Department of Biomedical Engineering

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Biomedical Engineering Overview

Biomedical engineering education at Carnegie Mellon University reflects the belief that a top biomedical engineer must be deeply trained in both a traditional engineering practice and biomedical sciences. The unique additional major program leverages extensive collaborations with sister departments in the College of Engineering and with major medical institutions in Pittsburgh. This collaborative approach, combined with a rigorous engineering education, confers unique depth and breadth to the education of Biomedical Engineering graduates.

Students who elect Biomedical Engineering as a major must also declare a major in one of the traditional engineering disciplines: Chemical Engineering, Civil & Environmental Engineering, Electrical & Computer Engineering, Materials Science & Engineering, or Mechanical Engineering.

The curriculum, demanding but readily feasible to complete in four years, is highly rewarding to motivated students.

Common Requirements for the Additional Major

The Biomedical Engineering additional major program takes advantage of curricular overlaps between Biomedical Engineering and traditional engineering majors, such that the dual major can be completed in four years with only a modest increase in course requirements. The requirements for Biomedical Engineering consist of the core, the tracks, and the capstone design course. The core exposes students to basic facets of biomedical engineering to lay a foundation. The tracks allow students to build depth in a specific aspect of biomedical engineering. The capstone design (http://www.bme.cmu.edu/ugprog/design.html) engages students in team work to develop real-world applications.

While most tracks are designed to parallel a traditional engineering discipline, a self-designed track allows students to pursue specific areas not covered by the pre-defined tracks. **The additional major in Biomedical Engineering should be declared at the same time when declaring a traditional engineering major.**

Course Requirements for the Additional Major

Minimum units required for additional major: 93–102

Student majoring in Biomedical Engineering must meet three sets of requirements: 1) Biomedical Engineering (BME), 2) a traditional engineering discipline, and 3) CIT General Education(http://engineering.cmu.edu/current_students/services/general_education_requirements/general_education_2016) sequence.   The Quality Point Average (QPA) for courses that count toward the additional major must be 2.00 or better. No course taken on a pass/fail or audit basis may be counted toward the additional major.

The course requirements for the BME portion of the additional major are as follows:

Core Courses (all required)

		Units
03-121	Modern Biology- Fall and Spring	9
42-101	Introduction to Biomedical Engineering- Fall and Spring	12
42-201	Professional Issues in Biomedical Engineering- Fall and Spring	3
42-202	Physiology- Fall and Spring	9
42-203	Biomedical Engineering Laboratory- Fall and Spring #	9
42-302	Biomedical Engineering Systems Modeling and Analysis- Fall and Spring	9
42-401	Foundation of BME Design-Fall	6
42-402	BME Design Project- Spring	9
		66

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 (http://www.bme.cmu.edu/ugprog/bmte.html))
- Biomechanics (BMEC (http://www.bme.cmu.edu/ugprog/bmec.html))
- Biomedical Signal and Image Processing (BSIP (http://www.bme.cmu.edu/ugprog/bsip.html))
- Cellular and Molecular Biotechnology (CMBT (http://www.bme.cmu.edu/ugprog/cmbt.html))
- Self-Designed Biomedical Engineering (SBME (http://www.bme.cmu.edu/ugprog/sbme.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)

42/27-411	Engineering Biomaterials- Fall	9
42-612/27-520	Tissue Engineering- Spring	12
42-670	Special Topics: Biomaterial Host Interactions in Regenerative Medicine- Fall	12

Additional BMTE Electives

03-320	Cell Biology	9

42-613	Molecular and Micro-scale Polymeric Biomaterials in Medicine- Spring	9
42-620	Engineering Molecular Cell Biology- Fall	12
42-624	Biological Transport and Drug Delivery- Spring	9
42-673	Special Topics: Stem Cell Engineering- Spring, every other year	9
42-772	Special Topics: Applied Nanoscience and Nanotechnology- Fall	12
42-x00	BME Research* or 39-500 Honors Research Project* or 42-661 Surgery for Engineers or 42-671 Precision Medicine for Biomedical Engineers	9

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 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(http://www.bme.cmu.edu/ugprog/bmte.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 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)

42-341	Introduction to Biomechanics- Fall	9
42-645/24-655	Cellular Biomechanics- Intermittent	9
42-646/24-657	Molecular Biomechanics- Spring, every other year	9
42-648	Cardiovascular Mechanics- Spring	12

Additional BMEC Electives

33-441/03-439	Introduction to BioPhysics- Fall	10
42-444	Medical Devices- Fall and Spring	9
42-447	Rehabilitation Engineering- Fall	9
42-640/24-658	Computational Bio-Modeling and Visualization- Spring	12
42-643/24-615	Microfluids- Intermittent	12
42-x00	BME Research* or 39-500 Honors Research Project* or 42-661 Surgery for Engineers or 42-671 Precision Medicine for Biomedical Engineers	

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 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 BMEC (http://www.bme.cmu.edu/ugprog/bmec.html) page on the BME website.

Biomedical Signal and Image Processing (BSIP) Track

Overview

The BSIP track addresses bio/medical phenomena based on the information embedded in sensor-detected signals, including digital images and nerve electrical pulses. Students in this track will gain 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 BSIP Track must take the following combination of **three** courses:

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

BSIP Electives

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

42-431/18-496	Introduction to Biomedical Imaging and Image Analysis- Fall	12
42-630	Introduction to Neuroscience for Engineers- Spring	12
42-631	Neural Data Analysis- Fall	9
42-632	Neural Signal Processing- Spring	12
42-672	Fundamentals of Biomedical Imaging and Image Analysis- Spring	12

Additional BSIP Electives

03-534	Biological Imaging and Fluorescence Spectroscopy- Spring	9
15-386	Neural Computation- Spring	9
16-725	Medical Image Analysis- Spring	12
18-491 or 18-792	Fundamentals of Signal Processing- Fall [1] / Advanced Digital Signal Processing	12
42-426	Biosensors and BioMEMS- Intermittent	9
42-447	Rehabilitation Engineering- Fall	9
42-474	Special Topics: Introduction to Biophotonics	9
42-640/24-658	Computational Bio-Modeling and Visualization- Spring	12
42-698	Special Topics- A : Bioinstrumentation - Intermittent	9
42-x00	BME Research* or 39-500 Honors Research Project* or 42-661 Surgery for Engineers or 42-671 Precision Medicine for Biomedical Engineers	

[1] Note that either 18-491 or 18-792 (offered in Spring), but not both, may be counted as a BSIP Elective.

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 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 BSIP (http://www.bme.cmu.edu/ugprog/bsip.html) page on the BME website.

Cellular and Molecular Biotechnology (CMBT) Track

Overview

The CMBT track emphasizes fundamentals and applications of biochemistry, biophysics, and cell biology, and processes on the nanometer to micrometer size scale. Students in this track acquire understanding of the molecular and cellular bases of life processes, and build skills in quantitative modeling of live cell-based biotechnologies and in technologies that exploit the unique properties of biomolecules in non-biological settings.

Targets

The CMBT track is ideally suited for the combined education of Biomedical Engineering and Chemical Engineering, which provides a strong core of chemistry and molecular processing principles. The track may also interest students of Mechanical Engineering, Materials Science & Engineering, or Civil & Environmental Engineering who have an interest in molecular aspects of Biomedical Engineering. The CMBT track prepares students for careers in bio/pharmaceutical, medical diagnostics, biosensors, drug delivery, and biological aspects of environmental engineering.

Requirements

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

- One (1) **Required** CMBT Elective
- Two (2) CMBT Electives (either **Required** or **Additional**)

CMBT Electives

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

42-620	Engineering Molecular Cell Biology- Spring	12
42-623	Cellular and Molecular Biotechnology- Intermittent	9
42-624	Biological Transport and Drug Delivery- Spring	9

Additional CMBT Electives

03-320	Cell Biology	9
42/06-622	Bioprocess Design- Spring, intermittent	9
42-643	Microfluids- Spring, intermittent	12
42-645/24-655	Cellular Biomechanics- Intermittent	9
42-646/24-657	Molecular Biomechanics- Spring, every other year	9
42-673	Special Topics: Stem Cell Engineering- Fall, every other year	9
42-772	Special Topics: Applied Nanoscience and Nanotechnology- Fall	12
42-x00	BME Research* or 39-500 Honors Research Project* or 42-661 Surgery for Engineers or 42-671 Precision Medicine for Biomedical Engineers	

* The 42-x00 research project (42-200/300/400 Sophomore/Junior/Senior Biomedical Engineering Research Project OR 39-500 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 CMBT (http://www.bme.cmu.edu/ugprog/cmbt.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, and allows students to choose courses relevant to the theme from across the University.   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 the Biomedical Engineering Undergraduate Affairs Committee. Contacts for the Committee are Prof. Robert Tilton (http://www.bme.cmu.edu/people/faculty4.html#Tilton) (committee chair), and Prof. Conrad Zapanta(http://www.bme.cmu.edu/people/faculty4.html#Zapanta) (Biomedical Engineering Associate Head).
2. A SBME track proposal must be submitted electronically as a Word document to Prof. Conrad Zapanta(http://www.bme.cmu.edu/people/faculty4.html#Zapanta) at least three weeks prior to Pre-Registration during the spring of the sophomore year. The proposal must include:
    - The three courses of the designed 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 must do one of the following:
    - 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

Minor in Biomedical Engineering

Associate Department Head

Professor Conrad M. Zapanta
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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 two or three electives. Students pursuing the minor may contact BME Associate Head (http://www.bme.cmu.edu/people/staff.html#ADH) for advice. Students interested in declaring Biomedical Engineering minor should contact either the Associate Department Head (http://www.bme.cmu.edu/people/staff.html#ADH) of Biomedical Engineering or the Biomedical Engineering Undergraduate Program Coordinator (http://www.bme.cmu.edu/people/staff.html#UPC).

Requirements

Minimum units required for minor:57

03-121	Modern Biology	9
42-101	Introduction to Biomedical Engineering (co-req. or pre-req. 03-121)	12
42-202	Physiology (pre-req. 03-121 or permission of instructor)	9
42-xxx	BME Elective (>= 9 units), Any course offered by the Department of Biomedical Engineering numbered 42-300 or higher and worth at least 9 units	
xx-xxx	Elective I (>= 9 units) [#]	
xx-xxx	Elective II (>= 9 units) [+]	

Some Special Topics, newly offered or intermittently offered 42-xxx may be acceptable as electives.   Students should consult with their advisors and petition the Biomedical Engineering Undergraduate Affairs Committee for permission to include such courses.

Notes

[#]   Elective I cannot be a required course in the student's major. It may be
1. Any required or additional track elective course selected from any of the four Biomedical Engineering tracks. See the online catalog (http://www.bme.cmu.edu/ugprog/catalog.html) for a listing of courses.
2. Any 42-xxx course with a 42-300 or higher number and worth at least 9 units.
3. 42-203 Biomedical Engineering Laboratory (or the cross-listed version 03-206 for students in the Health Professions Program). The course has a limited capacity and priority is given to students who have declared the Additional Major in Biomedical Engineering.
4. 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.

[+]   Elective II must be a Biomedical Engineering Required or additional track elective.

[**]   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.

Full-Time Faculty

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

ANTAKI, JAMES F. , Professor of Biomedical Engineering – Ph.D, University of Pittsburgh, 1991; .

ARMITAGE, BRUCE A. , Professor of Chemistry, Biological Sciences, and Biomedical Engineering – Ph.D., University of Arizona, 1993; .

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

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

CAI, YANG, Senior Systems Scientist, CyLab, 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; .

CHASE, STEVEN M., Assistant 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 , Assistant Professor of Biomedical Engineering and Materials Science & Engineering – Ph.D., Harvard, 2011; .

COOK, KEITH, Associate Professor of Biomedical Engineering – Ph.D., Northwestern University, 2000; .

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

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., Associate Professor of Biomedical Engineering and Materials Science & Engineering – Ph.D., University of Florida, 2004; .

GALEOTTI, JOHN, Adjunct Assistant Professor of Biomedical Engineering – Ph.D, Carnegie Mellon University, 2007; .

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

HO, CHIEN , Professor of Biological Sciences and Biomedical Engineering – Ph.D., Yale University, 1961; .

HOLLINGER, JEFFREY O. , Professor Emeritus of Biomedical Engineering and Biological Sciences – D.D.S. and Ph.D., University of Maryland, 1973 & 1981; .

HSIA, JIMMY, Professor of Biomedical and Mechanical Engineering – Ph.D., Massachusetts Institute of Technology, 1990; .

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

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

KOVACEVIC, JELENA , Professor and Head of Electrical & Computer Engineering, and Professor of Biomedical Engineering – Ph.D., Columbia University, 1991; .

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

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–.

MCHENRY , MICHAEL E. , Professor of Materials Science & Engineering and Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 1988; .

MINDEN, JONATHAN S. , Professor of Biological Sciences and Biomedical Engineering – Ph.D., Albert Einstein College of Medicine, 1985; .

MOURA , JOSE M. F., Professor of Electrical & Computer Engineering and Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 1975; .

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; .

OZDOGANLAR, BURAK , Associate Professor of Mechanical Engineering, Biomedical Engineering and Materials Science & Engineering – Ph.D., University of Michigan, 1999; .

PRZYBYCIEN, TODD M., Professor of Biomedical Engineering and Chemical Engineering – Ph.D., California Institute of Technology, 1989; .

RABIN, YOED, Professor of Mechanical Engineering and Biomedical Engineering – D.Sc., Technion - Israel Institute of Technology, 1994; .

REN, XI, Assistant Professor of Biomedical Engineering – Ph.D., Peking University, 2011; .

RIVIERE, CAMERON N., Associate Research Professor, Robotics Institute and Biomedical Engineering – Ph.D., Johns Hopkins University, 1995; .

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

SCHNEIDER, JAMES W., Professor of Chemical Engineering and Biomedical Engineering – Ph.D., University of Minnesota, 1998; .

SHIMADA, KENJI, Theodore Ahrens Professor in Engineering – Ph.D., Massachusetts Institute of Technology, 1993; .

STETTEN, GEORGE D., Research Professor, Robotics Institute and Biomedical Engineering – MD/Ph.D., State University of New York Syracuse Health Center, 1991, and University of North Carolina, 2000; .

SYDLIK, STEFANIE, Assistant Professor of Chemistry and Biomedical Engineering – Ph.D., Massachusetts Institute of Technology, 2012; .

TAYLOR, REBECCA, Ph.D. – Assistant Professor of Mechanical Engineering and Biomedical Engineering, Stanford University, 2013; .

TILTON, ROBERT D. , Professor of Biomedical Engineering and Chemical Engineering – Ph.D., Stanford University, 1991; .

TRUMBLE, DENNIS, Adjunct Assistant Professor of Biomedical Engineering (on campus) – Ph.D., Carnegie Mellon University, 2010; .

WAGGONER, ALAN S., Professor of Biological Sciences and Biomedical Engineering – Ph.D., University of Oregon, 1969; .

WANG, YU-LI, Mehrabian Professor and Head of Biomedical Engineering – Ph.D., Harvard University, 1980; .

WASHBURN, NEWELL R. , Associate Professor of Biomedical Engineering, Chemistry, and Materials Science & Engineering – Ph.D., University of California, Berkeley, 1998; .

WEISS, LEE E., Research Professor, Robotics Institute, Biomedical Engineering, and Materials Science & Engineering – Ph.D., Carnegie Mellon University, 1984; .

WHITEHEAD, KATHRYN A, Assistant Professor of Chemical and Biomedical Engineering – Ph.D., University of California, Santa Barbara, 2007; .

YANG, GE, Associate Professor, Biomedical Engineering and Lane Center for Computational Biology – Ph.D., University of Minnesota, 2004; .

YU, BYRON, Associate Professor of Biomedical Engineering and Electrical & Computer Engineering – Ph.D., Stanford University, 2007; .

ZAPANTA, CONRAD M., Teaching Professor and Associate Head of Biomedical Engineering – Ph.D., The Pennsylvania State University, 1997; .

ZHANG, YONGJIE JESSICA, Associate Professor of Mechanical Engineering and Biomedical Engineering – Ph.D., University of Texas at Austin, 2005; .