# Bioengineering Research Map

**Lee Makowski, Professor and Chair**  
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**Qianqian Fang, Associate Professor and Associate Chair for Research and Graduate Studies**  
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## Imaging, Instrumentation, and Signal Processing
- Samuel Chung
- Qianqian Fang
- Tim Lannin
- Helen Markewich
- Mark Niedre
- Esin Sozer
- Mohammad Abbas Yaseen

## Biomechanics, Biotransport, and MechanoBiology
- Rouzbeh Amini
- Ambika Bajpayee
- 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 Jaeggli
- Jiahe Li
- Elizabeth Libby
- Lee Makowski
- Helen Markewich
- Harikrishnan Parameswaran
- Sara Rouhanifard
- Jeffrey Ruberti
- Shiaoming Shi

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

## Engineering Education
- Aileen Huang-Saad

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bioe.northeastern.edu
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 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
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/
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

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**Web page:** [https://sites.google.com/view/wormneurolab/](https://sites.google.com/view/wormneurolab/)  
**Profile:** [https://coe.northeastern.edu/people/chung-samuel/](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: 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.
Miten Jain
Assistant Professor
Affiliated Faculty, Bioengineering
mi.jain@northeastern.edu

Research Area 3: Molecular, Cell and Tissue Engineering
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/
Teaching: Biomechanics, cell motility, graduate and undergraduate physics
Jiahe Li
Assistant Professor of Bioengineering
jiah.li@northeastern.edu

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/li-jiahe/
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=WgdQw7wAAAAI
Lab: https://lusystemsbio.northeastern.edu
Teaching: dynamical systems, biophysics
Lee Makowski
Professor and Chair of Bioengineering
l.makowski@northeastern.edu

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: 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.minkaracambinelab.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.
Research Area 1: Imaging, Instrumentation, and Signal Processing

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

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

Lab website: [https://web.northeastern.edu/breathe/](https://web.northeastern.edu/breathe/)  
Publications: Google Scholar  
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 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/
Publications: Google Scholar
Profile: 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.

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

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
Eduardo Sontag  
*University Distinguished Professor*

Electrical & Computer Engineering & Bioengineering Faculty, Program in Therapeutic Science, Harvard Medical School

[e.sontag@northeastern.edu](mailto:e.sontag@northeastern.edu)

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


**Lab:** [http://www.sontaglab.org/](http://www.sontaglab.org/)

**Publications:** Google Scholar

**Profile:** [https://coe.northeastern.edu/people/sontag-eduardo/](https://coe.northeastern.edu/people/sontag-eduardo/)

**Teaching:** BIOE 5115 Dynamical Systems in Biological Engineering
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 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