## Bioengineering Research Map

**Biomedical Devices and Bioimaging**
- Samuel Chung
- Qianqian Fang
- Tim Lannin
- Helen Markewich
- Mark Niedre
- Esin Sozer
- Tao Sun
- Mohammad Abbas
- Yaseen

**Engineering Education**
- Aileen Huang-Saad

**Biomechanics, Biotransport, and Mechanobiology**
- Rouzbeh Amini
- Chiara Bellini
- Guohao Dai
- Jessica Oakes
- Harikrishnan Parameswaran
- Jeffrey Ruberti
- Sandra Shefelbine

**Molecular, Cell, and Tissue Engineering**
- Anand Asthagiri
- Ambika Bajpayee
- Samuel Chung
- Guohao Dai
- Michael Jaeggl
- Jiahe Li
- Elizabeth Libby
- Lee Makowski
- Helen Markewich
- Harikrishnan Parameswaran
- Sara Rouhanifard
- Jeffrey Ruberti
- Shiaoming Shi

**Systems, Synthetic, and Computational Bioengineering**
- Anand Asthagiri
- Chiara Bellini
- Miten Jain
- Erel Levine
- Herbert Levine
- Elizabeth Libby
- Mingyang Lu
- Mona Minkara
- Jessica Oakes
- Nikolai Slavov
- Eduardo Sontag
- Raimond Winslow

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Bioengineering

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Anand Ashthagiri
Associate Professor of Bioengineering
Affiliated Professor of Biology and Chemical Engineering
a.asthagiri@northeastern.edu

Research Area 3: Molecular, Cell and Tissue Engineering
Research Area 4: Systems, Synthetic and Computational 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/asthagiri-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

Structural and Mechanical Characterization

Multi-scale Modeling

Image-based Biomechanics and Mechanobiology

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

Research Area 3: Molecular, Cell, and Tissue Engineering

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

Molecular Bioelectrostatics and Drug Delivery Lab | Northeastern University

Lab website: https://web.northeastern.edu/bajpayeelab/
Teaching: BIOE 5650 Multiscale Biomechanics; 2350 Biomechanics; 5651 Fields Forces and Flows
Chiara Bellini  
*Associate Professor of Bioengineering*

Affiliated Faculty, Mechanical and Industrial Engineering  
c.bellini@northeastern.edu

Research Area 2: Biomechanics, Biotransport and MechanoBiology  
Research Area 4: Systems, Synthetic and Computational 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/](https://coe.northeastern.edu/people/bellini-chiara/)  
Teaching: BIOE 2350 Biomechanics
Samuel Chung
Assistant Professor of Bioengineering
s.chung@northeastern.edu

Research Area 1: Biomedical Devices and Bioimaging
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
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
Profile: 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: Biomedical Devices and Bioimaging

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/
Miten Jain
Assistant Professor
Affiliated Faculty, Bioengineering
mi.jain@northeastern.edu

Research Area 4: Systems, Synthetic and Computational Bioengineering

Research Interests: Genome organization and function; long read sequencing of DNA, RNA, and proteins; Nanopore technology; biological methods and deep learning for resolving complex repeats and nucleotide modifications; applying genomics to the clinic; developing therapeutic applications.

Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/jain-miten/
Erel Levine
Associate Professor
Affiliated Faculty, Chemical engineering
e.levine@northeastern.edu

Research Area 4: Systems, Synthetic and Computational 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
Herbert Levine  
*University Distinguished Professor of Bioengineering and Physics*  
h.levine@northeastern.edu

**Research Area 4: Systems, Synthetic and Computational Bioengineering**


**Publications:** [Google Scholar]  
Profile: [https://coe.northeastern.edu/people/levine-herbert/](https://coe.northeastern.edu/people/levine-herbert/)

**Teaching:** Biomechanics, cell motility, graduate and undergraduate physics
Elizabeth Libby
Assistant Professor of Bioengineering
e.libby@northeastern.edu

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

**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

**Modeling cellular state transitions**

**Gene network construction**

**Genomic data integration**

**Publications:** [https://scholar.google.com/citations?user=WgdQw7wAAAAJ](https://scholar.google.com/citations?user=WgdQw7wAAAAJ)  
**Lab:** [https://lusystemsbio.northeastern.edu](https://lusystemsbio.northeastern.edu)  
**Teaching:** dynamical systems, biophysics
Lee Makowski
*Professor and Chair of Bioengineering*

l.makowski@northeastern.edu

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**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.

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**Publications:** [Google Scholar](https://www.google.com)

Profile: [https://coe.northeastern.edu/people/makowski-lee/](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: Systems, Synthetic and Computational 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.

Lab website: http://www.minkara combinelab.com
Profile: https://coe.northeastern.edu/people/minkara-mona/

The pulmonary surfactant system is vital for healthy breathing and acts as the first line of defense against airborne pathogens.
Mark Nedre  
Professor of Bioengineering  
m.niedre@northeastern.edu

Research Area 1: Biomedical Devices and Bioimaging

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 Oakes
Assistant Professor of Bioengineering
j.oakes@northeastern.edu

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

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

Lab website: https://web.northeastern.edu/breathe/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/parameswaran-harikrishnan/
Teaching: GE 2361 Mathematical methods for Engineers, BIOE 5060 Mechanotransduction in cells and tissue
Sara Rouhanifard  
*Assistant Professor of Bioengineering*

s.rouhanifard@northeastern.edu

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/](https://rouhanifardlab.com/)

Publications: [Google Scholar](https://scholar.google.com)

Profile: [https://coe.northeastern.edu/people/rouhanifard-sara/](https://coe.northeastern.edu/people/rouhanifard-sara/)

Teaching: BIOE 3380
Jeffrey Ruberti  
Professor of Bioengineering  
j.ruberti@northeastern.edu

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.

Mechanochemistry: Extensial strain drives collagen fibrillogenesis. Fluorescence images show strain field in fluid ACSNano 2016

High Resolution Microscopy: Hole in cell matrix left behind by cell nucleus Exp Eye Res 2017

Single Molecule Mechanochemistry: Force slows enzymes JACS 2011


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

molecular microscopy  in vivo experiments  FEA  histology  musculoskeletal modeling  translational therapies

Lab: www.shefelbine.org
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/shefelbine-sandra/
Teaching: ME 5665 Musculoskeletal Biomechanics, BIOE 2350 Biomechanics
Nikolai Slavov
Associate Professor of Bioengineering
Affiliated Faculty, Biology
n.slavov@northeastern.edu

Research Area 4: Systems, Synthetic and Computational Bioengineering

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

Lab: https://slavovlab.net/
Publications: Google Scholar
Profile: https://coe.northeastern.edu/people/slavov-nikolai/
Teaching: Mathematical Methods for Engineers and Methods and Logic in Systems Biology
Research Area 4: Systems, Synthetic and Computational 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
Tao Sun
Assistant Professor
Bioengineering Faculty
t.sun@northeastern.edu

Research Area 1: Biomedical Devices and Bioimaging
Research Area 2: Biomechanics, Biotransport and Mechanobiology
Research Area 3: Molecular, Cell and Tissue Engineering

Research Interests: Focused Ultrasound, Ultrasound Imaging, Neuroimaging, Drug Delivery, Immunomodulation and Immunoengineering, Glioblastoma, Alzheimer’s Disease.

Profile: https://coe.northeastern.edu/people/sun-tao/
Teaching: BIOE 5235 Biomedical Imaging
Raimond Winslow  
Professor of Bioengineering  
Director of Life Science and Medicine Research, Roux Institute  
r.winslow@northeastern.edu

Research Area 4: Systems, Synthetic and Computational 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 Abbas Yaseen
Assistant Professor of Bioengineering
m.yaseen@northeastern.edu

Research Biomedical Devices and Bioimaging

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

- 650 undergraduates, 259 graduate students including 144 Masters, 115 PhD (Spring 2023)

- 64 tenured/tenure-track faculty including affiliated, 5 teaching faculty
  - 6 Distinguished Professors
  - 10 Young Investigators Awards
  - 11 Professional Society Fellowship

- 180 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, etc

- ABET accredited
Bioengineering Overview

• **$24M** external research awards (2021-2022)

• 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