Bioengineering
Research Map

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Qianqian Fang
Mark Niedre
Sara Rouhanifard
Mohammad Abbas Yaseen

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Ambika Bajpayee
Chiara Bellini
Guohao Dai
Jessica Oakes
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Jeffrey Ruberti
Sandra Shefelbine

Molecular, Cell, and Tissue Engineering
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Ambika Bajpayee
Samuel Chung
Guohao Dai
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Computational Systems and Synthetic Bioengineering
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Herbert Levine
Elizabeth Libby
Mingyang Lu
Mona Minkara
Jessica Oaks
Nikolai Slavov
Eduardo Sontag
Raimond Winslow
Anand Ashthagiri  
Associate Professor of Bioengineering  
Affiliated Professor of Biology and Chemical Engineering  
a.astthagiri@northeastern.edu

Research Area 3: Molecular, Cell and Tissue Engineering  
Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: cell and tissue engineering, quantitative principles of cancer cell biology and developmental biology

Lab Website: http://www.cell-engineering.org  
Profile: https://coe.northeastern.edu/people/astthagiri-anand/  
Teaching: BIOE3380 Biomolecular dynamics and control, BIOE5420 Cellular Engineering
Rouzbeh Amini
Associate Professor of Bioengineering, Mechanical and Industrial Engineering
r.amini@northeastern.edu

Research Area 2: Biomechanics, Biotransport and MechanoBiology

Lab website: https://ramini.coe.northeastern.edu/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/amiini-rouzbeh/
Ambika Bajpayee
Assistant Professor of Bioengineering
Molecular Electrostatics & Drug Delivery Lab
a.bajpayee@neu.edu

Research Area 2: Biomechanics, Biotransport and MechanoBiology
Research Area 3: Molecular, Cell, and Tissue Engineering

Research Interests: Targeted delivery of drugs and imaging probes; bio-electrostatics; bio-transport modeling; biomechanics; mechanisms underlying trauma and age induced osteoarthritis

Lab website: https://web.northeastern.edu/bajpayeelab/
Profile: https://coe.northeastern.edu/people/bajpayee-ambika/
Teaching: BIOE 5650 Multiscale Biomechanics; BIOE 5651 Fields Forces and Flows
Chiara Bellini  
Assistant Professor of Bioengineering  
Affiliated Faculty, Mechanical and Industrial Engineering  
c.bellini@northeastern.edu

Research Area 2: Biomechanics, Biotransport and MechanoBiology  
Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Cardiovascular mechanics; cell-mediated growth & remodeling of tissues and organs; thoracic aortic aneurysms; arterial stiffness; vascular/skeletal systems interaction; effect of chronic aerosol inhalation on cardiovascular function

Publications: Google Scholar  
Profile: https://coe.northeastern.edu/people/bellini-chiara/  
Teaching: BIOE 2350 Biomechanics
Samuel Chung
Assistant Professor of Bioengineering
s.chung@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing
Research Area 3: Molecular, Cell, and Tissue Engineering

Research Interests: microscopy automation; subcellular laser surgery; axon regeneration

Web page: https://sites.google.com/view/wormneurolab/
Profile: https://coe.northeastern.edu/people/chung-samuel/
Teaching: BIOE 2355 Quantitative Physiology; BIOE 5648 Biomedical Optics
Heather Clark
Professor, Bioengineering and Chemistry
Director, Institute for Chemical Imaging of Living Systems
h.clark@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing

Research Interests: My group is currently working at the interface of chemistry and biology to develop and apply novel nanoscale probes for bio measurements. Ultimately, we will use nanosensors to image specific chemical processes in the body, in real-time.

Research Institute: https://cils.northeastern.edu/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/clark-heather/
Guohao Dai  
*Associate Professor of Bioengineering*  
g.dai@northeastern.edu

**Research Area 2:** Biomechanics, Biotransport and MechanoBiology  
**Research Area 3:** Molecular, Cell, and Tissue Engineering

**Research Interests:** Vascular Tissue Engineering, Stem Cell Engineering, 3D Bioprinting

**Publications:** [Google Scholar](https://scholar.google.com)  
Profile: [https://coe.northeastern.edu/people/dai-guohao/](https://coe.northeastern.edu/people/dai-guohao/)  
Teaching: Physiological Fluid Mechanics
Qianqian Fang  
Associate Professor of Bioengineering  
Affiliated Faculty, Electrical and Computer Engineering  
q.fang@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing

Research Interests: Optical tomography, computational optics, optical brain imaging, neuroinformatics

Web page: https://fanglab.org; http://mcx.space; http://neurojson.org
Profile: https://coe.northeastern.edu/people/fang-qianqian/
Teaching: BIOE 3210 Bioelectricity, 5235 Biomed. Imaging, 5810 Design of Biomed Instru.; 5648 Biomedical Optics
Aileen Huang-Saad
Associate Professor of Bioengineering

Director of Life Science and Engineering Programs
a.huang-saad@northeastern.edu

Research Area: Engineering Education

Research Interests: Entrepreneurship education microenvironments and their impact on the engagement of diverse populations, the influence of i-Corps on university ecosystems, and transforming BME education through instructional design

The Instructional Incubator was developed to increase student-centered, responsive teaching.

Lab: https://teel.sites.northeastern.edu/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/huang-saad-aileen/
Erel Levine  
Associate Professor  
Affiliated Faculty, Chemical engineering  
e.levine@northeastern.edu

Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Gut-brain interactions and its effects on health, stress response, and behavior; Statistical and machine learning approaches to biological data; Synthetic biology in multi-cellular organisms

Lab: https://web.northeastern.edu/sysbioeng/  
Profile: https://coe.northeastern.edu/people/levine-erel/  
Teaching: Mathematical methods in bioengineering, quantitative and physical biology
Research Area 4: Computational Systems and Synthetic Bioengineering


Basic circuit underlying epithelial plasticity

Chemotaxis: cell showing actin (red), myosin (green)

T-cells (yellow) failing to invade tumor (experiment)

Spatial patterning of phenotypes (theory)

Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/levine-herbert/
Teaching: Biomechanics, cell motility, graduate and undergraduate physics
Research Area 3: Molecular, Cell and Tissue Engineering

Research Interests: Protein engineering; immunotherapy; cancer treatment; vaccine development; drug delivery

Lab: https://web.northeastern.edu/lilab/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/l-jiahe/
Elizabeth Libby
Assistant Professor of Bioengineering
e.libby@northeastern.edu

Research Area 3: Molecular, Cell and Tissue Engineering
Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Synthetic biology, microbiology, biosensor development

Publications: Google Scholar
Lab: https://libbylab.sites.northeastern.edu/
Profile: https://coe.northeastern.edu/people/libby-elizabeth/
Mingyang Lu  
Assistant Professor of Bioengineering  
m.lu@northeastern.edu

Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Computational systems biology, an integration of mathematical modeling and bioinformatics for studying gene regulatory networks, single cell genomics, epithelial-mesenchymal transition, coarse-graining, reverse engineering, machine learning, stochasticity and heterogeneity in gene expression

Publications: Google Scholar  
Profile: https://coe.northeastern.edu/people/lu-mingyang/
Research Area 3: Molecular, Cell and Tissue Engineering

Research Interests: Image and signal processing as applied to biophysical data designed to answer fundamental questions about the molecular basis of living systems.

Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/makowski-lee/
Teaching: Principles of Bioengineering, Molecular Bioengineering
Mona Minkara
Assistant Professor of Bioengineering
Affiliated Faculty, Chemistry and Chemical Biology
m.minkara@northeastern.edu

Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Using computational methods including Monte Carlo methods, molecular dynamics simulations, and molecular docking calculations to obtain a fundamental understanding of molecular interactions that occur at biological interfaces, such as the pulmonary surfactant system in the lungs.

The pulmonary surfactant system is vital for healthy breathing and acts as the first line of defense against airborne pathogens.

SP-A (PDB: 1R13) SP-B (PDB: 1DFW) SP-C (PDB: 2YAD) SP-D (PDB: 4M18)

Lab website: http://www.minkaracombinelab.com
Profile: https://coe.northeastern.edu/people/minkara-mona/
Mark Niedre  
Professor of Bioengineering  
m.niedre@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing  
Research Area 3: Molecular, Cell, and Tissue Engineering

Research Interests: Biomedical optics; fluorescence imaging; cancer metastasis; rare cell detection and tracking in the body; ultrafast light-tissue interactions; image reconstruction and signal processing

Lab: https://sites.google.com/site/niedrelab/home  
Publications: Google Scholar  
Profile: https://coe.northeastern.edu/people/niedre-mark/  
Teaching: BIOE 3210 Bioelectricity, BIOE 5235 Biomedical Imaging
Jessica M. Oakes  
Assistant Professor of Bioengineering  
j.oakes@northeastern.edu

Research Area 2: Biomechanics, Biotransport and MechanoBiology  
Research Area 4: Computational Systems and Synthetic Bioengineering

Cardiopulmonary Health Impact Following Chronic Exposure  
Coupling Clinical Data with Modeling to Optimize Drug Delivery in Asthma

Targeted Nanoparticle Drug Delivery

Publications: https://www.northeastern.edu/biofluids/  
Profile: https://coe.northeastern.edu/people/oakes-jessica/  
Teaching: Transport and Fluids for Bioengineers and Computational Biomechanics
Hari Parameswaran  
Assistant Professor of Bioengineering  
h.parameswaran@northeastern.edu

**Research Area 2:** Biomechanics, Biotransport and MechanoBiology  
**Research Area 3:** Molecular, Cell, and Tissue Engineering

**Research Interests:** Mechanotransduction, multiscale mechanobiology, Computational modeling, Cell-Cell communication, **[Current:]** Dynamic switching of force transmission pathways in multicellular ensembles

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Lab website: [https://web.northeastern.edu/breathe/](https://web.northeastern.edu/breathe/)  
Publications: [Google Scholar](https://scholar.google.com)  
Profile: [https://coe.northeastern.edu/people/parameswaran-harikrishnan/](https://coe.northeastern.edu/people/parameswaran-harikrishnan/)  
Teaching: GE 2361 Mathematical methods for Engineers, BIOE 5060 Mechanotransduction in cells and tissue
Sara H. Rouhanifard  
Assistant Professor of Bioengineering  
s.rouhanifard@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing  
Research Area 3: Molecular, Cell, and Tissue Engineering

Research Interests: Development of single-cell technologies for DNA+RNA, Nucleic acid detection as a diagnostic tool, RNA modifications in developing neurons.

Lab: https://rouhanifardlab.com/  
Publications: Google Scholar  
Profile: https://coe.northeastern.edu/people/rouhanifard-sara/  
Teaching: BIOE 3380
Research Area 2: Biomechanics, Biotransport and MechanoBiology
Research Area 3: Molecular, Cell and Tissue Engineering

Research Interests: My lab focuses on the role matrix molecules play in the transition of animals from a loosely-connected grouping of cells to a fully-connected, mechanically robust structure. The relevant disciplines are: Mechanochemistry, Mechanobiology, Mechanobioreactor Development, Cell Culture, Single Molecule Light Microscopy, High Resolution Electron Microscopy.

Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/ruberti-jeffrey/
Teaching: Principles of Bioengineering, Quantitative Physiology, Capstone Design
Sandra Shefelbine  
*Professor of Bioengineering, jointly appointed in Mechanical and Industrial Engineering*

s.shefelbine@northeastern.edu

**Research Area 2: Biomechanics, Biotransport and MechanoBiology**

**Research Interests:** multi-scale mechanics of bones; adaptation of bone to mechanical loading during growth and ageing

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**molecular microscopy**  
**in vivo experiments**  
**FEA**  
**histology**  
**musculoskeletal modeling**  
**translational therapies**

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Lab: [www.shefelbine.org](http://www.shefelbine.org)
Publications: [Google Scholar](https://scholar.google.com)
Profile: [https://coe.northeastern.edu/people/shefelbine-sandra/](https://coe.northeastern.edu/people/shefelbine-sandra/)
Teaching: ME 5665 Musculoskeletal Biomechanics, BIOE 2350 Biomechanics
Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Rationally engineered directed differentiation, single-cell analysis, ribo- some-mediated translational regulation, proteomics, cell signaling, systems biology

Lab: https://slavoylab.net/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/slavov-nikolai/
Teaching: Mathematical Methods for Engineers and Methods and Logic in Systems Biology
Eduardo Sontag

University Distinguished Professor
Electrical & Computer Engineering & Bioengineering Faculty, Program in Therapeutic Science, Harvard Medical School
e.sontag@northeastern.edu

Research Area 3: Molecular, Cell, and Tissue Engineering
Research Area 4: Computational Systems and Synthetic Bioengineering


Lab: http://www.sontaglab.org/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/sontag-eduardo/
Teaching: BIOE 5115 Dynamical Systems in Biological Engineering
Research Area 4: Computational Systems and Synthetic Bioengineering

Research Interests: Computational modeling of the cardiac myocyte to understand the molecular basis of arrhythmias; machine learning in critical care medicine to identify those patients who require urgent care.

Profile: https://coe.northeastern.edu/people/winslow-raimond/
Mohammad Abba Yaseen
Assistant Professor of Bioengineering
m.yaseen@northeastern.edu

Research Area 1: Imaging, Instrumentation, and Signal Processing

Research Interests: Advanced microscopy for minimally invasive, in vivo characterization of brain function

Lab website: https://www.yaseen-omnilab.org/
Profile: https://coe.northeastern.edu/people/yaseen-mohammad-abbas/
Bioengineering
Overview

• 674 undergraduates, 197 graduate students including 104 Masters, 93 PhD (Fall 2021)

• 73 tenured/tenure-track faculty including affiliated
  - 3 Distinguished Professors
  - 8 Young Investigator Awards
  - 8 Professional Society Fellowships
  - 1 AHA member, 2 AIMBE members

• 30+ Co-op employers in Boston area
  - Bio-rad, Boston Scientific, Moderna, Covidien, Genzyme, MIT Lincoln Labs, Novartis, Smith and Nephew, Vention Medical, Wyss Institute for Biologically Inspired Engineering

• ABET accredited
Bioengineering
Overview

• $20M external research awards (2019-2021)

• Recent external funding sources:
  • National Science Foundation
  • National Institutes of Health
  • Paul G. Allen Frontiers Group
  • National Cancer Institute
  • American Heart Association
  • National Institute of Arthritis and Musculoskeletal and Skin Diseases
  • Department of Homeland Security
  • National Institute of Neurological Disorders and Stroke