Department of Biomedical Engineering

Professor Bin He, Department Head
bhe1@andrew.cmu.edu

Professor Conrad M. Zapanta, Associate Department Head for Education
czapanta@cmu.edu

Location: Scott Hall 4N201
Phone: 412-268-3955
www.bme.cmu.edu (http://www.bme.cmu.edu)

Core Courses
(all required)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-121</td>
<td>Modern Biology- Fall and Spring</td>
<td>9</td>
</tr>
<tr>
<td>or 03-151</td>
<td>Honors Modern Biology</td>
<td></td>
</tr>
<tr>
<td>42-101</td>
<td>Introduction to Biomedical Engineering- Fall and Spring</td>
<td>12</td>
</tr>
<tr>
<td>42-201</td>
<td>Professional Issues in Biomedical Engineering- Fall and Spring</td>
<td>3</td>
</tr>
<tr>
<td>42-202</td>
<td>Physiology- Fall and Spring</td>
<td>9</td>
</tr>
<tr>
<td>42-203</td>
<td>Biomedical Engineering Laboratory- Fall and Spring</td>
<td>9</td>
</tr>
<tr>
<td>42-302</td>
<td>Biomedical Engineering Systems Modeling and Analysis- Fall and Spring</td>
<td>9</td>
</tr>
<tr>
<td>42-401</td>
<td>Foundation of BME Design-Fall*</td>
<td>6</td>
</tr>
<tr>
<td>42-402</td>
<td>BME Design Project- Spring</td>
<td>9</td>
</tr>
</tbody>
</table>

# Also known as 03-206 for Health Professions Program (http://www.cmu.edu/hpp) students.
* 42-401 serves as the precursor/pre-requisite for 42-402 BME Design Project.

Tracks (Completion of one track is required)
- Biomaterials and Tissue Engineering (BMTE (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/bmte_track.html))
- Biomechanics (BMEC (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/bmec_track.html))
- Biomedical Devices (BMDV)
- Biomedical Signal Processing and Imaging (BS (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/bsip_track.html))
- Cellular and Molecular Biotechnology (CMBT (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/cmbt_track.html))
- Neuroengineering (Neuro (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/neuro_track.html))
- Self-Designed Biomedical Engineering (SBME (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/sbme_track.html))

Biomaterials and Tissue Engineering (BMTE) Track

Overview
The BMTE track addresses issues at the interface of materials science, biology and engineering. The topics include the interactions between materials and cells or tissues, the effects of such interactions on cells and tissues, the design of materials for biological applications, and the engineering of new tissues.

Targets
The BMTE track is ideal for students interested in combining the education of Biomedical Engineering with Materials Science & Engineering or with Chemical Engineering. Both provide the necessary foundation in chemistry and/or materials science. Students of this track may develop careers in biotechnology, tissue engineering, biopharmaceuticals, and medical devices that leverage materials properties.

Requirements
In addition to the Biomedical Engineering core courses, students in the BMTE Track must take the following combination of three courses:
- One (1) Required BMTE elective
- Two (2) BMTE Electives (either Required or Additional)
**BMTE Electives**

Required BMTE Electives (must take one of the following)
- 42-610 Introduction to Biomaterials 9
- 42-611 Engineering Biomaterials 12
- 42-612/27-520 Tissue Engineering 12
- 42-670 Special Topics: Biomaterial Host Interactions in Regenerative Medicine 12

Additional BMTE Electives
- 03-320 Cell Biology 9
- 42-613 Polymeric Biomaterials 9
- 42-620 Engineering Molecular Cell Biology 12
- 42-624 Biological Transport and Drug Delivery 9
- 42-643 Microfluidics 12
- 42-673 Special Topics: Stem Cell Engineering 9
- 42-676 Bio-nanotechnology: Principles and Applications 9
- 42-681 Disease Models for Therapeutic Discovery 9
- 42-682 BME Research or 39-500 CIT Honors Research Project or 42-6XX Clinical Course (Surgery for Engineers/Precision Medicine/ICU Medicine) 9-12

* The 42-680 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 CIT Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.

Some Special Topics and newly offered or intermittently offered courses may be acceptable as BMTE track electives. Students should consult with their BME advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as BMTE track electives.

Sample schedules can be found on the BMTE (https://www.cm.edu/bme/Academics/Undergraduate%20Programs/bmte_track.html) page on the BME website.

**Biomechanics (BMEC) Track**

**Overview**

The BMEC track addresses the application of solid or fluid mechanics to biological and medical systems. It provides quantitative understanding of the mechanical behavior of molecules, cells, tissues, organs, and whole organisms. The field has seen a wide range of applications from the optimization of tissue regeneration to the design of surgical and rehabilitation devices.

**Targets**

The BMEC track is ideally suited to the combined education of Biomedical Engineering and Mechanical Engineering or Civil & Environmental Engineering. Both provide the necessary foundation in the underlying physical principles and their non-Biomedical Engineering applications. This track may also appeal to students of Electrical & Computer Engineering who are interested in biomedical robotics. Education in biomechanics enables students to pursue careers in medical devices or rehabilitation engineering.

**Requirements**

In addition to the Biomedical Engineering core courses, students in the BMEC Track must take the following combination of three courses:
- One (1) **Required** BMEC Elective
- Two (2) **BMEC Electives** (either **Required** or **Additional**)

**BMEC Electives**

Required BMEC Electives (must take at least one of the following)
- 42-649 Introduction to Biomechanics 12
- 42-645/24-655 Cellular Biomechanics 9
- 42-648 Cardiovascular Mechanics 12
- 42-691 Biomechanics of Human Movement 12

Additional BMEC Electives
- 16-868 Biomechanics and Motor Control 9
- 42-444 Medical Devices 9
- 42-447 Rehabilitation Engineering 9
- 42-640/24-658 Image-Based Computational Modeling and Analysis 12
- 42-643 Microfluidics 12
- 42-680 BME Research or 39-500 CIT Honors Research Project or 42-6XX Clinical Course (Surgery for Engineers/Precision Medicine/ICU Medicine) 9-12

* The 42-680 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 CIT Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.

Some Special Topics, newly offered or intermittently offered courses may be acceptable as track electives. Students should consult with their advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as track electives.

Sample schedules can be found on the BMTE (https://www.cm.edu/bme/Academics/Undergraduate%20Programs/bmte_track.html) page on the BME website.

**Biomedical Devices (BMDV) Track**

**OVERVIEW**

The BMDV track addresses issues at the interface of medicine and engineering. The topics include biomedical sensors, actuators, diagnostic devices, therapeutic devices, instruments, systems, and fundamental topics of device material, device fabrication, and device interaction with biological cells, tissues and organs. The Biomedical Device track will prepare students for leaders in the biomedical device industry and for further education in graduate/medical schools.

**Targets**

The BMDV track will prepare students for leaders in the biomedical device industry and for further education in graduate/medical schools. It is ideal for students interested in combining the education of Biomedical Engineering with Electrical and Computer Engineering, or with Mechanical Engineering, or with Materials Science & Engineering.

**Requirements**

In addition to the Biomedical Engineering core courses, students in the MDEV Track must take the following combination of three courses:
- One (1) **Required** BMDV Elective
- Two (2) **BMDV Electives** (either **Required** or **Additional**)

**BMDV ELECTIVES**

Required BMDV Electives (must take at least one of the following)
- 42-678 Medical Device Innovation and Realization 12
- 42-682 Bioinstrumentation and Measurement 12
- 42-693 Special Topics in Integrated Systems Technology: Micro/Nano Biomedical Devices 12
- 42-694 Principles of Medical Device Engineering 12

Additional BMDV Electives
- 16-467 Human Robot Interaction 12
- 18-412 Neural Technology: Sensing and Stimulation 12
- 18-416 Nano-Bio-Photonics 12
- 24-104 Maker Series: Intro to Modern Making 3
- 42-444 Medical Devices 9
- 42-447 Rehabilitation Engineering 9
- 42-689 Introduction to Biomedical Imaging 9
- 42-648 Cardiovascular Mechanics 12
- 42-675 Fundamentals of Computational Biomedical Engineering 12
- 42-676 Bio-nanotechnology: Principles and Applications 9
- 42-688 Introduction to Neural Engineering 12
Biomedical Signal Processing and Imaging (BSPI) Track

OVERVIEW
The BSPI track addresses biomedical phenomena based on the information embedded in sensor-detected signals, including digital images and nerve electrical pulses. Students in this track will gain an understanding of the technologies involved in acquiring signals and images, the mathematical principles underlying the processing and analysis of signals, and the applications of signal/image processing methods in basic research and medicine.

TARGETS
This track aligns most naturally with a combined education of Biomedical Engineering and Electrical & Computer Engineering, which lays a solid foundation in signal processing principles. This track prepares students for careers in medical imaging or smart prosthetics. It also interfaces with many clinical practices including radiology, neurology/neurosurgery, and pathology.

REQUIREMENTS
In addition to the Biomedical Engineering core courses, students in the BSPI Track must take the following combination of three courses:

- One (1) Required BSPI elective
- Two (2) BSPI Electives (either Required or Additional)

BSPI ELECTIVES
Required BSPI Electives (must take at least one of the following)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>42-620</td>
<td>Introduction to Biomedical Imaging</td>
<td>9</td>
</tr>
<tr>
<td>42-631</td>
<td>Neural Data Analysis</td>
<td>9</td>
</tr>
<tr>
<td>42-632</td>
<td>Neural Signal Processing</td>
<td>12</td>
</tr>
</tbody>
</table>

Additional BSPI Electives

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-534</td>
<td>Biomedical Imaging and Fluorescence Spectroscopy</td>
<td>9</td>
</tr>
<tr>
<td>18-491</td>
<td>Fundamentals of Signal Processing¹</td>
<td>12</td>
</tr>
<tr>
<td>42-437</td>
<td>Biomedical Optical Imaging</td>
<td>9</td>
</tr>
<tr>
<td>42-640/24-658</td>
<td>Image-Based Computational Modeling and Analysis</td>
<td>12</td>
</tr>
<tr>
<td>42-675</td>
<td>Fundamentals of Computational Biomedical Engineering</td>
<td>12</td>
</tr>
<tr>
<td>42-682</td>
<td>Bioinstrumentation and Measurement</td>
<td>12</td>
</tr>
<tr>
<td>42-683</td>
<td>Introduction to Machine Learning for Biomedical Engineers</td>
<td>9</td>
</tr>
<tr>
<td>16-725</td>
<td>(Bio)Medical Image Analysis</td>
<td>12</td>
</tr>
<tr>
<td>42-x00</td>
<td>BME Research* or 39-500 CIT Honors Research Project* or 42-6XX Clinical Course (Surgery for Engineers/Engineering Medicine/ICU Medicine)</td>
<td>9-12</td>
</tr>
</tbody>
</table>

¹ Students make take either 18-491 Fundamentals of Signal Processing OR 18-792 Advanced Digital Signal Processing (but not both)

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 CIT Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.

Some Special Topics, newly offered or intermittently offered courses may be acceptable as track electives. Students should consult with their advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as track electives.

Additional courses: Some Special Topics, newly offered or intermittently offered courses may be acceptable as track electives. Students should consult with their advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as track electives.

Sample schedules can be found on the BME website (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/bsip_track.html).
Neuroengineering (Neuro) Track

Overview
The Neuroengineering (Neuro) track uses engineering techniques to examine, understand, and apply the properties of complex neural systems. Areas of interest include the research and development of neural engineering technologies for sensing, interfacing, imaging, and modulating the nervous systems. Examples of applications include brain-computer interfaces for use in paralysis, neural stimulation device design for sensory and motor prostheses and basic science research, and neural recording and imaging devices.

Targets
This track aligns most naturally with a combined education of Biomedical Engineering and Electrical & Computer Engineering, which lays a solid foundation in signal processing principles. This track prepares students for careers in brain-computer interfaces, neural stimulators, and neuroprosthetics.

Requirements
In addition to the Biomedical Engineering core courses, students in the BMEC Track must take must take the following combination of three courses:
- One (1) Required Neuro Elective
- Two (2) Neuro Electives (either Required or Additional)

Neuro Electives
Required Neuro Electives (MUST TAKE AT LEAST ONE OF THE FOLLOWING)

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>42-688</td>
<td>Introduction to Neural Engineering</td>
<td>12</td>
</tr>
<tr>
<td>42-631</td>
<td>Neural Data Analysis</td>
<td>9</td>
</tr>
<tr>
<td>42-632</td>
<td>Neural Signal Processing</td>
<td>12</td>
</tr>
</tbody>
</table>

Additional Neuro Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>18-370</td>
<td>Fundamentals of Control</td>
<td>12</td>
</tr>
<tr>
<td>18-412</td>
<td>Neuro Technology: Sensing and Stimulation</td>
<td>9</td>
</tr>
<tr>
<td>18-416</td>
<td>Nano-Bio-Photonics</td>
<td>12</td>
</tr>
<tr>
<td>18-460</td>
<td>Optimization</td>
<td>12</td>
</tr>
<tr>
<td>42-437</td>
<td>Biomedical Optical Imaging</td>
<td>9</td>
</tr>
<tr>
<td>42-447</td>
<td>Rehabilitation Engineering</td>
<td>9</td>
</tr>
<tr>
<td>42-630</td>
<td>Introduction to Neuroscience for Engineers</td>
<td>12</td>
</tr>
<tr>
<td>42-676</td>
<td>Bio-nanotechnology: Principles and Applications</td>
<td>9</td>
</tr>
<tr>
<td>42-689</td>
<td>Introduction to Biomedical Imaging</td>
<td>9</td>
</tr>
<tr>
<td>42-682</td>
<td>Bioinstrumentation and Measurement</td>
<td>12</td>
</tr>
<tr>
<td>42-683</td>
<td>Introduction to Machine Learning for Biomedical</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Engineers</td>
<td></td>
</tr>
<tr>
<td>42-x00</td>
<td>Biomedical Research* or 39-500 CIT Honors Research Project* or 42-6XX Clinical Course (Surgery for Engineers/Precision Medicine/ICU Medicine)</td>
<td>9-12</td>
</tr>
</tbody>
</table>

Other courses as approved

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 CIT Honors Research Project) must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.

Some Special Topics, newly offered or intermittently offered courses may be acceptable as track electives. Students should consult with their advisors and petition the BME Undergraduate Affairs Committee for permission to include such courses as track electives.

Sample schedules can be found on the Neuro (https://www.cmu.edu/bme/Academics/Undergraduate%20Programs/neuro_track.html) page on the BME website.

Self-Designed Biomedical Engineering (SBME) Track

The SBME track is aimed at helping highly motivated students who have a strong sense of career direction that falls beyond the scope of regular Biomedical Engineering tracks. Students are allowed to design the ‘track’ portion of the curriculum in consultation with the faculty. Example themes include medical robotics, neural engineering, or computational biomedical engineering.

Requirements
In addition to the Biomedical Engineering core requirements, students must take three elective courses of at least 9 units each. These elective courses must form a coherent theme that is relevant to biomedical engineering. In addition, at least one of the elective courses must be judged by the Biomedical Engineering Undergraduate Affairs Committee to have substantial biological or medical content.

If undergraduate research is part of the SBME track, the research project must be on a BME topic that is aligned to the track, supervised or co-supervised by a BME faculty member, and conducted for 9 or more units of credit.

Petition Procedure
1. Students wishing to pursue a self-designed track should first consult with Prof. Conrad Zapanta (https://www.cmu.edu/bme/People/Faculty/profile/czapanta.html) (Biomedical Engineering Associate Head of Education).
2. A SBME track proposal must be submitted electronically to Prof. Conrad Zapanta (https://www.cmu.edu/bme/People/Faculty/profile/czapanta.html) at least three weeks prior to Pre-Registration during the spring of the sophomore year. The proposal must include:
   - The three courses of the designated track, including catalog descriptions and when these courses are expected to be taken.
   - A justification of how these courses form a coherent theme relevant to biomedical engineering.
   - Two alternative courses that may substitute for one of the proposed courses, in case the original course is not available.
3. Once approved, the student must sign an agreement listing the theme and the three courses comprising the SBME track.
4. In the event that issues beyond the student’s control, such as course scheduling or cancellation, prevent the student from completing the approved course plan, the student may petition the Biomedical Engineering Undergraduate Affairs Committee to:
   - Substitute a course with another course that fits the approved theme, OR
   - Complete one of the regular tracks (all classes)

Minor in Biomedical Engineering

Professor Conrad M. Zapanta, Associate Department Head of Education czapanta@cmu.edu
www.bme.cmu.edu (http://www.bme.cmu.edu/)

The minor program is designed for engineering students who desire exposure to biomedical engineering but may not have the time to pursue the Biomedical Engineering additional major. The program is also open to students of all colleges and is popular among science majors. In conjunction with other relevant courses, the program may provide a sufficient background for jobs or graduate studies in biomedical engineering. Students interested in a medical career may also find this program helpful.

The Biomedical Engineering minor curriculum is comprised of three core courses and three electives. Students pursuing the minor may contact the BME Associate Head for Education (https://www.cmu.edu/bme/People/Faculty/profile/czapanta.html) (http://www.bme.cmu.edu/people/staff.html#admissions) for advice. Students interested in declaring Biomedical Engineering minor should contact either the BME Associate Head for Education (https://www.cmu.edu/bme/People/Faculty/profile/czapanta.html) or the Biomedical Engineering Undergraduate Program Coordinator (https://www.cmu.edu/bme/People/Administration/).

Requirements

Minimum units required for minor: 57

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>03-121</td>
<td>Modern Biology</td>
<td>9</td>
</tr>
<tr>
<td>or 03-151</td>
<td>Honors Modern Biology</td>
<td>9</td>
</tr>
<tr>
<td>42-101</td>
<td>Introduction to Biomedical Engineering</td>
<td>12</td>
</tr>
<tr>
<td>42-202</td>
<td>Physiology</td>
<td>9</td>
</tr>
<tr>
<td>42-xxx</td>
<td>BME Elective I</td>
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</tr>
<tr>
<td>42-xxx</td>
<td>BME Elective II</td>
<td></td>
</tr>
<tr>
<td>42-xxx</td>
<td>BME Elective III</td>
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</tr>
</tbody>
</table>

A BME Elective is defined as one of the following:
1. One semester of 42-200 Sophomore BME Research Project, 42-300 Junior BME Research Project, 42-400 Senior BME Research Project or 39-500 Honors Research Project. The project must be supervised by a core or courtesy Biomedical Engineering faculty member and for 9 or more units. Research projects supervised by a courtesy Biomedical Engineering faculty member must have significant biomedical engineering relevance. Note that BME Research Project can only be count as one BME elective.

2. 42-203 BME Laboratory (or the cross-listed version 03-206 for students in the Health Professions Program). Please note that priority for enrollment in 42-203 or 03-206 will be given to students who have declared the Additional Major in Biomedical Engineering. If sufficient room in the course remains after all majors have been accommodated in a given semester, students who have declared the Biomedical Engineering Designated Minor will be given the next priority for enrollment. If space still allows, other students will be enrolled.

3. Any 42-xxx course with a course number greater than 42-300 and worth at least 9 units (excluding 42-300 and 42-400- see previous comment regarding BME Research Project).

Students can petition the Biomedical Engineering Undergraduate Affairs Committee to count non-BME classes that have significant biological or medical content towards the minor requirements.

Full-Time Faculty

ABBOTT, ROSALYN, Assistant Professor of Biomedical Engineering – Ph.D., University of Vermont, 2011;

BARATI FARIMANI, AMIR, Assistant Professor, Mechanical Engineering and Biomedical Engineering – Ph.D., University of Illinois at Urbana-Champaign, 2015;

BARTH, ALISON L., Professor, Biological Sciences, and Biomedical Engineering – Ph.D., University of California, Berkeley, 1997;

BEHRMANN, MARLENE, George A. and Helen Dunham Cowan Professor of Cognitive Neuroscience Center for the Neural Basis of Cognition and Department of Psychology Professor, Biomedical Engineering – Ph.D., University of Toronto, 1991;

BETTINGER, CHRISTOPHER J., Professor of Biomedical Engineering and Materials Science & Engineering – Ph.D., Massachusetts Institute of Technology, 2008;

BRUCHEZ, MARCEL P., Professor of Biological Sciences, Chemistry, and Biomedical Engineering – Ph.D., University of California, Berkeley, 1998;

CAI, YANG, Associate Research Professor, Biomedical Engineering – Ph.D., West Virginia University, 1997;

CAMPBELL, PHIL G., Research Professor, Institute of Complex Engineering Systems, Biomedical Engineering, Biological Sciences, Materials Science & Engineering – Ph.D., The Pennsylvania State University, 1985;

CHALACHEVA, P. SANG, Assistant Teaching Professor of Biomedical Engineering – Ph.D., University of Southern California, 2014;

CHAMANZAR, MAYSAM, Assistant Professor, Electrical and Computer Engineering, Biomedical Engineering – Ph.D., Georgia Institute of Technology, 2012;

CHASE, STEVEN M., Associate Professor of Biomedical Engineering and Center for the Neural Basis of Cognition – Ph.D., Johns Hopkins University, 2006;

CHOSET, HOWIE, Professor, Robotics Institute, Biomedical Engineering, and Electrical & Computer Engineering – Ph.D., California Institute of Technology, 1996;

COHEN-KARNI, TZAHI (ITZHAQ), Associate Professor of Biomedical Engineering and Materials Science & Engineering – Ph.D., Harvard University, 2011;

COOK, KEITH, Professor and Associate Department Head of Graduate Studies of Biomedical Engineering – Ph.D., Northwestern University, 2000;

DAHL, KRIS N., Professor of Chemical Engineering, Biomedical Engineering, and Materials Science & Engineering – Ph.D., University of Pennsylvania, 2004;

DANDIN, MARC, Assistant Professor, Electrical & Computer Engineering and Biomedical Engineering – Ph.D., University of Maryland, 2012;

DOMACH, MICHAEL M., Professor of Chemical Engineering and Biomedical Engineering – Ph.D., Cornell University, 1983;

FEDDER, GARY K., Howard M. Wilkoff Professor, Institute for Complex Engineering Systems, Biomedical Engineering, Electrical & Computer Engineering, Robotics Institute – Ph.D., University of California, Berkeley, 1994;

FEINBERG, ADAM W., Arthur Hamerschlag Career Development Professor; Professor of Biomedical Engineering and Materials Science & Engineering – Ph.D., University of Florida, 2004;

GALLETTI, JOHN, Systems Scientist, Robotics Institute and Assistant Professor of Biomedical Engineering – Ph.D., Carnegie Mellon University, 2007;

GEYER, HARMUT, Associate Professor, Robotics Institute and Biomedical Engineering – Ph.D., Friedrich-Schiller-University of Jena, Germany, 2005;

GITTIS, ARYN, Associate Professor, Biological Sciences, and Biomedical Engineering – Ph.D., University of California, San Diego, 2008;

GROVER, PULKIT, Associate Professor, Electrical & Computer Engineering, Center for Neural Basis of Cognition, and Biomedical Engineering – Ph.D., University of California, Berkeley, 2010;

HALILAJ, ENI, Assistant Professor, Mechanical Engineering and Biomedical Engineering – Ph.D., University of California, Berkeley, 2015;

HE, BIN, Trustee Professor and Department Head, Biomedical Engineering – Ph.D., Tokyo Institute of Technology, 1988;

JUST, MARCEL, D.O. Hebb University Professor of Psychology and Biomedical Engineering Director, Center for Cognitive Brain Imaging – Ph.D., Stanford University, 1972;

KAINERSTORFER, JANA M., Assistant Professor of Biomedical Engineering – Ph.D., University of Vienna, 2010;

KASS, ROBERT, Maurice Falk Professor, Statistics, Department of Machine Learning, Center for the Neural Basis of Cognition, and Biomedical Engineering Interim co-Director, Center for the Neural Basis of Cognition – Ph.D., University of Chicago, 1980;

KELLY, SHAWN, Adjunct Associate Professor of Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 2003;

KUHLMAN, SANDRA, Associate Professor, Biological Sciences, and Biomedical Engineering – Ph.D., University of Kentucky, 2001;

LEDUC, PHILIP R., Professor of Mechanical Engineering, Biomedical Engineering, and Biological Sciences – Ph.D., Johns Hopkins University, 1999;

LEE, TAI SING, Professor, Computer Science, Center for the Neural Basis of Cognition and Biomedical Engineering – Ph.D., Harvard University, 1993;

LOESCHE, MATHIAS, Professor of Physics and Biomedical Engineering – Ph.D., Technical University of Munich, 1986;

MAJIDI, CARMEL, Associate Professor of Mechanical Engineering and Biomedical Engineering – Ph.D., University of California, Berkeley; Carnegie Mellon, 2007–

MITCHELL, TOM M., E. Fredkin University Professor, Computer Science, Robotics, Language Technologies, and Biomedical Engineering – Ph.D., Stanford University, 1979;

MOUARA, JOSE M. F., University Professor of Electrical & Computer Engineering and Biomedical Engineering – Ph.D., University of California, Berkeley, 2001;

MURPHY, ROBERT F., Ray and Stephanie Lane Professor of Computational Biology and Professor of Biological Sciences, Biomedical Engineering, and Machine Learning – Ph.D., California Institute of Technology, 1980;

OLSON, CARL, Professor, Center for the Neural Basis of Cognition and Biomedical Engineering – Ph.D., University of California, Berkeley, 1979;

OZDOGANLAR, BURAK, Ver Planck Professor, Mechanical Engineering and Biomedical Engineering – Ph.D., Department of Biomedical Engineering, 2004;

REIN, XI (CHARLIE), Assistant Professor of Biomedical Engineering – Ph.D., Peking University, 2011;

RIVIERE, CAMERON N., Associate Research Professor, Robotics Institute and Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 2004;

RUSSELL, ALAN J., Highmark Distinguished Career Professor, Institute of Complex Engineering Systems and Biomedical Engineering – Ph.D., University of California, San Diego, 1987;

SCHNEIDER, JAMES W., Professor of Chemical Engineering and Biomedical Engineering – Ph.D., University of Minnesota, 1998;
SHIMADA, KENJI, Theodore Ahrens Professor, Mechanical Engineering and Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 1993;
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