



## Biomedical Engineering

In consultation with an appointed faculty adviser, M.S. students should select a program of 30 points of credit of graduate courses (4000 level or above) appropriate to their career goals. This program must include the course in computational modeling of physiological systems (*BMEN E6003*); two semesters of *BMEN E9700: Biomedical engineering seminar*; at least four other biomedical engineering courses; and at least one graduate-level applied mathematics course (excluding statistics). Master's students interested in pursuing research can choose up to 6 credits (2 semesters) of research under the guidance of a BME faculty member. It is the responsibility of the student to contact individual faculty to find research opportunities. Research can be done for either credit or stipend, but not both simultaneously. If a Master's student is interested in conducting research, it is in their best interest to begin contacting research advisors as early as possible in the semester. A thesis based on experimental, computational, or analytical research is optional. Students wishing to pursue the Master's Thesis option should register for *BMEN E9100 Master's Research* and consult with their BME faculty adviser.

### Course Groupings:

Innovation and Entrepreneurship  
Cell and Tissue Engineering  
Biomechanics  
Biosignals and Biomedical Imaging  
Neural Engineering  
Genomics and System Biology

Quantitative Biology  
Bioinductive and Biomimetic Materials  
Biomaterials  
Biomems and Nanotechnology  
Robotics and Control of Biological Systems

### Required Courses – 18 Credits

#### *BMEN E6003 Comp Modeling of Physiologic Systems*

Advanced computational modeling and quantitative analysis of selected physiological systems from molecules to organs. Selected systems are analyzed in depth with an emphasis on modeling methods and quantitative analysis. Topics may include cell signaling, molecular transport, excitable membranes, respiratory physiology, nerve transmission, circulatory control, auditory signal processing, muscle physiology, data collection and analysis.

#### *BMEN 9700 Graduate Seminar (2 Semesters)*

All matriculated graduate students are required to attend the seminar as long as they are in residence. **No degree credit is granted.** The seminar is the principal medium of communication among those with biomedical engineering interests within the University. Guest speakers from other institutions, Columbia faculty, and students within the Department who are advanced in their studies frequently offer sessions.

*1 Graduate Level Applied Math course (>4000 level, non-stat)*

*4 BMEN Graduate Classes (4000 level or higher)*

### Technical Electives – 12 Credits

- Content should be BME-related
- 3 Courses in SEAS 4000 level or higher (including BMEN)
- 1 graduate level course permitted outside of SEAS (with Academic Advisor approval)

*It is recommended that students without an undergraduate degree in BME or Biology take BMEN E4001 and E4002 as part of their MS degree requirements.*



# COLUMBIA | ENGINEERING

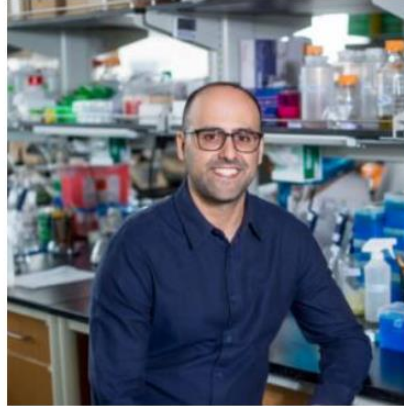
The Fu Foundation School of Engineering and Applied Science

## Biomedical Engineering Faculty



**ELHAM AZIZI**

ASSISTANT PROFESSOR OF BIOMEDICAL ENGINEERING & HERBERT AND FLORENCE IRVING ASSISTANT PROFESSOR OF CANCER DATA RESEARCH (IN THE HERBERT AND FLORENCE IRVING INSTITUTE FOR CANCER DYNAMICS AND IN THE HERBERT IRVING COMPREHENSIVE CANCER CENTER)



**TAL DANINO**

ASSOCIATE PROFESSOR OF BIOMEDICAL ENGINEERING



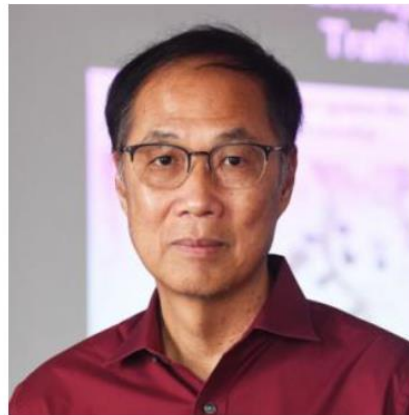
**X. EDWARD GUO**

STANLEY DICKER PROFESSOR OF BIOMEDICAL ENGINEERING; CHAIR, DEPARTMENT OF BIOMEDICAL ENGINEERING



**ANDREW LAINE**

PERCY K. & VIDA L. W. HUDSON PROFESSOR OF BIOMEDICAL ENGINEERING AND RADIOLOGY (PHYSICS)



**KAM W. LEONG**

SAMUEL Y. SHENG PROFESSOR OF BIOMEDICAL ENGINEERING (SYSTEMS BIOLOGY)



**HELEN H. LU**

PERCY K. AND VIDA L.W. HUDSON PROFESSOR OF BIOMEDICAL ENGINEERING



**HENRY HESS**

PROFESSOR OF BIOMEDICAL ENGINEERING



**ELIZABETH M. C. HILLMAN**

HERBERT AND FLORENCE IRVING PROFESSOR AT THE ZUCKERMAN INSTITUTE AND PROFESSOR OF BIOMEDICAL ENGINEERING AND RADIOLOGY (PHYSICS)



**CLARK T. HUNG**

PROFESSOR OF BIOMEDICAL ENGINEERING, PROFESSOR OF ORTHOPEDIC SCIENCES (IN ORTHOPEDIC SURGERY)