin, Mike Zebiak

Novel MRI Approaches to Detect Brown Fat

Jennifer Larbi and Erik Samuelsson

Fabricating Multi-Layered Human Skin Tissue Using 3D Bioprinting Technology

Jeremy C. Gaerlan, Hsiang-Wei (Kevin) Ma, and

Minh-Thuy Nguyen

Contrast-Enhanced CT Imaging of Cartilage for Predictions of Skeletal Repair

Amanda Grafilo, Brittany Pack, and Kamolnat Tabattanon

Session IIIa

SYSTEMS, SIGNALS & SYNTHESIS

Chair: Prof. Steven Colburn

Assessing Challenges Related to Hearing Impairments in Acoustically Complex and Dynamic Conditions
Matthew Lima, Dustin Shigaki, and Jason Porter

In Silico Characterization of Peptide Coding Small Open Reading Frames (smORFs)
Eduardo Coronado and Joseph Mendoza

Developing a Novel Brd2 Small Molecule Inhibitor to Therapeutically Modulate Inflammation, Improve Metabolism and Reduce Cancer Risk.
Frank Lombardi, Courtney Lyons and, Kate Slyngstad

Simulating Binaural Cochlear Implants to Process Various Cases of Stimuli
Sana Hashmani, Sarah Hocevar, Grace Ingalls, and Trisha Serquina

Stair Safe: Stair Support System for the Elderly and Physically Challenged
Ariele Friedman and Justin Tocci

Engineering RNA Regulator in Live Cells
Augustus Thorkildsen and Bethany Zettler

Session IIIb

MODELS OF TISSUE & DISEASE

Chair: Prof. Allison Dennis

The Effect of Humeral Positioning on Glenohumeral and Subacromial Forces in a Cadaveric Model of Simulated Pitching
David Cohen, Chun Liu, Ronak Nair

A Microfluidic Model for the Study of Breast Cancer Metastatic Tropism to the Lung
Maria Barrios and Elias Exarchos

Automated Blood Sample Deployment and Retraction for Acoustic Tweezing Rheometer
Peter Ishiguro (ME), Shireen Kheradpey, Jeremy Lee (ME), Frank Lin (ME), and Ryan Schoepflein
Ultrasound Visualization of an Interventional Device in the Mitral Valve
Nathanael Lee and Anthony Tranakas

Mechanical Characterization of Bone and Bone Marrow Lesions in the Osteoarthritic Hip
Jordan Desautels, Kathryn Gikas, and Young Guang

Analysis of a Sternal Approximation and Stabilization System for Median Sternotomy
Bradley Chiga and Musab Siddiqui

Session IV

DEVICES

Chair: Prof. Michael Smith

Non-Invasive Mapping of Interstitial Fluid Pressure using Optical Microscopy
Luis Carrasquillo and Rebecca Thompson

Use of Directional Microphones to Detect Cardiac Irregularities in Heart Failure Patients
Jose Camero (ECE), Portia Considine (ECE), Cong Liu (ECE), Jennifer Ma, Xinghan Xiong (ECE), Thomas Your

Fluorescence Measurement in a High Throughput Turbidostat Platform
Zhi (George) Jiao, Harsh Patel, and Jean-Marc Tsang

A Modular System for Optical Measurement of pH in a Continuous Culture Turbidostat
Alan Pacheco, Juliann Tefft and Hallie Thorp

Minimalist Ankle Support Technology
Will Livingston and Luke Mertins

Fabrication of Microfluidic Chip for Monitoring Neural Network Development
Pin-Hao Chao and Kevin Colelli

A Microfluidic Device to Study How Unsteady, Recirculating Flows Affect Trans- Endothelial Lipid Transport
Isaiah Ho, Andrew Ivanov, Gina Jimenez, and Michael Lau

3D Printed Electrodes in a Microfluidic Device to Measure Transepithelial Electrical Resistance (TEER)
Yiorgos Christakis, Parker Dow, Nikhil Mahadevan, and Jaedon Scott

Developing Methods for Assessing Auditory Function in Minimally Verbal Individuals with Autism
Nicole Ouellette, Olivia Lutz, and Monica Weitekamp

 Department of Biomedical Engineering

Boston University
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Annual Report 2014-2015

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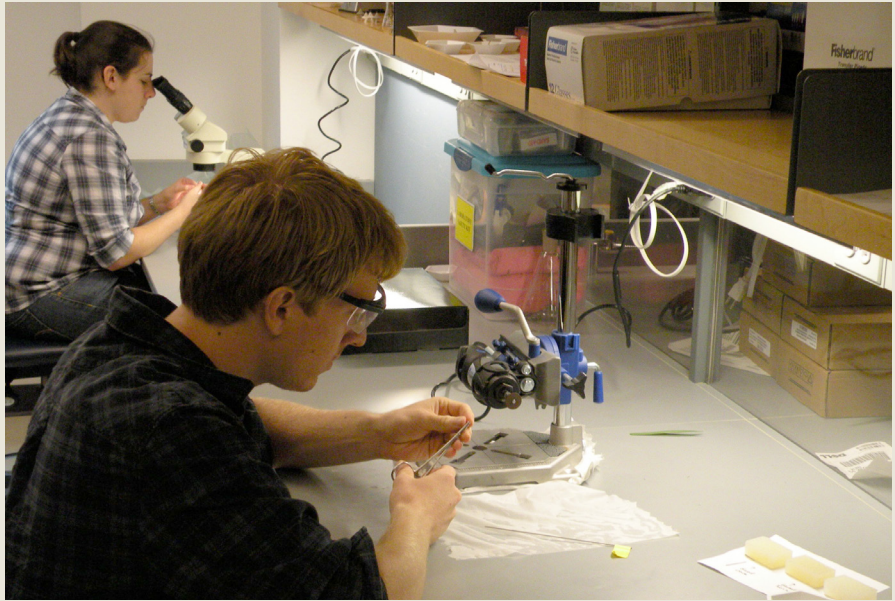
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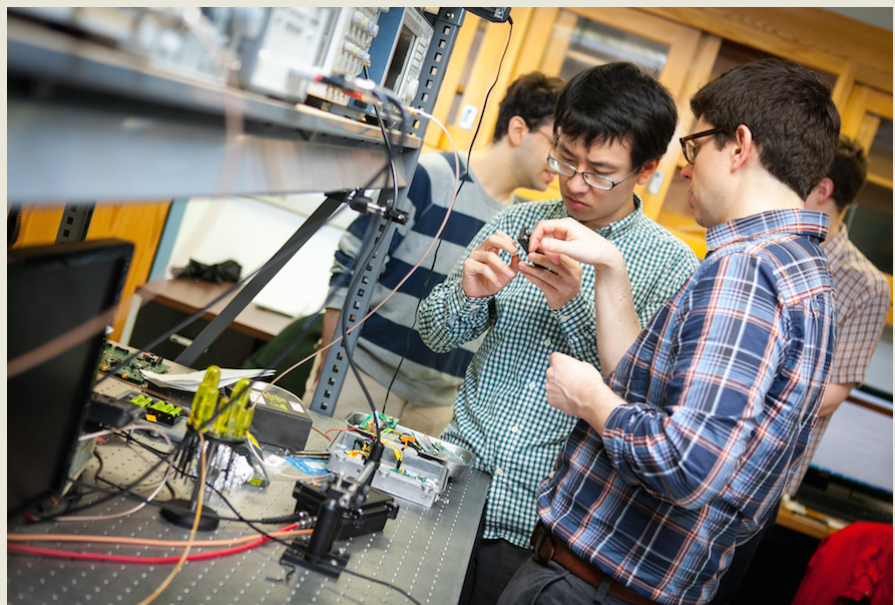
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