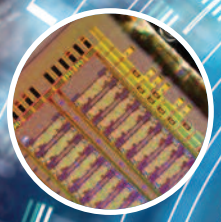
Boston University College of Engineering

Engineering the Future.



BOSTON UNIVERSITY

2017-18 Academic Year Summary

Stopping heart attacks in their tracks.
Energizing thousands of K-12 students about STEM across the world.
Innovating curriculum for the digital economy.

This is What 21st Century Engineering Looks Like

Taking the Lead.

The Boston University College of Engineering has spent the past year making impacts in the most groundbreaking areas of engineering while envisioning what engineering will be in the decades to come. The successes of this year go beyond revolutionary research in areas ranging from CAR-T for cancer therapy to smart sensors for IOT devices. They come from the rapidly shifting technological landscape, and a drive to use innovation to advance society.

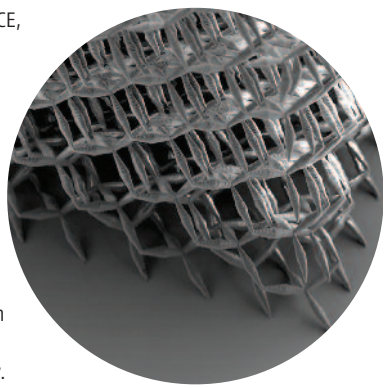
BU ranks 15th among private graduate engineering programs.

Source: *US News & World Report*

$20 million to synthesize heart tissue.

How do you mend a broken heart? You make a new one. That's the ultimate goal of the College's new multi-institution **NSF-ERC in Cellular Metamaterials (CELL-MET)**, which is focused on the fabrication of synthesized heart tissue that could be used in the short term to test the efficacy of medications, and eventually replace damaged tissue after a heart attack.

Led by Professors David Bishop (ECE, Physics, MSE, ME, BME) and Chris Chen (BME, MSE) and with contributions from an interdisciplinary faculty at BU, the University of Michigan, Florida International University and six affiliated institutions, the ERC rests comfortably at the intersection of BU's strengths in biomedical engineering, photonics, and nanotechnology.



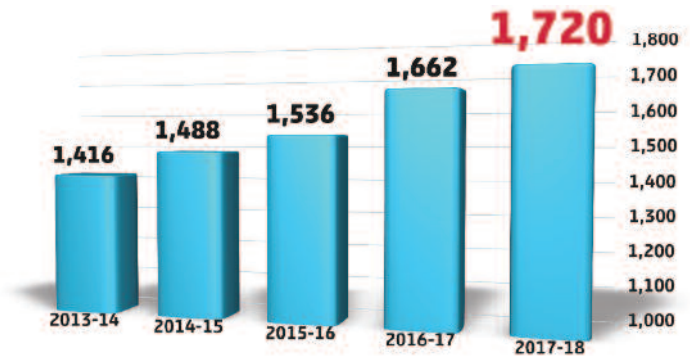
A new center for experimental robotic research.

The College has established a new interdisciplinary **Center for Autonomous and Robotics Systems (CARS)** building upon the expertise of faculty and utilizing BU's advanced facilities. The center has space to design robots that perform complex physical tasks, but will also become a center of excellence for autonomy by involving industry and academic partners nationally and internationally. **CARS** will focus on three main research application areas: the science of autonomy; robotic vehicles and manipulators; and microbiological robotics.

A Destination for Engineering Excellence

An engineering education at Boston University continues to be highly sought after at both the undergraduate and graduate levels. Applications for undergraduate enrollment increased 4% and applications to graduate programs increased 11%.

Undergraduate Enrollment



BU Institutional research Fall Mid-Semester I reports corresponding AY.

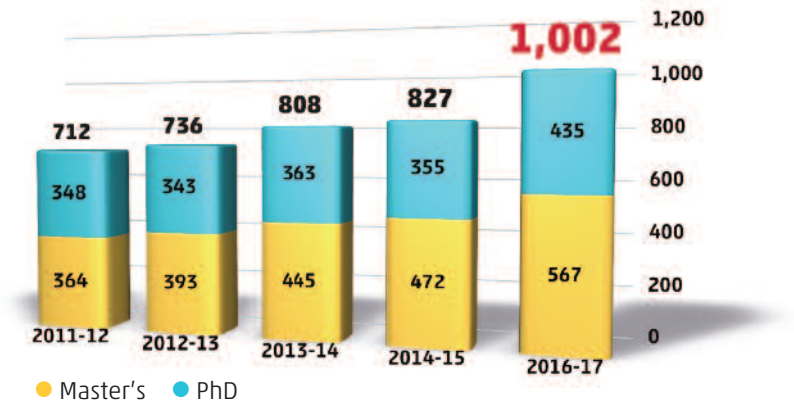
ENG #8 in mid-career salary

Source: Payscale

#35

BU's *US News & World Report* graduate programs ranking has risen 19 places since 2005, the most of any top-50 school

ENG Graduate Enrollment



Transforming the Undergraduate Curriculum for the Interdisciplinary Data Science Economy

Boston University recognizes the role that data science is playing throughout the economy – in transportation, healthcare, urban design, and the internet of things, among other fields. After consulting with industry experts and partners, the College transformed its undergraduate curriculum to insure that all students receive foundational knowledge and the ability to integrate data science and machine learning with engineering systems. Beginning this fall, all undergraduates are taking newly developed courses that empower them to apply these tools and techniques to today's cutting-edge, multidisciplinary technologies.

Faculty Highlights

- Professor **David Bishop** (ECE, Physics, MSE, ME, BME) was elected a fellow of the National Academy of Inventors. Bishop holds US patents for 47 micromechanical inventions, including the Lambda router.
- Professor **Joyce Y. Wong** (BME, MSE) has been named a Fellow of the American Academy for the Advancement of Science (AAAS) for her innovative discoveries in biomaterials development to probe how structure, material properties and composition of cell-biomaterial interfaces modulate fundamental cellular processes, and for promoting women in STEM.
- Assistant Professor **Mary Dunlop** (BME) won the American Chemical Society (ACS) Synthetic Biology 2017 Young Investigator Award, recognizing the contributions of scientists who have made a major impact on the field of synthetic biology early in their careers.
- Assistant Professor **Wilson Wong** (BME) is the 2018 recipient of the ACS Synthetic Biology Young Investigator Research Award.
- Professors **David Boas** (BME, ECE), and **Selim Ünlü** (ECE, MSE), and Associate Professor **Luca Dal Negro** (ECE, MSE, Physics) have been elected as Fellows of The Optical Society (OSA).
- Associate Professor **Katherine Yanhang Zhang** (ME, BME, MSE) has been elected a Fellow of the American Society of Mechanical Engineers (ASME).
- Assistant Professor **James Bird** (ME, MSE) was recognized by the American Society for Engineering Educators in the summer edition of Prism magazine as one of 20 high-achieving researchers and educators under 40.

A Banner Year for Philanthropy

Campaign Goal:
$100M
YTD Achievement:
$88.6M
Alumni Donors
1,200

If philanthropy is the venture capital of society, then the investment in Boston University engineering students will produce great returns now and for years to come. Entering the final year of the capital campaign, the College is nearing its goal of $100 million with $88.6 million committed so far. Gifts and pledges from alumni, parents, friends, foundations and corporations brought in over $8 million this past year, including a record number of new commitments of $10,000-plus from alumni and parents.

ENG also had two very special fundraising achievements last year: establishing an endowed fund to honor one of its most iconic professors — the Ted de Winter Distinguished Faculty Fellowship Fund; and reaching the $1 million revenue level for the endowed Societal Engineering Fund.

Societal Engineering Endowed Fund Supports Transformative Programs

The concept of the Societal Engineer is embedded in the College community. Societal Engineers develop projects and products to improve society. They travel to resource-limited environments to tackle real-world challenges. They work in middle and high schools across the globe to encourage students to pursue engineering careers. Now, the curricular and extracurricular programs that support BU's Societal Engineers will be backed in perpetuity by the $1 million-and-growing **Societal Engineering Endowed Fund**. Infused with gifts from alumni, parents and friends of the College, the fund will allow for the development of new programs while ensuring that existing programs will receive ongoing support.

Engineering students traveled to Zanzibar to test medical devices for use in low resource areas.

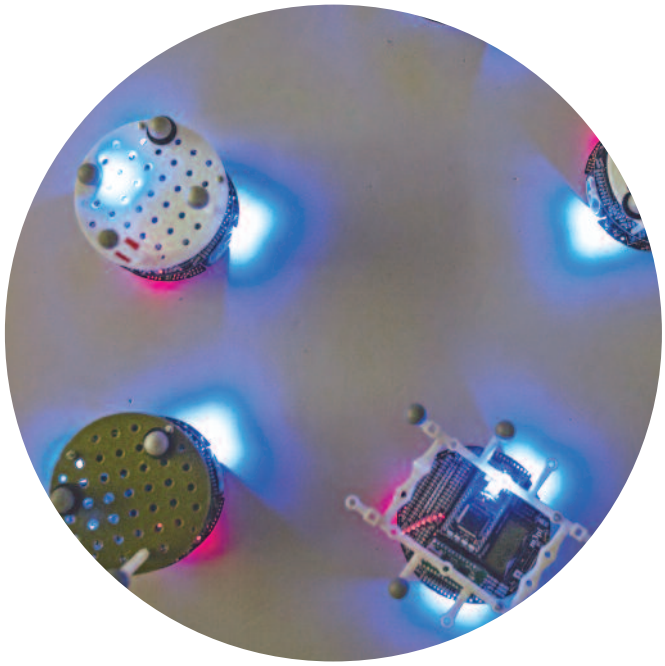
College Launches National Museum STEM Education Program

The College of Engineering is committed to engaging with community partners to broaden the participation of women and underrepresented minorities in engineering. With this goal in mind, the College kicked off a new outreach initiative with science museums to encourage interest and excitement in engineering. The College, in partnership with the NSF-ERC in Cellular Metamaterials (CELL-MET), will develop hands-on activity kits to be deployed to museums across the US, engaging K-6 students in fun and interactive engineering activities. The College will also offer professional development programming for museum educators to facilitate the communication of complex engineering concepts to popular audiences. Activity development is underway with plans to distribute kits in 2019.

- Professor **Muhammad Zaman** (BME, MSE) was presented the Rice 360° Inspiration Award, an award for global health professionals that serve as an inspiration, from Rice University.
- Professors **Paul Barbone** (ME, MSE) and **W. Clem Karl** (ECE, SE) have been elected to the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows.
- Assistant Professor **Michelle Sander** (ECE, MSE) was elected to an IEEE Senior Member.
- Associate Professor **Douglas Densmore** (ECE, BME) received an Under 40 Innovator Award from the Design Automation Conference.
- Professor **David J. Waxman** (BME, Biology) is the recipient of the 2018 Bernard B. Brodie Award in Drug Metabolism given by the American Society for Pharmacology and Experimental Therapeutics.

Research Highlights

- Interdisciplinary research using light to understand brain functions will receive a major boost under a new $2.9 million National Science Foundation PhD Research Traineeship grant. The five-year grant will allow the establishment of a new graduate-level program of study that focuses on the subject. Professor **Thomas Bifano** (ME, MSE) is the grant's principal investigator.
- Research published by Assistant Professor **Wilson Wong** (BME) in Cell outlines a refined CAR-T system – called split, universal and programmable (SUPRA) CAR-T – that can be continuously altered to target different types of cancer cells, and turned on and off, offering a significantly more finely tuned treatment than current therapies.
- A team of College of Engineering researchers led by Professor **Janusz Konrad** (ECE) has won a $1 million contract from the Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) to develop COSSY (Computational Occupancy Sensing SYstem), a system of sensors that can estimate the number of people in a room and adjust airflow in heating, ventilation and air conditioning (HVAC) appropriately, with the goal of saving energy.
- Assistant Professor **Ahmad 'Mo' Khalil** (BME) has used Synthetic Biology to develop a do-it-yourself framework named eVOLVER for precise, automated, high-throughput cell growth and evolution – features that researchers had to compromise on before. The work has been published as the cover story of the July issue of *Nature Biotechnology*.
- Professor **Enrico Bellotti** (ECE, MSE) is the principal investigator of a new $1.25 million interdisciplinary center that will work with collaborators from the US Army Research Laboratory, industry and academia to develop new simulation and design methodologies for semiconductor materials and devices.



- Professors **Kamil Ekinci** (ME, MSE) and **Chuanhua Duan** (ME, MSE), along with collaborators from the BU School of Medicine, have developed a new rapid antibiotic susceptibility test that works by measuring the movements of bacteria.
- Associate Professor **Douglas Densmore** (ECE, BME) has worked with researchers and software engineers to demonstrate the usefulness of an automated pipetting robot that is designed to handle larger transfer volumes of liquid faster and more accurately than a typical manually prepared reaction.
- Assistant Professor **Milos Popovic** (ECE) is a principal investigator on a study developing new microchip technology capable of optically transferring data, speeding data transfer and reducing energy consumption in current devices.
- In two recent papers published in Physical Review Letters, Associate Professor **Douglas Holmes** (ME, MSE) outlines two different concepts that push forward our understanding of how soft matter behaves under unstable conditions like growth.
- An interdisciplinary team of researchers led by Professor **Mark Grinstaff** (BME) has developed a novel sustained-release, biodegradable nanoparticle system to carry a common cancer drug, delivering a therapeutic dose in one injection that has the same curative effect as the standard multi-dose effect.
- Professor **Catherine Klapperich** (BME, MSE) has devised a new, easy-to-use HIV blood testing method called SNAPflex (System for Nucleic Acid Prep – Flexible) that prepares samples without refrigeration and at much lower cost.

$92.9 Million

total amount of engineering-related expenditures*

*most recent available figure, as reported to *US News & World Report*

Professor Wilson Wong (BME)

ENG At A Glance

Students in 2017-18

Undergraduate **1,720**
Master's Degree **567**
Doctoral Degree **435**

Degrees Granted

Bachelor's **393**
Master's **322**
Doctoral **56**

Faculty

Tenure/Tenure Track **125**
Non-Tenure Track **16**
Research **15**

Alumni

Living Alumni **20,053**

Academic Degrees

Biomedical Engineering
Computer Engineering
Electrical and Computer Engineering
Electrical Engineering
Global Manufacturing
Manufacturing Engineering
Materials Science and Engineering
Product Design and Manufacture
Systems Engineering

Undergraduate Concentrations

Aerospace Engineering
Energy Technologies
Manufacturing Engineering
Nanotechnology
Technology Innovation

Graduate Specializations

Data Analytics
Cybersecurity
Robotics

Graduate Certificates

Engineering Innovation
Energy & Sustainability
Micro-Electro Mechanical Systems
Product Design

Dual Degrees

Doctor of Philosophy and Doctor of Medicine (MD/PhD)
MS in Product Design and Manufacture and MBA in Management Dual Degree Program (MS/MBA)
STEM Educator-Engineer Program Dual Degree Program (BS/MAT)
Modular Medical Integrated Curriculum

Interdisciplinary Research Centers & Institutes

Biological Design Center
Center for Autonomous and Robotics Systems
Center for Computational Science
Center for Information and Systems Engineering
Center for Semiconductor Materials & Devices Modeling
Center for Space Physics
Fraunhofer Center for Manufacturing Innovation
Hearing Research Center
Institute for Sustainable Energy
Institute for Health System Innovation and Policy
Nanotechnology Innovation
Neurophotonics Center
NSF Engineering Research Center in Cellular Metamaterials
Precision Diagnostics Center
Rafik B. Hariri Institute for Computing and Computational Science & Engineering
Smart Lighting Engineering Research Center

BU

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