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BME Department at a Glance:

It’s been another eventful year for BME at BU. One of the most important changes occurred in August, when our Chair, Ken Lutchen, was named Dean of the College of Engineering at BU. We will miss Ken, but we are confident that he will provide superb, energetic leadership at the college level. John White, an AIMBE fellow who has had great success administering both our undergraduate and graduate programs through the years, as agreed to step in and serve as Chair ad interim, beginning in Academic Year 2006-7.

This year marks the end of our five year Whitaker Foundation Leadership Award. Through this award, the Department was able to add 12 Faculty and their new labs, 10 staff, a new graduate program core curriculum with thematic courses supporting the general areas of Cell and Subcellular Bioengineering, Physiology and System Dynamics and Protein and Genomic Engineering, and Core Facilities consisting of 2 clean rooms, a Bio-Interface Technology Lab, Micro/Nano Imaging Facility, and a Computational Simulation Facility. The ribbon cutting ceremony for these BME Core Facilities was held June 21, with BU President Bob Brown as the keynote speaker.

The Department received a Coulter Foundation Translational Partnership Award, which provides $2.9M over 5 years with a potential $10M endowment after 5 years. Dr. Arthur Rosenthal, Adjunct Professor of Translational Research in Biomedical Engineering is the Program Director. The first five awards were given to Drs. Irving Bigio, Ed Damiano, Maxim Frank-Kamenetskii, Mark Grinstaff, and Catherine Klapperich.

Dr. Amit Meller joined the BME faculty this year. He comes to BU from the Harvard University, Rowland Institute. Dr. Meller adds to the Department’s already strong research group in Cell and Subcellular Biomechanics. Research Professor Tom Szabo joined the BME Department from the Aeromechanical Engineering Department at BU. He specializes in medical imaging primarily ultrasound. We also added four faculty with secondary appointments in Biomedical Engineering: Professor Shayamsunder Erramilli (primary in Physics) who uses high resolution infrared microscopy to study biological systems; Professor James Hamilton from the Department of Physiology and Biophysics at the BU School of Medicine, who studies biological systems with physical-chemical and physiological/biochemical approaches; and Professor Matthew Nugent from the Departments of Biochemistry and Ophthalmology at the BU School of Medicine, who studies tissue engineering and drug delivery. Dr. Matt Wachowiak from Biology studies olfaction using optical recordings.

We offered for the first time our new Graduate level, two course sequence in Biomaterials and Tissue Engineering, which is being taught by, Mark Grinstaff, Catherine Klapperich, and Joyce Wong.

Biomedical Engineering at Boston University is a model of interdisciplinary research and education. We are the largest Biomedical Engineering department in the country from a faculty size point of view. Our 32 primary faculty attracted over $20 million in extramural funds available for expenditure per year (over $11 million from NIH alone). This translates to over $650,000 per faculty in new funds per year. Our faculty published 132 articles in peer-reviewed journals and gave 220 invited talks around the world. Our graduate and undergraduate programs are ranked 7th and 8th, respectively in US News and World Report.

Our B.S. program is now 40 years old. Nearly all the basic engineering sciences (e.g. fluids,
signals, systems, solids, etc.) in the B.S. program are taught by bioengineering faculty to biomedical engineering students. The students learn all the fundamental principles in the context of life science applications. While we do not require a tracking choice at the undergraduate level, we do require students to acquire life-long learning and success skills via rigorous depth in engineering in the context of life and clinical sciences, in communication skills, and in independent design and research. We allow the students to determine, through electives, the degree to which they want to specialize before attacking the next level of their careers. Our curriculum ensures substance, depth, and fundamentals in bioelectric, biosystems, biomolecular, and biomechanical engineering. The 2003 ABET review cited multiple strengths of our program, particularly noting the unique, rigorous and empowering Senior Project course and its ability to blend rigorous design and research training. The majority of our senior class had found placements in wide spectrum of biomedical industries or graduate school. In the Fall we expect 28 new graduate students (24 PhD students) with the great majority being US citizens. Our PhD applicant pool numbered continues to grow: in 2006 we had 463 applications. The quality of the matriculants remains very high (mean GPA = 3.7 and GRE, Q+V = 1395).

Our faculty are comprised of world renown scientists at every scale of biology and in a wide spectrum of bioengineering subspecialties. Their research is driven by advancing fundamental understanding of biology and physiology in health and disease and then translating these principles to new technologies that impact the human condition and medicine. There are seven interdisciplinary research centers directed by BME faculty: Center for Advanced Biotechnology (CAB), Center for Advanced Genomic Technology (CAGT), Center for BioDynamics (CBD), Biomolecular Engineering Research Center (BMER), Center for Nanoscience and Nanobiotechnology (CNN), Hearing Research Center (HRC), and NeuroMuscular Research Center (NMRC). The department also includes the following laboratories: Biomedical Optics; Biomicroscopy; Cell and Tissue Mechanics; Pulmonary Bioengineering; Cell and Subcellular Biomechanics; Neuronal Dynamics, Brain and Vision; Visual Information Processing, Fields and Tissues; Applied BioDynamics; Micro/Nano Biosystems; Molecular Biotechnology; and Vascular Interface and Microhemofluidics.

**NIH Ph.D. Training Grant:** This interdisciplinary program attends to the growing understanding that scientists must be interdisciplinary and focuses on training students to use quantitative techniques to investigate biological systems from subcellular processes to large, complex physiological systems. We successfully competed for a five year renewal of this grant, scoring the highest of all the NIGMS-supported training grants reviewed that year. There were 13 students in the program this year and five more will join this Fall. In the Fall the students organized our second Annual Symposium in Quantitative Biology and Physiology at which the students and invited speakers gave presentations highlighting their quantitative biology and physiology-based research.

**Whitaker Industrial Internship Program & Career Planning:** This program continues to have extraordinary success. We were able to place 24 students in BME positions throughout the country. Our seniors receive guidance and mentoring in preparing their resume, interview techniques, and in networking to potential employers.

**Faculty Recruiting:** Dr. Amit Meller, who was recruited last year, officially started July 1. Dr. Meller comes to BU from the Harvard University, Rowland Institute where he was a Senior Fellow. His research involves the development and application of novel methods to study the structure, function, dynamics, and interactions of biomolecules at the individual molecule or individual complex level. He will be an excellent addition to our Cell and Subcellular Bioengineering group.

**BME Retreat.** In June 2006, the BME Faculty, Post Docs, and Qualified Graduate Students participated in a 2 day Scientific Retreat at the Sheraton Harbor Side Hotel in Portsmouth, New Hampshire to share research presentations, discuss future department initiatives, and discuss and receive input from graduate students on the BME graduate program. The event included talks by graduate students from most BME labs, a poster session, and was capped off by a Banquet with David Kaplan, the BME Chair at Tufts University, as the dinner speaker.

**Faculty Research Accomplishments:** The Cell and Subcellular Bioengineering group had a very successful year. Professor Micah Dembo continued an NIH grant to study quantitative models of cell shape and motion. Dr. Marc Herant continued his grant from the Whitaker
Foundation on the mechanics of ameboid cells. Professor Joyce Wong continued her NIH R01 grant on bioengineered substrata to probe cellular behavior, and a subcontract from the University of Pennsylvania to study breast cancer pathogenesis and treatment from a physico-computational perspective. These studies relate to her NASA-funded research on novel microstructure for vascular tissue engineering. Joyce’s Post Doc Jennie Leach received a Fellowship from the American Heart Association. Dr. Joe Tien received a new NIH R01 award to study the synthesis and characterization of patterned microvascular networks continuing from his 2 NIH grants to study self-assembly of mesostructured biomaterials and in vitro synthesis of a microvascular networks. Dr. Ed Damiano was funded by an award from NIH on microviscometric studies of the ESL in microvessels, a CAREER award from NSF to study mechano-electrochemical behavior of the capillary glycocalyx, and received one of the first Coulter Translational Partnership Awards to engineer a robust fully automated closed loop control unit for glucose regulation in type 1 diabetes. His Post Doc Firas El-Khatib received a fellowship from the Juvenile Diabetes Research Foundation International for the design of a closed-loop controller for blood glucose in type 1 diabetes.

In the area of Systems Biology and BioDynamics Dr. Jim Collins was supported by grants from NIH, NSF, HRCA, DOE, and industry. He is advancing design and application of synthetic genetic regulatory networks and using a systems identification approach for distilling out natural gene regulation networks. He also continues developing new technologies for motor and posture control, particularly in the elderly. Both areas have received visibility from the lay press to the most prestigious scientific journals. Dr. Tim Gardner received an NIH R01 to study predicting drug mechanism via chemo-genomic profiling. He is also co-PI with Dr. Collins on a DOE grant to study rapid reverse engineering of genetic networks. Dr. Martin Steffen, with a primary appointment at the BU School of Medicine and secondary in BME, is developing tools for systems biology of mammalian cells, mass spectrometry techniques, for identifying post-translational modifications, and characterizing proteomic differences.

We have world leaders in biomedical optics. Dr. Irving Bigio continued with his major multi-institutional grant through NIH to advance the sharing of scientific and clinical information to accelerate the translation of basic cancer research to clinical practice in the field of optical imaging. He also has funding from NIH to use optical measurement to study fast drug kinetics. He also was another first time recipient of a Coulter Translational Partnership Grant for optically guided diagnosis and treatment for colonic cancer. Dr. Jerome Mertz’s research synthesizes biomedical optics with neuroscience. He received an NIH grant on deep ultraviolet nonlinear microscopy in thick tissue.

In the pulmonary engineering group, Dr. Ken Lutchen continued an NIH R01 to combine Hyperpolarized MRI imaging with oscillatory mechanics to study airway hyperreactivity and heterogeneity in asthma. He also continued two NIH subcontracts, one with Mass. General Hospital and the other with the Brigham and Women’s Hospital to advance multi-scale computational models of the lung. Professor Bela Suki was supported by two NIH grants to examine the role of mechanical forces in the progression of emphysema and to determine how specific ventilation patterns improve lung physiology and biology. Dr. Suki also has an NSF grant to study lung structure and function in mice via acoustic morphotome. Via NIH and a subcontract with Harvard University, Professor Dimitrije Stamenovic advances new paradigms to determine how cell prestress establishes the mechanical stability of cells.

In the area of neuroengineering, Dr. John White was supported by an NIH R01 grant and 2 subcontracts from the University of Wisconsin and Cornell to study neuronal dynamics, how natural biological noise impacts neuronal systems and bridging single cell and population dynamics. He also received a conference grant to bring scientist to a Workshop at BU to discuss real time methods in electrophysiology. Dr. Carlo Deluca continued his NASA funded research on how gravity impacts neuromuscular control and has an NIH grant on harnessing motoneuron activity. Dr. Chris Passaglia received an NSF CAREER award on deciphering the neural basis of visual behavior and has a Smith Family Foundation award to study the retinal coding of visual information in glaucomatous eyes. Dr. Joe Tsien, whose primary appointment is at the BU School of Medicine with a Secondary appointment in BME, is creating an interdisciplinary, cross campus research Center for Neurobiology to study the neural mechanisms underlying memory.

In Biomolecular and Genomic Engineering, Professor Zhiping Weng continued her NSF CAREER award to predict protein docking and has 2 NIH award to study alternative
promoter usage in tissue-specific gene expression and identify cis-elements responsible for striatum specific gene expression. Dr. Sandor Vajda was funded by multiple NIH awards to study protein docking problems. Dr. Charles Delisi continued an NIH grant to develop computational methods for cell systems analysis. Dr. Temple Smith was funded from NSF Grants to probe the “Eukaryotic Core”, to study cellular signaling and to examine the activation of inflammation and stress response pathways. Dr. Simon Kasif continued his NIH grant on a comparative cross-species genomic analysis system and has a new NIH award for gene annotation using evidence integration and propagation in functional linkage graphs. He also served as PI on a Sponsored Research Agreement with Sequenom Corporation in CAB. Within the Center for Advanced Biotechnology, Dr. Maxim Frank-Kamenetskii was funded by NIH to develop new oligonucleotide probes with duplex DNA, and fluorescence in situ detection of short DNA sequences. He also received a Coulter Foundation award to study specific detection of microbes in patient specimens. Dr. Charles Cantor continued active funding efforts via collaboration with CAB, the Hamilton-Thorne Corporation and Sequenom Inc. Dr Natalia Broude was Co-PI with Dr. Cantor on the funding from Hamilton-Thorne.

In the Hearing Research Center Dr. Steve Colburn continued his grants from NIH to study bilateral cochlear implants in a subcontract through the Mass, Ear and Eye Institute and binaural hearing. Dr. David Mountain had substantial funding from NIH and DoD/Navy. One of his NIH projects examines gene expression in the hair cell. Another is devoted to advancing “Ear Lab,” a virtual hearing laboratory. A third examines active filtering in the cochlea. His DoD work focuses on new software and hardware for event-based auditory processing and for modeling audition in the whale. Dr. Kamal Sen, received an NIH R01 award to study auditory cortical processing of communication sounds, and another award to study cortical processing of complex sounds and plasticity in awake songbirds from the National Organization for Hearing Research Foundation. Research Professor Tom Szabo continued his grant on real-time troop physiological status monitoring using a common wireless Network from DOD via a subcontract from Worcester Polytechnic Institute.

Professor Cassandra Smith continued a grant from BioKit Corporation to study isothermal DNA ligation and amplification diagnostics. Finally, Drs. Sol Eisenberg and Herb Voigt were funded for another 5 years from the NSF to continue their efforts on our NSF-REU site grant, providing enriching research and professional experiences during the summer for 20 undergraduates. Dr. Voigt also continued with a grant from the Whitaker Foundation for Industrial Internships in BME.

**Student Activities and Successes:** Our student societies were wonderfully active, sponsoring our 10th Annual Biomedical Engineering Day with a speaker, interview workshops, a banquet and BME Undergraduate Research Poster symposium. A large number of our underclassmen worked as research assistants in the faculty laboratories. This year also marked the second year of an industry sponsored Industrial Research Fellowship Program. The program provides support for the summer research of BME Juniors, who do 10 weeks of research over the summer in faculty labs to hopefully transition into a Senior Project. The BME Industrial Advisory Board was instrumental in getting funding from Boston Scientific, Corning, Genzyme, Guidant, Phillips Medical, and 3M to sponsor these fellowships. One of the most enjoyable and exciting moments of the past year was the 21st Annual Senior Project Conference held in May. Nearly 70 outside companies and well over 100 guests attended throughout the day, including many family members of these superb students.

**Our Vision and Goals**

Fundamental information at every level of biology and physiology is becoming available at mind-boggling rates. Such information ranges from protein structure and function, to gene, protein, and cell regulation, to micro and macro driven imaging insights on structure and material properties, to cell thru organ system dynamics. In parallel is the revolution in biomedical computation allowing synthesis of all this information into comprehensive, structurally and mechanistically consistent models. The predictive power of these models will be enormous and they will help prioritize new sensors, technologies and experiments. We are at the dawn of a new era in advancing our understanding of how emergent behavior derives from the integration of its individual biological components in the context of structure. Indeed a great challenge to BME is to identify how to responsibly manage generation and manipulation of the vast amounts of biological information that we can now acquire. One of the
challenges faced in all BME programs in the nation is to bridge the gap between basic scientific discovery and new technologies that will improve the human condition.

At BU the quality of our new students is as good as any in the nation. Our curriculum is substantive and forward looking. Our next challenges include creatively teaching molecular and cell biology to bioengineers, both didactically and in the lab. We will design new ways to infuse computation and design deeper into the curriculum. Finally, we must leverage our core strengths to a new set of large scale initiatives that will cut across traditionally academic and scientific boundaries.

Our success is a result of a dedicated faculty and staff that recognize teamwork as the essence of departmental success and department success as the essence of individual success. It seems as if every outside visitor (be they a prospective student, faculty, or visiting scientist) reacts similarly. They are astonished that we are not 32 faculty in 32 distinct laboratories. Rather, we are an integrated department not only within BME but with biology, chemistry, physics, math, computer science, and the life sciences at the medical school. Boston University has embraced this interdisciplinary excitement. Collaboration is in our soul.
OFFICIAL OPENING OF BME CORE FACILITIES

An official ribbon cutting ceremony was held on June 21 to officially mark the opening of the laboratory facilities constructed during the BME Department’s five year Whitaker Foundation Leadership and Development Award. BU President Bob Brown spoke at the ceremony saying that it “…marks a pivotal point in the history of BU and biomedical engineering at BU,” adding that the Whitaker Foundation grant has been instrumental in establishing Boston University and its biomedical engineering program as one of the best, nationally and globally. The labs include facilities and equipment that will enhance the Graduate and Undergraduate Education BME Student receive as well as contribute to the already exceptional research programs BioInterface Technologies labs, a Micro/Nano BioImaging Facility, Micro/Nano Biosystems Fabrication and Teaching Facility (all at 44 Cummington St.) and the BME Computational Simulation Facility (in the Life Science and Engineering Building).

BioInterface Technologies Labs

Wet Chemistry Unit (Room 509C and 509E):
- Applied Biosystems 7300 Real Time PCR System
- Molecular Devices SpectraMax M5 Plate Reader
- Nicolet 4700 Fourier Transform IR Spectroscopy
- Brookhaven 90plus Nano-particle Sizer
- PDS 2010 Parylene Deposition System
- Virtis BT4KZL Freeze Dryer

Mechanical Testing Unit (Room 511):
- Instron 5848 Micro-tester
- TA Instruments AR2000 Rheometer

Tissue Culture Unit (Room 507):
- Two 4’ SterilGard III Advance Bio-Safety Cabinets
- Four Sanyo MCO-17AC CO2 incubators
- Nikon TS100-F Inverted Microscope
- Sorvall Legend RT Benchtop Centrifuge
- Coulter Z2 Analyzer
- Microm HM525 Cryomicrotome

Surface Science Unit (Room 501C):
- Kruss DSA100 Contact angle goniometer
- Q sense E4 Quartz Crystal Microbalance
- TA Instruments Q10 Differential Scanning Calorimeter
- BIACORE
**Micro/Nano Imaging Facility**

- FV1000 laser point scanning confocal microscope.
- IX81-ZDC with TIRF excitation system
- IX81 microscope with wide field fluorescence ratio-imaging and FRET.
- IX-81 microscope, with a second excitation source for wide field photo-bleach or photo-activation
- IX-71 microscope, with LCD based RGB emission filter.
- MFP-3D Inverted Optical microscope, for simultaneous AFM and optical imaging.

Each system has dedicated CCD camera, with the TIRF system using an electron multiplying camera for extreme low light imaging, live cell incubation on the microscope stage, and options for perfusion and flow studies. Each system has an associated computer workstation that drives the instrumentation and provides standard and programmable image processing options.

![Atomic Force Microscope](image1.png)

![Fluorescent Microscope](image2.png)

**Class 1000 Clean Room**

- E-beam evaporator (Sharon Vacuum)
- Programmable Spin coater Module with 2 programmable Baking Plate Units (Karl Suss Delta 80 T2 / 200)
- Mask Aligner adjusted for 4” and 3” wafer
- Photolithography (Karl Suss MA6/BA6)
- Plasma Processing System (PVA TePla Model M4L RF 600W)
- Wet Processing Laminar Hood
- Planned additions: Reactive Ion Etching (RIE) system, Plasma Enhanced Chemical Vapor Deposition (PECVD) system, Sputtering system.

**Class 100 Clean Room**

- Mask Aligner for up to 3” wafers (Karl Suss MJB3)
- Programmable Spin coater in a dedicated Fume Hood.
- Chemical Fume Hood for wafer cleaning, etching and photoresist developing.
- Microscope with video system
- Profilometer (Dektak by Veeco)
- 100W SPI Plasma Asher (O₃)
- Elipsometer

![E-Beam Evaporator in Class 100 Clean Room](image3.png)

**BME Computational Simulation Facility**

- 56 units single or dual-CPU AMD Opteron Linux workstations or comparable Unix workstations (one at each classroom seat)
- 72 units single or dual-CPU AMD64 or Opteron Linux cluster nodes or comparable Unix cluster (in machine room racks)
- Two units 8-CPU (expandable to 16 with dual core) AMD Opteron Linux "supercomputer"
- Two units 3000VA UPS power backup

![Computational Classroom](image4.png)

**Common Standard Equipment:**

-80 freezer, Incubator shaker, Freeze dryer, Ice maker, 100 sq. foot cold room equipped with sink, Autoclave, Dishwasher, BioRad VersaDoc4000 system.
Coulter Foundation Translational Research Partnership

The department a $2.9M Translational Research Partnership Award from the Wallace H. Coulter Foundation. The grant is designed to facilitate joint efforts between biomedical engineers, the Coulter Foundation, and medical researchers that are aimed at moving promising technologies to clinical application. Across the nation, 63 institutions applied for the grant. We are one of only nine chosen to receive the award. The award enables us to form a working partnership with the Coulter Foundation to promote, develop, and support translational research by funding promising research projects, increasing and supporting effective collaborations between biomedical engineers and clinicians and increasing awareness of the importance of moving promising technologies to clinical application. The goal of the partnership is to focus on outcomes that improve patient care. The oversight committee making the awards to the individual projects includes people from the Charles River and Medical Campuses, experts in technology, business development, and industry.

Five faculty have been awarded approximately $100K each for their projects: “Creating a wearable glucose regulation system for type-one diabetes”, Dr. Ed Damiano and his clinical collaborator Dr. Toby Milgrome, a pediatrician at Worcester’s Fallon Clinic.

“Using light to detect cancer”, Dr. Irving Bigio and his clinical collaborator Dr. Satish Singh, a School of Medicine assistant professor of medicine and a gastroenterologist with the VA Boston Healthcare System, are working to use a fiber-optic probe integrated with forceps and snare devices to guide the diagnosis and treatment of cancer.

“A microfluidic laboratory analyzes pathogen DNA”, Dr. Catherine Klapperich and her clinical partner Dr. Satish Singh, a School of Medicine assistant professor of medicine and a gastroenterologist with the VA Boston Healthcare System. The goal of the project is to create a portable, disposable device that can be taken to remote parts of the world, far from advanced labs and hospitals, to test for any number of diseases.

“Engineering molecules to treat osteoarthritis”, Dr. Mark Grinstaff and Dr. Ilya Voloshin, a BU School of Medicine assistant professor of medicine and a surgeon with Boston Orthopedic Surgical Associates, are developing polysaccharide surrogates, which can be injected into joints and act as a cushion to further wear and tear.

“Mimicking DNA to identify bacteria”, a project directed by Dr. Maxim Frank-Kamenetskii and Dr. Charles Lee, an associate cytogeneticist at Brigham and Women’s Hospital and an associate professor of pathology at Harvard Medical School. The technology could give doctors and scientists an extremely specific and rapid means of detecting a wide array of bacterial diseases by synthesizing a “PNA opener” molecule that will bind only with specific microbial DNA signatures.

BME RETREAT

On June 12th and 13th 2006, BME Faculty, Post-docs and post-qualified graduate students enjoyed a scientific retreat at a the Sheraton Seaport Hotel in Portsmouth, NH. Two days of scientific talks in 4 sessions were held that represented the breadth and depth of Biomedical Engineering research in the Department. The session titles were Biomolecular Engineering and Systems Biology, Biomechanics, Biomaterials and Tissue Engineering, Biosensors, Biomedical Optics, and Diagnostics, and Sensory Systems and Neuroengineering. Each graduate student and post-
doc presented a poster of their research that remained on display for the entire 2 day retreat and were formally viewed during 2 evening sessions with cocktails and hors d'oeuvres. There were also 2 administrative sessions; in one the faculty divided into 4 separate groups to discuss the “Challenges in the BME Undergrad Program”, “strengths and weaknesses of the BME graduate program”, “dealing with the future funding crisis”, and “relation of BME to future thrust areas of the College and University”. In the other session the graduate students and selected faculty held a panel discussion on careers in academia and industry and also in a separate closed session the graduate students discussed issues that they felt could improve the BME graduate program. The culmination of the retreat was a banquet on the second day with guest speaker, David Kaplan the Chair of the BME Department at Tufts University. After most of the Department left on the morning of June 14 the graduate students who participate in the BME Program in Quantitative Biology funded by NIH and the faculty steering committee met to discuss the training grant.
## BOSTON UNIVERSITY

### BME 2006 Retreat Schedule

**June 12, 2006**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>9:00 am</td>
<td>Welcome Remarks</td>
<td>Great Hall</td>
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<tr>
<td>9:00 am</td>
<td>Scientific Session 1: Macromolecular Engineering &amp; Systems Biology</td>
<td>Great Hall</td>
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<tr>
<td>9:45 am</td>
<td>Indiana Mapping of Nuclear Transcriptional Regulation: The Finger Small talk</td>
<td>Great Hall</td>
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<tr>
<td>10:00 am</td>
<td>DNA Damage-induced DNA Damage - Michael Feeder</td>
<td>Great Hall</td>
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<tr>
<td>10:45 am</td>
<td>Application of Computational School Mapping in the Identification of Drugable Hot Spots on Protein</td>
<td>Great Hall</td>
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<tr>
<td>11:30 am</td>
<td>Family Advisory Services: Sandra Zafiriou</td>
<td>Great Hall</td>
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<tr>
<td>12:00 pm</td>
<td>Towards Systems Biology of Diabetes: Identification of Molecular metrics Associated with Insulin Resistance</td>
<td>Great Hall</td>
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<tr>
<td>12:30 pm</td>
<td>Family Advisory Services: Sandra Zafiriou</td>
<td>Great Hall</td>
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<tr>
<td>1:00 pm</td>
<td>Performance Indicators - Cassandra Smith</td>
<td>Great Hall</td>
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<tr>
<td>1:00 pm</td>
<td>proteomics &amp; Genetics of COPD: Mechanisms of Chronic Inflammation - Maria Jafar</td>
<td>Great Hall</td>
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<tr>
<td>1:30 pm</td>
<td>OPEN TIME (Hotel Check-in 5 pm)</td>
<td>Great Hall</td>
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<tr>
<td>2:00 pm</td>
<td>Posters Sessions (Nico &amp; Classroom)</td>
<td>Great Hall</td>
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**June 13, 2006**

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<tbody>
<tr>
<td>10:00 am</td>
<td>Scientific Session 3: Biomarkers, Hematopoietic &amp; Immunology</td>
<td>Great Hall</td>
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<tr>
<td>10:45 am</td>
<td>Biomarkers with Hematopoietic &amp; Immunology: Oxytocin in Carcinogenesis</td>
<td>Great Hall</td>
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<td>11:30 am</td>
<td>Biomarkers with Hematopoietic &amp; Immunology: Oxytocin in Carcinogenesis</td>
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<td>12:00 pm</td>
<td>Biomarkers with Hematopoietic &amp; Immunology: Oxytocin in Carcinogenesis</td>
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<td>Posters Sessions (Nico &amp; Classroom)</td>
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**June 11, 2006**

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<th>Time</th>
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<tr>
<td>9:00 am</td>
<td>Continental Breakfast</td>
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**June 12, 2006**

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NEW FACULTY

As of July 1, 2006, the Biomedical Engineering Department faculty number 32 primary members with the addition of Associate Professor Amit Meller and the loss of Associate Professor Tejal Desai in August 2005. Dr. Desai will maintain her relationship with the Department in research and mentoring graduate students with an Adjunct appointment. Three Secondary Appointments were approved this year for Dr. James Hamilton, Professor Biomedical Engineering and Professor of Physiology and Biophysics at the BU School of Medicine, and Research Professor of Medicine, Dr. Matthew Nugent, Professor of Biomedical Engineering and Professor of Biochemistry, Departments of Biochemistry and Ophthalmology BUSM, and Dr. Shayamsunder Erramilli Professor Biomedical Engineering and Physics. The department also added Thomas Szabo, Research Professor in Biomedical Engineering who moved from the Aerospace and Mechanical Engineering Department in October, 2005.

STAFF

This year the BME Department recruited and hired our final staff position funded by the Whitaker Leadership award, Dr. Damir Khismatullin, the Associate Director for the Computational Simulation Facility. We also replaced several positions that were vacated by normal turnover; Jennifer Wilson was hired as the Administrative Manager for the Center for Advanced Biotechnology, Joe Canavan was hired as the Lab Manager for the BME Undergraduate Teaching Laboratory, Susan Harlow was hired as the Undergraduate Program Coordinator, and David Brown was hired as the BME Internship and Placement Coordinator.
RESEARCH

During the period 7/1/05 – 6/30/06 the BME Faculty had 91 new and continuing funding awards for a total of $20,588,810 or $654,155 per faculty member. The faculty published 132 articles in peer reviewed journals or Book Chapters and made over 220 Invited lectures. The Department sponsored 7 Seminar Series consisting of the high profile Distinguished Scientist in BME Seminar Series, the 13th annual F. A. Bourke Distinguished Lecture in Biotechnology, the Center for BioDynamics Seminar Series, the Hearing Research Center Seminar Series, the NeuroMuscular Research Center Seminar Series, the Center for Advanced Genomic Technologies Seminar Series, and the Brain and Vision Seminar Series.

GRADUATE PROGRAM

Maintaining the size while and maintaining/improving the quality is one of the goals for the BME Graduate program. We continue to meet this goal in 05-06 with an incoming class in the fall of 2006 of 28 students (24 PhD and 4 MS). Their average GRE (Q+V) is 1395 and average GPA is 3.7. Including the incoming class, the graduate program size is currently 146 students (25 MS, 115 PhD and 6 MD/PhD); this represents an increase of 20% from last year.

Seventeen students completed their PhD (83 total since 1991) and 7 students completed their MS. We received 463 applications (6% increase), of which 97 were accepted (4% increase). All of the 24 entering PhD students are fully funded by a combination of the BME Distinguished Fellowships, NIH training grant, Pharmacology Fellowship, Photonics Fellowship and RAs from faculty research grants. 20 of 24 new PhD matriculants are from domestic universities. New students come to us from several strong programs, including Ben Gurion University, Bowdoin College, Indian Institute of Technology, Kalamazoo College, Lehigh University, M.I.T., Nanjing University, Northwestern University, Penn State University, Rensselaer Polytechnic Institute, Stanford University, State University of New York, Union College, University of Hong Kong, University of Michigan, University of Florida, University of Pennsylvania, University of Washington (2), Vanderbilt University, and our own Boston University (4).
UNDERGRADUATE PROGRAM

The Biomedical Engineering undergraduate program continues to be one of the largest and best programs in the country. Our total class enrollment this year is 346, making up 30% of the College's total enrollment. Our Sept. 2005 entering class of 107 was 35% of the College of Engineering's freshman class. The ratio of females in BME is 34%. This year we awarded 67 Bachelor of Science degrees, 25% of the BS degrees awarded by the College of Engineering. The BME Day banquet on the evening of February 24th kicked off the start of the 10th Annual BME Day activities. Dr. George M. Whitesides, professor of Bioorganic/Physical Organic Chemistry and Materials Science at Harvard University, was the featured speaker. A major strong point of our curriculum continues to be the Senior Project Program. This year 54 companies came to BU on April 28, 2006 to listen to the 64 BME Seniors present the results of their year long research/design projects. Also, for the third year we have sponsored a BME Industry night, bringing Companies and students together in a networking environment. This introduces companies to our students and exposes BME students to various career options in industry. This also marked the 2nd year of the BME Industrial Fellowship Program. Six companies, Boston Scientific, Corning, Genzyme, Guidant, Phillips Medical, and 3M have donated funding to support six BME students over the summer to participate in faculty research programs that will hopefully carry over into the academic year as Senior Projects.
FACULTY

The Biomedical Engineering Department added one new primary faculty member and lost one this year to keep our number steady at 32. There are also 16 BU faculty with joint or secondary appointments in BME, 14 Adjunct Faculty, 4 Professorial-Level Research Faculty, 9 Senior Research Associates, 30 Research Associates, 14 Research Assistants, and 20 Visiting Faculty.

PRIMARY FACULTY

CHAIRMAN

KENNETH R. LUTCHEN
Professor, Biomedical Engineering
B.S., Engineering Science, University of Virginia,
M.S., Ph.D., Biomedical Engineering, Case Western Reserve University

Airway and lung tissue mechanics and ventilation; Computational modeling of structure-function relations in the lung; Mechanical ventilation; Integrated biomechanics of the lung; linear and nonlinear systems identification.

ASSOCIATE CHAIR, GRADUATE PROGRAM

IRVING J. BIGIO
Professor, Biomedical Engineering, Electrical and Computer Engineering; & Physics
Ph.D., Physics, University of Michigan

Medical applications of optics, lasers and spectroscopy; biomedical optics and biophotonics; biomolecular dynamics; applied spectroscopy, especially to biomedical problems; nonlinear optics, quantum electronics and laser physics.

ASSOCIATE CHAIR, UNDERGRADUATE PROGRAM

JOHN A. WHITE
Associate Professor, Biomedical Engineering
B.S., Biomedical Engineering, Louisiana Tech University, Ph.D., Biomedical Engineering, Johns Hopkins University

Nonlinear membrane conductances in neurons; modulation of ion channels; dynamics of neuronal networks.
CHARLES R. CANTOR
Professor, Biomedical Engineering & Pharmacology
AB, Chemistry, Columbia Univ, PhD Biophysical Chemistry, Univ of California, Berkeley
LOA, CSO Sequenom Inc
Human genome analysis; molecular genetics; new biophysical tools and methodologies; genetic engineering

CHARLES DELISI
Metcalf Professor of Science and Engineering; Dean Emeritus, College of Engineering
B.A., Physics, City College of New York, Ph.D., Physics, New York University
Developing and applying computational/mathematical methods, and high throughput experimental methods for inferring the structure and function of protein networks

H. STEVEN COLBURN
Professor, Biomedical Engineering, Director, Hearing Research Center
S.B., S.M., Ph.D., Electrical Engineering, Massachusetts Institute of Technology
Measurement and modeling of binaural hearing performance. Modeling the activity of auditory brainstem neurons and measurement and modeling of spatial attributes of sound perception.

CARLO J. DE LUCA
Professor, Biomedical Engineering & Neurology; Director, NMRC
B.A.Sc., University of British Columbia (Canada), M.Sc., University of New Brunswick (Canada), Ph.D., Queens University (Canada)
Motor control of normal and abnormal muscles; objective evaluation of muscle fatigue, objective assessment of functional activities in humans; biosignals

JAMES J. COLLINS
Professor, Biomedical Engineering; University Professor, Co-Director, Center for BioDynamics
A.B., Physics, College of the Holy Cross; Ph.D., Medical Engineering, University of Oxford
Nonlinear dynamics in biology and physiology; synthetic gene networks; sensory prosthetics; human balance control.

MICAH DEMBO
Professor, Biomedical Engineering
B.S., Mathematics, Allegheny College, Ph.D., Biomathematics, Cornell University
Statistical mechanics in biological systems; cell information processing and signal transduction; thermodynamics and mechanics of cell adhesion; biophysics of cell deformation, active motility.

EDWARD DAMIANO
Associate Professor, Biomedical Engineering
Ph.D., Applied Mechanics, RPI; M.S., Mechanical Engineering, Washington University; B.S., Biomedical Engineering, RPI
Integrated cellular and extracellular biomechanics; biofluid dynamics; microhemofluidics; microcirculation; vestibular biomechanics; non-Newtonian rheology; closed-loop blood-glucose

SOLOMON EISENBERG
Professor, Biomedical Engineering; Professor, Electrical and Computer Engineering
S.B., S.M., Sc.D., Electrical Engineering, MIT
Electrically mediated phenomena in tissues and biopolymers; cartilage biomechanics; computational modeling of electric field distributions in the human thorax and heart during defibrillation; transcranial magnetic stimulation
<table>
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<tr>
<th>Name</th>
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<tr>
<td>EVAN EVANS</td>
<td>Professor, Biomedical Engineering</td>
<td>B.S., M.S., Engineering</td>
<td>Nano-microscale biomechanics; ultrasensitive force probes and extreme resolution optical techniques; material properties of cellular structure; role of structural forces in cell biochemistry</td>
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<td>JEROME MERTZ</td>
<td>Professor, Biomedical Engineering &amp; Physics, Rensselaer Polytechnic Institute, Ph.D., Engineering Science, University of CA at San Diego</td>
<td></td>
<td>Respiratory physiology; respiratory mechanics, role of airway closure in asthma</td>
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<tr>
<td>MAXIM D. FRANK-KAMENETSKII</td>
<td>Professor, Biomedical Engineering, M.Sc., Ph.D., Biophysics, Moscow Physical-Technical Institute, Sc.D. (IVth degree), Physical and Mathematical Sciences, Institute of Chemical</td>
<td>DNA structures; DNA topology; DNA functioning, PNA (peptide nucleic acid)</td>
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<tr>
<td>AMIT MELLER</td>
<td>Associate Professor, Biomedical Engineering; Ph.D., Physics, Weizmann Institute of Science, Rehovot Israel, Msc, Physics</td>
<td>Nanopore force spectroscopy of RNA folding kinetics, DNA switches and transcription initiation kinetics, RNA helicases activity, mapping transcription factors interaction with DNA, ultra fast DNA sequencing, novel optical methods for single molecule detection</td>
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<tr>
<td>EVAN EVANS</td>
<td>Professor, Biomedical Engineering</td>
<td>B.S., M.S., Mechanical Engineering, University of Nevada, Ph.D., Biophysics and Physiology, University of Mississippi Medical School</td>
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<td>TIM GARDNER</td>
<td>Assistant Professor, Biomedical Engineering, Ph.D., Biomedical Engineering, Boston University; B.S.; Mechanical Engineering, Princeton University</td>
<td>Gene circuit mapping, modeling and engineering; bacterial stress response and virulence regulatory circuits; metabolic network mapping and modeling; microbial energy production; microarray expression analysis; statistical methods for identification of drug mechanism of action</td>
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<td>Professor, Biomedical Engineering</td>
<td>B.S., M.S., Biophysics, University of Illinois at Urbana-Champaign; A.B., Chemistry Honors, Occidental College</td>
<td>Development and application of new optical microscopy techniques to biological imaging</td>
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<tr>
<td>SIMON KASIF</td>
<td>Professor, Biomedical Engineering</td>
<td>B.S., Mathematics, Tel Aviv University; M.S. &amp; PhD, Computer Science, University of Maryland</td>
<td>Bioinformatics, Computational Genomics, Algorithm Design, Artificial Intelligence, High Performance Systems</td>
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<td>MARK GRINSTAFF</td>
<td>Associate Professor, Biomedical Engineering &amp; Chemistry, University of Illinois at Urbana-Champaign; A.B., Chemistry Honors, Occidental College</td>
<td>Biomaterials, tissue engineering, drug delivery, macromolecular chemistry and engineering, self-assembly, nanodevices</td>
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<td>JEROME MERTZ</td>
<td>Professor, Biomedical Engineering &amp; Physics, Université Paris VI &amp; University of California, Santa Barbara, B.A., Physics Princeton University</td>
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<tr>
<td>DAVID C. MOUNTAIN</td>
<td>Professor, Biomedical Engineering</td>
<td>Auditory information processing; sensory biophysics; computer simulation; biomedical electronics; biomedical signal processing; environmental engineering</td>
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<tr>
<td>KAMAL SEN</td>
<td>Assistant Professor, Biomedical Engineering</td>
<td>Electrophysiological recording of neural responses in auditory processing, theoretical methods to characterize neuronal encoding, computational models of natural sound processing</td>
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<tr>
<td>TEMPLE F. SMITH</td>
<td>Professor, Biomedical Engineering</td>
<td>The syntactic and semantic structure of the genetic information in biomolecular sequences, structures, and their evolution</td>
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<td>CASSANDRA L. SMITH</td>
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<td>Molecular Biotechnology and Genomics</td>
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<td>JOE TIEN</td>
<td>Assistant Professor, Biomedical Engineering</td>
<td>Microvascular tissue engineering; microvascular physiology; hydrogels</td>
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<td>KAMAL SEN</td>
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<td>Visual information processing and transmission; retinal physiology in normal and diseased states; computational models of neural coding, visual prostheses</td>
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<td>BÉLA SUKI</td>
<td>Associate Professor, Biomedical Engineering</td>
<td>Mechanical properties of living tissues; the ensemble behavior of complex biological systems; nonlinearities in biological systems</td>
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<td>TEMPLE F. SMITH</td>
<td>Professor, Biomedical Engineering</td>
<td>The syntactic and semantic structure of the genetic information in biomolecular sequences, structures, and their evolution</td>
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<tr>
<td>CASSANDRA L. SMITH</td>
<td>Professor, Biomedical Engineering</td>
<td>Molecular Biotechnology and Genomics</td>
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<tr>
<td>JOE TIEN</td>
<td>Assistant Professor, Biomedical Engineering</td>
<td>Microvascular tissue engineering; microvascular physiology; hydrogels</td>
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<tr>
<td>KAMAL SEN</td>
<td>Assistant Professor, Biomedical Engineering</td>
<td>Visual information processing and transmission; retinal physiology in normal and diseased states; computational models of neural coding, visual prostheses</td>
<td></td>
</tr>
<tr>
<td>BÉLA SUKI</td>
<td>Associate Professor, Biomedical Engineering</td>
<td>Mechanical properties of living tissues; the ensemble behavior of complex biological systems; nonlinearities in biological systems</td>
<td></td>
</tr>
<tr>
<td>TEMPLE F. SMITH</td>
<td>Professor, Biomedical Engineering</td>
<td>The syntactic and semantic structure of the genetic information in biomolecular sequences, structures, and their evolution</td>
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<td></td>
</tr>
</tbody>
</table>
LUCIA M. VAINA
Professor, Biomedical Engineering & Neurology, MS, U. Timisoara and Urbino; PhD Mathematical Logic, Sorbonne, Doctorat d'Etat ès Sciences & Médecine (Neurologie), Human & Computational Vision, Institut National Politechnique de Toulouse
Computational visual neuroscience; biological and computational learning; functional and structural neuroimaging

HERBERT F. VOIGT
Professor, Biomedical Engineering; Associate Research Professor, Otolaryngology, School of Medicine, Ph.D., Biomedical Engineering, Johns Hopkins University B.E. (E.E.), City College of New York
Auditory neurophysiology; neural circuitry; neural modeling

ZHIPPING WENG
Associate Professor, Biomedical Engineering BS, Electrical Engineering & Computer Science, University of Science & Technology of China, PhD, Biomedical Engineering, Boston University
Bioinformatics; DNA and protein sequence analysis; protein-protein interactions, protein structure analysis; optimization algorithms and their applications in molecular biology; drug and vaccine design

SANDOR VAJDA
Professor, Biomedical Engineering, MSc, Electrical Engineering, Gubkin Institute (Former USSR), MSc, Applied Mathematics, Éötvös Lorand Univ (Hungary), PhD, Chemistry, Hungarian Academy of Sciences
Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design

JOYCE WONG
Clare Boothe Luce Assistant Professor, Biomedical Engineering SB, Materials Science and Engineering, MIT, Ph.D., Materials Science and Engineering, Program in Polymer Science and Technology, MIT
Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions

LUCIA M. VAINA
Professor, Biomedical Engineering & Neurology, MS, U. Timisoara and Urbino; PhD Mathematical Logic, Sorbonne, Doctorat d'Etat ès Sciences & Médecine (Neurologie), Human & Computational Vision, Institut National Politechnique de Toulouse
Computational visual neuroscience; biological and computational learning; functional and structural neuroimaging

HERBERT F. VOIGT
Professor, Biomedical Engineering; Associate Research Professor, Otolaryngology, School of Medicine, Ph.D., Biomedical Engineering, Johns Hopkins University B.E. (E.E.), City College of New York
Auditory neurophysiology; neural circuitry; neural modeling

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Associate Professor, Biomedical Engineering BS, Electrical Engineering & Computer Science, University of Science & Technology of China, PhD, Biomedical Engineering, Boston University
Bioinformatics; DNA and protein sequence analysis; protein-protein interactions, protein structure analysis; optimization algorithms and their applications in molecular biology; drug and vaccine design

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Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design

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Clare Boothe Luce Assistant Professor, Biomedical Engineering SB, Materials Science and Engineering, MIT, Ph.D., Materials Science and Engineering, Program in Polymer Science and Technology, MIT
Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions

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Associate Professor, Biomedical Engineering BS, Electrical Engineering & Computer Science, University of Science & Technology of China, PhD, Biomedical Engineering, Boston University
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SANDOR VAJDA
Professor, Biomedical Engineering, MSc, Electrical Engineering, Gubkin Institute (Former USSR), MSc, Applied Mathematics, Éötvös Lorand Univ (Hungary), PhD, Chemistry, Hungarian Academy of Sciences
Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design

JOYCE WONG
Clare Boothe Luce Assistant Professor, Biomedical Engineering SB, Materials Science and Engineering, MIT, Ph.D., Materials Science and Engineering, Program in Polymer Science and Technology, MIT
Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions
BME FACULTY with Joint or Secondary Appointments in BME

THOMAS A. EINHORN
Professor and Chairman, Orthopedic Surgery
MD, Cornell University Medical College

Hip and knee replacement and reconstructive surgery, treatment of metabolic disease, orthopaedic trauma surgery, the biology of skeletal repair and regeneration

SHAYAMSUNDER ERRAMILLI
Professor Biomedical Engineering and Physics
BS, University of Pune; MS Indian Institute of Technology, PhD, University of Illinois

High-resolution infrared microscopy for studying biological systems.

BENNET GOLDBERG
Professor, Physics
MS, PhD, Physics, Brown University; BA, Harvard University

Experimental condensed-matter physics and polymer physics

STEPHEN GROSSBERG
Wang Professor of Cognitive and Neural Systems; Professor of Biomedical Engineering, Math & Psychology, Chair, Dept of Cognitive and Neural Systems
Ph.D., Mathematics, Rockefeller University

Vision, audition, language, learning and memory, reward and motivation, cognition, development, sensory-motor control, mental disorders

JAMES A. HAMILTON
Professor Biomedical Engineering and Physiology and Biophysics, Research Professor of Medicine

Novel approaches to biomedical problems by integrating physical-chemical and physiological/biochemical approaches complemented with molecular modeling, molecular biology and other cell biology methods

ALLYN E. HUBBARD
Professor, Biomedical Engineering & Electrical and Computer Engineering
B.S., M.S., Ph.D., Electrical Engineering, University of Wisconsin

Auditory physiology; experiments and modeling; neurocomputing; VLSI in biomedical applications; biosensors.
W. CLEMENT KARL  
Professor, Biomedical Engineering & Electrical and Computer Engineering  
S.B., S.M., Ph.D., Electrical Engineering and Computing Science, Massachusetts Institute of Technology

Response of tissues to injury and disease, design and use of polymer-based controlled drug delivery systems, tissue engineering, and the development of computational models of dynamic biological processes.

MATTHEW A NUGENT  
Professor of Biomedical Engineering, Professor of Biochemistry, Departments of Biochemistry and Ophthalmology BUSM  
BA & PhD, Biochemistry Brandies University

Multiresolution statistical signal and image processing; geometric estimation.

Catherine Klapperich  
Assistant Professor, Biomedical Engineering & Manufacturing Engineering, PhD, Mechanical Engineering, UC, Berkeley; S.M., Engineering Sciences, Harvard University

Disposable Diagnostics, Nanomechanics of hydrated biomaterials, biocompatibility at the cell-biomaterial interface, tissue engineering scaffold and microfluidic device design.

Barbara G. Shinn-Cunningham  
Assistant Professor, Biomedical Engineering, & Cognitive and Neural Systems, ScB Electrical Engineering, Brown University, MS & PhD EE and Computer Science, MIT

Binaural and spatial hearing, perceptual effects of echoes and reverberation, speech and signal intelligibility in noise and reverberation, source segregation, auditory and cross-modal attention, plasticity and learning in spatial perception.

Elise F. Morgan  
Assistant Professor, Biomedical Engineering & Aerospace and Mechanical Engineering  
MS PhD Mechanical Engineering, UC, Berkeley; B.S. Mechanical Engineering, Stanford University

Mechanical behavior of biological materials; mechanical stimulation of tissue differentiation; micromechanics of multiscale media; damage mechanics.

Martin Steffen  
Assistant Professor, Biomedical Engineering & Genetics and Genomics, BA Chemistry, Dartmouth College; MD/PhD Chemistry, Stanford University

Tools of systems biology for mammalian cells, technique of mass spectrometry, identifying post-translational modifications, characterizing proteomic differences.

Malvin Carl Teich  
Professor, Biomedical Engineering, Electrical and Computer Engineering; & Physics; SB, Physics, MIT, MS, Electrical Engineering, Stanford University, PhD, Electrical Engineering, Cornell University

Wavelet analysis of fractal biological signals; neural coding; auditory and visual psychophysics; quantum imaging.
RESEARCH FACULTY

JOE Z. TSIEN
Professor, Biomedical Engineering; Professor, Pharmacology

Use of genetically engineered mouse models for the elucidation of the neural mechanisms underlying memory.

SELIM UNLU
Professor, Electrical and Computer Engineering, Professor, Biomedical Engineering
PhD, Electrical Engineering, University of Illinois, Urbana-Champaign

Optical characterization and nanophotonics, solid-state and biological phenomena at the nanoscale.

MARK W. BITENSKY
Research Professor, Biomedical Engineering
B.A., MD, Yale University

G Protein Signal Transduction; Erythrocyte Biology; Macromolecular Ensembles

MARC HERANT,
Research Assistant Professor, Biomedical Engineering
Ph. D. Harvard University 1992, M.D., Washington University School of Medicine 2000

Modeling of cell shape and motion: dynamics of the lamella, dynamics of endocytosis; theoretical and numerical studies of fluid flow

NATALIA BROUDE
Research Associate Professor, Biomedical Engineering
BS, MS Organic Chemistry, Moscow State University; PhD, Organic Chemistry, Inst of Bioorganic Chemistry

Functional genomics, structure/function relationships in nucleic acids, development of advanced methods for genomic studies.

THOMAS L. SZABO,
Research Professor, Biomedical Engineering; PhD, Physics, University of Bath, UK; MS, Electrical Engineering, University of Rochester; BS, Electrical Engineering, University of Virginia School of Medicine

Medical imaging, diagnostic ultrasound, tissue characterization, transduction, biomedical signal processing, wave propagation, nonlinear acoustics
ADJUNCT FACULTY

Jadwiga Bienkowska, Adjunct Asst Professor
- Ph. D. University of Chicago, 1993
- Bioinformatics Group Leader, Serono Reproductive Biology Institute
- Collaborative research with Dr. Temple Smith in the BMERC.

Steven Burns, Adjunct Professor
- Ph.D. MIT, 1967
- Senior Research Scientist and Technical Director, Biomedical Engineering Center for Clinical Instrumentation, Harvard-MIT Div. Of Health, Sciences and Technology
- Teaching BE512, Biomedical Instrumentation since 1996

Douglas Cotter, Adjunct Associate Professor
- Ph.D. North Carolina State University, 1970
- President of Health Care Decisions Inc.
- Technical Advisor 1991 and Co-course Advisor for the BME Senior Project course

Alan Cowey, Adjunct Professor
- Ph. D. Cambridge, UK
- Emeritus Professor of Physiological Psychology, Supernumerary Fellow of Lincoln College, Oxford, UK
- Collaborative research with Prof. Lucia Vaina in the Brain and Vision Research Lab.

Tejal Desai, Adjunct Associate Professor
- Ph. D. Bioengineering, University of California, Berkeley & San Francisco
- Professor of Physiology and Bioengineering University of California, San Francisco
- Research Collaboration and Grad Students

J. Fernando Garcia-Diaz, Lecturer
- Ph.D. Universidad de Malaga, Spain, 1978
- Associate Professor, Department of Physiology, BUSM
- Teaching lectures in BE706, Quantitative Physiology for Engineers, since 1999

Ary Goldberger, Adjunct Associate Professor
- M.D. Yale Medical School, 1974
- Assoc. Prof. of Medicine, Harvard Medical School, Director of Electrocardiography/Physician at BIDMC
- Technical advisor for BME Senior Project course and thesis advisor for Ph.D. Students since1994

James Head, Lecturer
- Ph.D. Manchester University, UK, 1974
- Professor of Physiology, Department of Physiology, BU School of Medicine
- Teaching lectures in BE706, Quantitative Physiology for Engineers, since 2000

Hernan Jara, Adjunct Associate Professor
- Ph.D. University of Illinois at Chicago, 1985
- Assoc. Prof. or Radiology and Director of Radiological Sciences Boston Medical Center
- Teaches BE515, Intro to Medical Imaging, 1998

Xuliang Jiang, Adjunct Assistant Professor
- Ph.D. Columbia University, 1998
- Group Leader, Serono Reproductive biology Inst
- Collaborative research with Prof. Zhiping Weng

Paul O’Bryan, Lecturer
- Ph.D. Tulane University, 1969
- Associate Professor, Department of Physiology, Boston University Medical School, Director, MA Program in Medical Sciences at the BUSM
- Teaches lectures in BE706, Quantitative Physiology for Engineers since 1999

Arthur Rosenthal, Adjunct Professor of Translational Bioengineering
- Chief Scientific Office and Senior Vice President, Boston Scientific Corp.
- Chair, Industrial Advisory Board. Teaches BE467, since 2004

Smirnakis, Stelios, Adjunct Assistant Professor
- Ph. D. Harvard University, 1997
- M. D. Harvard Medical School, 1997
- Clinical Fellow in Neurointensive Care and Stroke Neurology at Mass General Hospital
- Supervises Students and collaborates on research in the Brain and Vision Research Lab.

James White, Adjunct Professor
- Ph.D. Harvard University, 1970
- Corporate Research Scientist, TASC
- Ph.D. Advisor and collaborator in BMERC

Sonia Witte, Lecturer
- Ph.D. University of Iowa
- Imaging Scientist, Epix Medical, Inc.
- Teaches lectures in BE706, Quantitative Physiology for Engineers since 1999
VISITING FACULTY

Hamid M. Abdolmaleky, Visiting Scholar
Post Doctoral Fellow, Harvard Medical School.

Timm Baumeister, Visiting Scholar, Scientist,
Konrad Zuse Institut für Informationstechnik

Michel Camplo, Visiting Scholar
Lecturer in Medicinal Chemistry, Laboratory of Molecular Materials and Biomaterials, UMR-CNRS

Paul DiMilla, Visiting Scholar
Senior Staff Engineer, Research & Development, Organogenisis Inc. Canton MA

Nathaniel Durlach, Visiting Scholar
Research Scientist, Massachusetts Institute of Technology

Peter Foldiak, Visiting Scholar
Lecturer, University of St. Andrews, Scotland UK

Martin Giese, Visiting Scholar
Assistant Professor, Department of Cognitive Neurology, University of Tubingen, Germany

Julie Harris, Visiting Research Associate Professor
Lecturer, Department of Psychology, University of Newcastle, UK

Heiko Hecht, Visiting Professor
Professor of Experimental Psychology, Johannes Gutenberg-Universitat Mainz, Germany

Abhijit Kulkarni, Visiting Scholar
Senior Research Engineer, Bose Corp.

Konstantinis Lazopoulos, Visiting Scholar
Associate Professor of Mechanics, National Technical University of Athens

Roser Llevadot, Visiting Scholar
Senior Scientist, Biokit, S.A.

Tim Kwan-Ta Lu, Visiting Scholar
PhD student, Harvard University and MIT HST Medical Engineering/Medical Physics Program

Lee Moore, Visiting Scholar
Directeur de Recherche, Laboratoire de Neurobiologie des Réseaux Sensorimoteurs, CNRS-UPR

Jorge Munatola-Prat, Visiting Scholar
Senior Scientist, Biokit, S.A.

Victor Noel, Visiting Scholar
Engineer, Mass. Eye & Ear Infirmary

James Oliver, Visiting Scholar
EPSRC Postdoctoral Fellow in Mathematics, University of Nottingham, UK

Attila Priplata, Visiting Scholar
Research Fellow, Harvard Medical School

Yukiko Tsuda, Visiting Scholar
PhD Student University of Waseda, Japan

Srinivasan, Lakshminarayan, Visiting Scholar
M. D.Candidate, Harvard Medical School and Ph. D. Candidate in Electrical Engineering at MIT.
SCIENTISTS

SENIOR RESEARCH ASSOCIATES
Ousama A’amar (Bigio)
Scott Beardsley, (Vaina)
Guillaume Cottarel (Collins)
Vadim Demidov (Cantor)
Koji Kinoshita (Evans)
Heiko Kuhn (Frank-Kamenetskii)
Theoden Netoff (White)
Irina Smolina (Frank-Kamenetskii)
Tatsuro Yoshida (Bitensky)

RESEARCH ASSOCIATES
Jean-Marc Allain (Dembo)
Gabor Balazsi (Collins)
Cyrus Billmoria (Colburn)
Andrew Brughera (Colburn)
Jean Luc Castagner (Bigio)
Vesna Damljanovic, (Dembo)
Socrates Deligeorges (Mountain)
Firas El-Khatib, (Damiano)
Nicholas Guido (Collins)
Brett Isenberg (Wong)
Valerie Jullien, (Grinstaff)
Iris Keren (Collins)
Kishore Kotta, (Grinstaff)
Igor Kuznetsov, (Dembo)
Aymeric Leray, (Mertz)
Arthur Liberzon, (Kasif)
Baoshun Ma (Lutchen)
Aleksander Masny, (C. Smith)
Robert Pitts (Vaina)
Bidhan Roy (Damiano)
Fouad Siddiqi (Cantor)
Maria Valencia-Burton (Broude)
Catherine Ventalon, (Mertz)
Xiao Wang, (Collins)
Yong Yu (Weng)
Lingang Zhang, (Kasif)
Xuedong Zhang, (Mountain)
Ling Zheng (Colburn)
Yi Zhou, (Colburn)
Yu-Dong Zhou (White)

RESEARCH ASSISTANTS
Kyle Allison, (Collins)
David Anderson (Mountain)
Lin Lin Gao (Bigio)
John Jiang (Damiano)
Frank Juhn, (Collins)
David Lancia (Mountain)
Hemal Mehta (Jackson)
Illaria Mogno (Gardner)
Becky Poon (Colburn)
Danial Shub (Colburn)
Alan Stockdale (Bigio)
Viktor Vajda (Mountain)
Jamey Weirzbowski (Collins)
Aleks Zosuls (Mountain)
BME Staff

Teresa L. Allen  
*Administrative Assistant*

Matt Barber  
*Director*

Erin Wright  
*Financial Administrator*

Deborah Dolan  
*Financial Manager*

Rene Smith  
*Academic Programs Manager*

Tara McDonald  
*Sr. Program Coordinator*

Susan Harlow  
*Undergraduate Program Coord*

Joe Canavan  
*Systems Analyst Administrator II*

Daniel Kamalic  
*Systems Analyst Administrator II*

Jen Marron  
*Assistant Director, Whitaker Laboratories*

Irene Orzechowski  
*Financial Administrator, Whitaker Laboratories*

Mary-Ellen Palmer  
*Lab Administrator, Whitaker Laboratories*

Daniel Brown, *BME Placement Coordinator*
BME TECHNICAL STAFF
Phillip Allen, PhD, Micro/Nano Imaging Laboratories
Natalia Broude, PhD, Molecular Bioengineering Laboratory
Xin Brown, PhD, Biointerface Technologies Laboratory and BME Facilities Manager
Joe Canavan, BME Undergraduate Teaching Laboratory
Esther Epstien, Senior Computer Systems Administrator, BMERC
Ze’ev Fiet, PhD, Micro Fabrication and Applications Laboratories (Cleanrooms)
Danial Kamalic, Systems Administrator for BME Computational Simulation Facility
Damir Khismatullin, PhD, Associate Director BME Computational Simulation Facility
Sean Quinlan, Systems Support Specialist BMERC

BME RESEARCH CENTER DIRECTORS

BioMolecular Engineering Research Center
Co-Directors: Temple Smith and Sandor Vajda
Center Administrator: Nancy Sands

Center for Advanced Biotechnology
Co-Directors: Charles Cantor, Jim Collins, Maxim Frank-Kamenetskii
Center Manager: Jennifer Wilson

Center for Advanced Genomic Technology
Co-Directors: Charles Delisi & Simon Kasif
Administrative Director: Caroline Lyman

Center for BioDynamics
Co-Directors: Jim Collins & Nancy Kopell (Mathematics)
Assistant Director: Geraldine Duffy

Center for Nanoscience and Nanobiotechnology
Director: Bennett Goldberg, Associate Director: Selim Ünlü

Hearing Research Center
Director: Steve Colburn
Center Administrator: Nancy Maguire

NeuroMuscular Research Center
Director: Carlo DeLuca
Assistant Director: Laura Pusaitis

COMMITTEES

Executive
K. Lutchen (Chair)
J. White
E. Damiano
I. Bigio
J. Marron
M. Barber

Faculty Search
M. Grinstaff (Chair)
B. Suki
J. Tien
J. Wong
C. Klapperich

Class Reps
2009 – H. Voigt
2008 – K. Sen
2007 – J. Collins
2006 – C. Delisi

Graduate
I. Bigio (Chair)
D. Mountain
J. Wong
M. Frank-Kamenetskii
M. Grinstaff
S. Colburn

Undergraduate
J. White (Chair)
J. Collins
T. Gardner
A. Jackson
C. Passaglia
H. Voigt

Graduate Admissions
E. Damiano (Chair)
S. Vajda
J. Mertz
Z. Weng
K. Sen
D. Stamenovic
L. Vaina

L. Vaina
Boston University’s Biomedical Engineering Industrial Advisory Board

**Chairman:**
Arthur Rosenthal, Ph.D.
Artech Associates and Venture Advisors
Advent International

**Members:**
Doug Adams
Founder, President and CEO
SOLX, Inc

Mark A. Beck
Division Vice President & Deputy General Manager, Life Sciences
Corning Incorporated

Robert W. Clarke, Ph.D.
Director, Biology and Preclinical Development
Pulmatrix, Inc.

Art Coury, Ph.D.
Vice President, Biomaterials Research
Genzyme Corporation

Ralph Faber
Co-Founder, President and CEO
3Wave Optics, LLC

Robert Frechette, PMP
Engineering Manager, Dialysis Technologies
Kendall Division / Tyco Healthcare

Steve Girouard, Ph.D.,
Executive Director
Atrial Fibrillation Innovation Center
Cleveland Clinic Foundation

David R. Jones
Director, Worldwide Quality & Regulatory Patient Monitoring,
Cardiac & Monitoring Systems
Philips Medical Systems

Henry Kay
Group Vice President, Endosurgery, New Market Development,
Strategic Planning
Boston Scientific Corporation

Robert T.V. Kung, Ph.D.
Senior Vice President and
Chief Scientific Officer
ABIOMED, Inc.

Bruce H. KenKnight
Director of Business Development,
Cardiac Rhythm Management Division
Guidant Corporation

Walt Olson, Ph.D.
Vice President, CRM Research
Medtronic, Inc.

Peter Russo
Professor, BU School of Management
Director, Entrepreneurship and Management Institute.

Gregg A. Vandesteeg, Ph.D.
Vice President, Research and Development
3M Health Care

Boston University’s Biomedical Engineering Alumni Board

Christopher Boyle, 1998
*Nitinol Medical Technologies*

David Deems, 1983
*Predicant Biosciences*

Pat Foley, 1991

Kerry Foley, 1991

Robert Frechette, 1993
*Tyco Healthcare | Kendall Division*

Steven Girouard, 1989
*Guidant Corporation*

Jennifer Jackson, 1996
*Brigham and Women’s Hospital*

Ezra Kucharz, 1990
*United States Tennis Association*

Karen Kulas, 1977
*Davol, Inc. | C.R. Bard, Inc.*

James Niemi, 1991
*Afferent Systems, Inc.*

Samit Patel, 1997
*ETHICON, Inc.*

Attila Priplata, 2000
*Boston University, Center for BioDynamics*

Andrew Quick, 1992
*Sonamed Corporation*

Binoy Singh, PhD, 1989
*Columbia Medical School*
### FACULTY AWARDS AND HONORS

**James Collins**
- Scientific American 50: top 50 outstanding leaders in science and technology
- Herman P. Schwan Distinguished Lecturer in Bioengineering, University of Pennsylvania
- Whitaker Plenary Lecturer, Whitaker Celebration

**Steve Colburn**
- 2006 Professor of the Year in Biomedical Engineering

**Carlo Deluca**
- Founding Fellow, Biomedical Engineering Society.
- Who’s Who in the World, 2006
- Who’s Who in America, 2006
- Who’s Who in the East, 2006
- Who’s Who in American Education, 2005

**Thomas Einhorn**
- Best Doctors 2005 - 2006

**Timothy Gardner**
- Distinguished Alumni Award, Grand Rapids Central High School, Grand Rapids, M

**Kenneth Lutchen**
- Plenary Speaker at Whitaker Foundation BME Education Summit
- Biomedical Engineering Professor of the Year, 2005
- Elected Fellow of the Biomedical Engineering Society – Inaugural Class 2005

**Christopher Passaglia**
- NSF CAREER Award, Deciphering the Neural Basis of a Visual Behavior

**Kamal Sen**
- Resident Faculty, Methods in Computational Neuroscience Summer Course, Woodshole, MA.

**Temple Smith**
- Chosen as Key note speaker for the European Conference on Computational Biology, Madrid, Spain
- Elected Member, College of Fellows, American Institute for Medical and Biomedical Engineering

**Dimitrije Stamenovic**
- Recipient of the World University Service Austria (“Brain Gain Program”) grant-award for organizing the Summer School for Biomedical Engineering, Belgrade, Serbia, 2005

**Tom Szabo**
- Understanding and selecting ultrasound imaging transducers (invited), 2006 AIUM Annual Convention, Washington, D.C.

**Lucia M. Vaina**
- Doctor Honoris Causa for Leadership in Systems Behavioral Neurology, from the Governing board of the Vasile Goldis University of Transylvania (Romania)

**John White**
- Co-director, Methods in Computational Neuroscience, Marine Biological Laboratory
FACULTY PROFESSIONAL SERVICE

Irving Bigio
National Institutes of Health: member of Study Section: Biomedical Imaging, and service for various ad
hoc grant review panels, site-visit teams, etc.
National Cancer Institute: Co-chair of Steering Committee, Network for Translational Research in Optical
Imaging
National Cancer Institute, NIH – Advisory Committee on Optical Technologies
NCI and AdMeTech Foundation, member of “Braintrust” new technologies for prostate cancer
External Scientific Advisor Committee: U. Texas, M.D. Anderson Cancer Center – Program on optical
sensing of cervical cancer
External Reviewer for Tenure/Promotion, Tufts University, College of Engineering
External Review Committee, U. of Michigan College of Engineering, for the BME Department
External reviewer, Swedish Foundation for Strategic Research
External Reviewer, Eng. and Physical Science Research Council, Great Britain
Board member, Photonics Research Ontario (research funding agency of the Provincial government,
Ontario, Canada, (until Sept. 04)
Editorial Boards, Journal of Biomedical Optics, Lasers in the Life Sciences
Reviewer for numerous journals
Conference Chair, Organizer, Program Committees for various international conferences.
External Scientific Advisory Committee, Advanced Research Technologies, Montreal,
Optical Society of America: Advisory Board on Biomedical Optics, and Steering Committee for topical
conferences

Charles Cantor
Currently Chief Scientific Officer and Member, Board of Directors, at SEQUENOM, Inc., San Diego, CA
Co-founder of Retrotope, Inc, 2006
Consultant to or board member for more than 20 national and international organizations.

Steve Colburn
Organizer of the "Binaural Bash" international hearing conference at Boston University October 2006.
Reviewer of manuscripts for ABME, JARO, JASA, and IEEE EMBS.
Reviewer of grants for Medical Research Council, England, and National Research Council, Canada
Scientific Advisory Board for Oticon hearing aid project at Walter Reed Hospital 2006

Jim Collins
Scientific Co-Founder and Chair of the Scientific Advisory Committee, Afferent Corporation
Scientific Co-Founder and Chair of the Scientific Advisory Committee, Cellicon Biotechnologies, Inc.
Member, Scientific Advisory Board, MannKind Corp.
Member, Scientific Advisory Board, Codon Devices
Clinical Advisor, Excel Medical Ventures, LLC
Special Advisor, PureTech Ventures, LLC
Member, Advisory Board, CHAOS: An Interdisciplinary Journal of Nonlinear Science
Member, Editorial Board, Journal of Nonlinear Science
Member, Editorial Board, SIAM Journal of Applied Dynamical Systems
Invited Judge, TR35 Competition, MIT's Technology Review Magazine
Invited Member, Systems Biology Advisory Committee, Mathematical Sciences Research Institute (MSRI)
Invited Member, Scientific Advisory Board, Integrative Cancer Biology Program, MGH
Invited Member, Scientific Organizing Committee, International Conference on Systems Biology
Invited Chair, Session on Motor Control, ISB/ASB Congress
Invited Chair, Session on Intracellular Networks, ICSB 2005
Invited Chair, IBF's Tech Transfer Investing Conference
Charles Delisi  
National Library of Medicine, NIH 10 year planning Committee  
Santa Fe Institute Science Advisory Board, Standing Member  
MIT Advisory Board on Systems Biology, Standing Member  
Los Alamos National Lab Advisory Committee, ad hoc  
5th International Conf on Bioinformatics and Systems Biology, Co-Chair  
Emmanuel College Presidential Advisory Board Standing Member  
Cornell Nanotechnology Advisory Committee, 28 November  
Emerging Infectious Disease Symposium, Co-Chair, 14 December  
NHLBI Framingham Executive Steering Committee, Standing Member  
Holliston High School—Guest Lecture for AP Biol. Feb 2006  
4th Annual Aspen Symposium on Biotechnology April  
Executive Committee for the Framingham SNP Health Association Resource  
Chair, BU Bioinformatics Program  

Carlo Deluca  
CEO, Altec Inc., Boston, MA  
CEO, DelSys, Inc., Boston, MA  
National Advisory Council for Biomedical Imaging and Bioengineering of NIH  
Scientific Advisory Board, Henry J. Kessler Institute for Rehabilitation  
Reviewer for 6 scientific journals  
Reviewer for NIH and NASA  
Chair of DelSys Prize award committee  
Advisor, Promotion Committee of Universite Libre de Bruxelles, Belgium  

Micah Dembo  
Editorial Board: Biophysical Journal.  

Edward Damiano  
Reviewer for American Journal of Physiology, Annals of Biomedical Engineering, Biorheology  
Journal of Biomechanical Engineering, Microcirculation, Proceedings of the National Academy of Sciences  
Served as one of six primary reviewers on an NSF CARRER panel entitled "Nano and Bio Mechanics of Materials Program," in the Civil and Mechanical System Division, Engineering Directorate, NSF.  

Maxim Frank Kamenetskii  
NCI study section on IMAT proposals: July 2005  
NSF-NIH Panel on Mathematical Biology: September 2005  
Organizing committee meeting of 15th Albany International Conference on Structural Biology  

Tim Gardner  
Scientific Advisor, Cellicon Biotechnologies, Inc., Boston, MA  
Steering committee member, DREAM Workshop, Columbia University  

Mark Grinstaff  
Liaison, Site Miner for CIMIT and Coulter Translational Partnership  

Andrew Jackson  
Reviewer for Pediatric Pulmonolgy, European Respiratory Journal, and Journal of Applied Physiology.
Catherine Klapperich
Member, Molecular Foundry Proposal Study Panel, Department of Energy and LBNL, 2005
Member, Editorial Board, Biomolecular Engineering. 2005-
Reviewer, Session Chair, Society for Biomaterials Annual Meeting 2005, Tissue Engineering Section.
Consultant, Pria Diagnostics, Inc.
Consultant, Wadsworth Medical Technologies, Inc.
Member, Scientific Advisory Board. (No financial relationship)

Ken Lutchen
Associate Editor, Annals of Biomedical Engineering
NIH Study Section – Biomedical Research Partnerships, special panel
NIH-Roadmap Study Section: Exploratory Centers in Interdisciplinary Research
NIH-NIGMS Biomedical Research and Research Training (BRT) Study Section, member
Secretary/Treasurer and Executive Board Member of AIMBE
Biomedical Engineering Society, Track Chair, Pulmonary Bioengineering
American Thoracic Society, Respiratory Structure Function Program Committee
Advisory Committees: University of Pittsburgh, McMaster University, and Marquette University
Fellows Selection Committee: AIMBE
Whitaker Foundation Leadership/Development Site Visit Review Committee
European MUIR Research Grant Review Committee member
Scientific Advisory Committee, Asthma Research Center, Brigham and Women’s Hospital

David Mountain
Invited Discussant, International Workshop on Sound and the Marine Environment, Sponsored by the International Oil and Gas Producers’ Association, Halifax, Nova Scotia,
Chairman, Town of Newbury Planning Board

Jerome Mertz
NIH study section reviewer, NIH-NCRR Biotechnology SEP (March 2-3, 2006)
Program Committee, Optical Society of America, Special Topics, Miami, FL. 2006

Chris Passaglia
Manuscript Reviewer for IEEE Transactions on Neural Systems & Rehabilitation Engineering and Visual Neuroscience

Kamal Sen
2006 Proposer, Invited Workshop at the Computational and Systems Neuroscience Meeting (COSYNE), Park City, Utah.
Barbara Shin-Cunningham
Appointed to serve as a regular member of the AUD NIDCD study section, 2006-2010
Served as an ad hoc member of the AUD NIDCD study section, spring 2006
Served as an ad hoc member of two special-emphasis study panels of the NIDCD, fall 05 and spring 06
Appointed member of the ARO Diversity and Minority Affairs Committee, 2006-2009
Appointed member of the Tutorials Committee, Acoustical Society of America, 2005-2008
Served as a member of the Ethics and Grievances Committee, Acoustical Society of America, 2002-
Invited to serve as an Associate Editor of the Journal of the Acoustical Society of America, 2006 (declined)
Served as a member of the Long-Range Planning Committee, Association for Research in Otolaryngology
Served as Secretary and Board Member of the International Community for Auditory Display, 2000-2006
Served as a member of the Governing Board, CELEST: Center of Excellence for Learning in Education,
Science, and Technology (an NSF Science of Learning Center)
Co-organizer (with Shihab Shamma), Workshop on “Difficult Issues in Auditory Scene Analysis,” held in
conjunction with the Computational and Systems Neuroscience meeting, to be held in Park City, Utah
Co-organizer (with Earl Miller), “CELEST Workshop on Auditory and Visual Attention,” held in
conjunction with the International Conference on Cognitive and Neural Systems, to be held in Boston
Invited participant in the Telluride Neuromorphic Engineering Workshop, Telluride, Colorado

Cassandra Smith
Founder and President, Daxx LLC, Boston
Editor-in-Chief, Biomolecular Engineering, Elsevier, Amsterdam
Scientific Advisory Board, Philip Morris External Research Program
Honorary Member and Consultant, Saren Medical Center, Tehran, Iran
Editorial Board, Twin Research & Human Genetics, Journal of the International Society for Twin
Research, Australian Academic Press
Consultant, MU-Vision, Inc.,
Consultant, Biokit, Barcelona, Spain
Consultant, Silicon Valley Expert Witness Group, Mountain View, Cal.
Consultant, Bosch-Sigpack, Neuhausen, Switzerland
Consultant, Moors and Cabot, Boston, Mass
Consultant, Moers and Cabot, Washington, D. C.
Editorial Advisory Board, Recent Patents in Biotechnology, Bentham Publishers
Journal Reviewer: Analytical Chemistry, American Journal Human Genetics, Biotechniques
Cell, Electrophoresis, Genetic Analysis: Techniques and Application, Genomics, Human Genetics, J.
Bacteriology, J. Biological Chemistry, J. Immunological Methods, Langmuir, Nature,
Neuropsychiatric Genetics, Nucleic Acids Research, Molecular Psychiatry, PNAS USA

Temple Smith
Co-founder, Modular Genetics Inc., Cambridge, MA
Member, Advisory Committee, UCSF Resource for Biocomputing, Visualization and Informatics
Advisory Board Member, FlyBase Project, Harvard University
Member, Alliance for Cellular Signaling (National NIH grant project under the University of Texas
Southwestern Medical Center)
Member, Ad Hoc Tenure Committee, Harvard University Division of Engineering & Applied Science and
Departments of Molecular & Cellular Biology and Organismic & Evolutionary Biology
Proposal review boards: National Institutes of Health, National Science Foundation
Journal review boards: Nucleic Acids Research, Molecular Biology and Evolution
Dimitrije Stamenovic
Ad Hoc member of the National Hearth Lung and Blood Institute (NIH) Peer Review Panel.
Ad Hoc member of the Biomedical Research Council Peer Review Panel, Singapore
Visiting Scientist in the Department of Environmental Health, Harvard School of Public Health, Boston
Member of the Scientific Committee of the First South-East European Conference on Computational Mechanics – SEECCM 06, Kragujevac, Serbia, June 28-30, 2006

Bela Suki
Editor of the Journal of Applied Physiology (2001-)
Editor of the journal Fluctuation and Noise Letters (2001-)
Reviewer National Sciences and ERC of Canada Ad-Hoc Reviewer (2005)
Reviewer: Swiss National Science Foundation Reviewer (2005)
Reviewer of 6 top journals in physiology, bioengineering and physics

Tom Szabo
Head of Delegation (U.S.), Technical Committee 87, International Electrotechnical Commission meeting

Lucia M. Vaina
Elected member, advisory board Institute of Contemporary Art (ICA) Boston, exhibition, Super Vision
On a special study section: Italian Ministry of Health—New directions in behavioral neuroscience research.
Consultant to Brain Saving Technology
Reviewer: Cerebral Cortex, Brain, Vision Research

Sandor Vajda
Co-organizer, CAPRI (Critical Assessment of Protein Interactions)
Member, NIH study section Computational Biology
Member, NIH STTR/SBIR study section Drug Development and Delivery
Grant reviewer for NSF, Israeli Science Foundation, Wellcome Trust Reviewed grant applications
Editorial Manager for the journal Proteins: Structure, Function, and Genomics

Herb Voigt
2006 President of the American Institute of Medical and Biological Engineering (AIMBE)
Alpha Eta Mu Beta, (Biomedical Engineering Honor Society); National President
Chair, Biomedical Engineering Society Education Committee
NSF Panels for REU programs and Neural and Sensory Systems
Editorial Board, Wiley Encyclopedia of Biomedical Engineering
American Association of Engineering Societies (AAES) Board of Directors

Zhiping Weng
Co-chair the Transcriptional Regulation Analysis Group of the ENCODE Consortium. In this capacity, co-chaired a two day workshop at Univ. California at Santa Cruz for the analysis group.
**John White**
Associate Editor for *Annals of Biomedical Engineering*
Associate Editor for *IEEE Transactions on Neural Systems and Rehabilitation Engineering*
Member, NIH study section on Learning and Memory. Responsibilities included review of ~10 applications for each of three meetings.
Invited session organizer / chair, BMES Meeting Baltimore, MD 2005
Co-director, Methods in Computational Neuroscience, Marine Biological Lab
Planned and held, BUReal 2006 Conference, funded by NIH, included 50 participants from BU, Georgia Tech, Cornell, Emory, Penn, UCSD, MIT, Ecole Normale Superiere, University of Cambridge, Pitt, Rutgers, Brandeis, Brown, Harvard, and other locations, focused on applications of real-time technology to problems in neurophysiology, cardiology, and biology.

**Joyce Wong**
Member, NIH Biomaterials and Biointerfaces (BMBI) Study Section
Associate Director, Center for Nanoscience and Nanobiotechnology, Boston University
Co-Editor: *Biointerphases* (new journal from American Institute of Physics)
Editorial Advisory Board Member: *Polymer Reviews*
AVS Science & Technology, Biomaterial Interfaces (BI) Division
Elected member, Executive Committee (2004-2006)
Technical Committee Member, Biomaterial Interfaces (BI) Division, 2005
Session Chair, Fall Meeting, 2005
Reviewer: PNAS; Biophysical Journal; Journal of the American Chemical Society; Advanced Materials; Journal of Chemical Physics; Journal of Cell Science; Journal of Applied Physiology; Nanoletters; Langmuir; Biomaterials; Biomacromolecules; Journal of Biomedical Materials Research; Tissue Engineering; Microvascular Research, Journal of Pharmaceutical Science; Cell Biochemistry and Biophysics; Annals of Biomedical Engineering
CORE FACILITIES & INSTRUCTIONAL LABS

**Biomedical Data-Acquisition Laboratory**
The Biomedical Data-Acquisition Lab supports the data acquisition and measurement activities of several courses. There are currently twelve stations, each outfitted with a pentium PC containing A/D and D/A boards and software, an oscilloscope, a power supply, and various modules for making measurements and conducting experiments which allow students to record a variety of physiologically important signals, including electrocardiograms, blood pressure, and electromyograms.

**Computer Modeling and Simulation Laboratory**
This lab contains 56 dual-CPU AMD Opteron workstations with 2G RAM and 17” LCD monitors; 52 dual-CPU AMD Opteron headless cluster nodes with 2G RAM, 2 eight-CPU AMD Opteron ccNUMA compute servers with 16G RAM along with computer peripherals such as printers etc. The room is configurable into 2 completely separate classrooms (16 seats in one 40 in the other) one large classroom with LCD projectors and computer support at the instructors lectern. The classroom supports all BME courses with computational components as well as open lab hours for student and researchers use.

**Whitaker Computational Center**
This lab contains 12 pentium III workstations that support both UNIX and Windows applications and is equipped with overhead LCD Projection capabilities to enhance computer based lectures. The center supports smaller computational classes as well as open lab hours.

**Cell and Biomolecular Mechanics Instructional Laboratory**
Core Directors: Natalia Broude, Ph. D. & Volkmar Heinrich, Ph. D.
The Cell and Biomolecular Mechanics Instructional Laboratory supports BME courses in Cellular and Subcellular Biomechanics and Molecular Bioengineering. The laboratories focus is on methods for study and manipulation of biomolecules and structural components of cells. Some of the equipment used in lab projects include: DSC microcalorimeter, ITC microcalorimeter, Freezing Point Osmometer, Vapor Pressure Osmometer, Microforge, Multitrough/Film balance, Video cameras, Micropipette puller, computers for automated experimentation and professional data analysis and representation, Real-time PCR machine, PCR thermocycler, UV-spectrophotometer equipped with thermo-regulated compartment, protein and DNA gel electrophoresis, gel documentation, Optical microscope equipped with: fluorescent attachment, optional Hoffman Modulation Contrast illuminating system, accessories for micromanipulation and pipette aspiration

**Micro and Nano Fabrication Facilities**
The Micro/Nano Fabrication Facilities are the focal point for all soft lithography. Two clean rooms (a class 100 and class 1000) house all of the necessary capabilities to write patterns and create devices that span the nano to micro size scale in nonstandard organic/inorganic biomaterials. Micro/nano fabrication classes will utilize both the Class 100 and Class 1000 clean rooms, but the Class 1000 area will allow space for items that do not need the ultra clean environment of the Class 100 room.

**Class 100 Clean Clean Room (518 square feet):** Provides 100% HEPA filtration coverage for a particle free environment to work with the most delicate instruments. The following equipment is available in this facility:
- Mask Aligner
- Profilometer
- Spin coater
- 100W SPI Plasma Asher (O₂)
- Elipsometer
- Microscope with video system
- Chemical Fume Hood for wafer cleaning, etching and photoresist developing
Class 1000 Clean Room (Projected completion Spring 2005, 1165 square feet): Adjacent to the Class 100 room. The following equipment is expected to be available in this facility:
- Programmable Spin coater Module with 2 programmable Baking Plate Units
- Mask aligner (for teaching purposes)
- Sputterer
- E-beam evaporator
- Plasma Processing System (PECVD)
- Wet Processing Laminar Hood
- Planned additions: Reactive Ion Etching (RIE) system

Biointerface Technology Core

Wet Chemistry Unit (Room 509C and 509E):
- Applied Biosystems 7300 Real Time PCR System
- Molecular Devices SpectraMax M5 Plate Reader
- Nicolet 4700 Fourier Transform IR Spectroscopy
- Brookhaven 90plus Nano-particle Sizer
- PDS 2010 Parylene Deposition System
- Virtis BT4KZL Freeze Dryer

Mechanical Testing Unit (Room 511):
- Instron 5848 Micro-tester
- TA Instruments AR2000 Rheometer

Tissue Culture Unit (Room 507):
- Two 4’ SterilGard III Advance Bio-Safety Cabinets
- Four Sanyo MCO-17AC CO² incubators
- Nikon TS100-F Inverted Microscope
- Sorvall Legend RT Benchtop Centrifuge
- Coulter Z2 Analyzer
- Microm HM525 Cryomicrotome

Surface Science Unit (Room 501C):
- Kruss DSA100 Contact angle goniometer
- Q sense E4 Quartz Crystal Microbalance
- TA Instruments Q10 Differential Scanning Calorimeter
- BIACORE

Micro/Nano Imaging Core

- FV1000 laser point scanning confocal microscope.
- IX81-ZDC with TIRF excitation system
- IX81 microscope with wide field fluorescence ratio-imaging and FRET.
- IX-81 microscope, with a second excitation source for wide field photo-bleach or photo-activation
- IX-71 microscope, with LCD based RGB emission filter.
- MFP-3D Inverted Optical microscope, for simultaneous AFM and optical imaging.

Each system has dedicated CCD camera, with the TIRF system using an electron multiplying camera for extreme low light imaging, live cell incubation on the microscope stage, and options for perfusion and flow studies. Each system has an associated computer workstation that drives the instrumentation and provides standard and programmable image processing options.

Common Standard Equipment:
-80 freezer, Incubator shaker, Freeze dryer, Ice maker, 100 sq. foot cold room equipped with sink, Autoclave, Dishwasher, BioRad VersaDoc4000 system.
RESEARCH

The Biomedical Engineering Department maintains a vibrant research program in its approximately 68,000 square feet of laboratory space at 24-64 Cummington St, at Boston University’s Charles River Campus. We are comprised of 22 separate research laboratories and seven Research Centers (separately described at the end of this section). The research can be characterized by a combination of

- empirical and theoretical work with an attention to explicit mathematical models for the phenomena under study,
- intensive computer use for experimental and theoretical work,
- a basic scientific flavor to the fundamental questions being asked,
- an attention to the applications of the work to the improvement of health care, and a thorough understanding of the underlying physiological processes.

RESEARCH AREAS IN BME

<table>
<thead>
<tr>
<th>Biomechanics &amp; Biomaterials</th>
<th>Biomolecular Eng. &amp; Biotech</th>
<th>Sensory Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular and Subcellular</td>
<td>Bioinformatics</td>
<td>Cochlear Structure-Function</td>
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<tr>
<td>Tissue and Biorheology</td>
<td>Protein Modeling</td>
<td>Auditory Signal Processing</td>
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<td>Electro-Mechanical Defibrillation</td>
<td>Genome Sequencing</td>
<td>Psychophysics</td>
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<td>Systems Biomechanics</td>
<td>DNA Structure-Function</td>
<td>Visual Perception Models</td>
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<td>Posture Control</td>
<td>Genetic, Protein &amp; Cell Regulation</td>
<td>fMRI Structure-Function</td>
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<tr>
<td>Biomedical Optics</td>
<td>Functional Genomics</td>
<td>Photoreceptor Biology</td>
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<tr>
<th>Cardiopulmonary Engineering</th>
<th>Neuroscience</th>
<th>Micro and Nano Biosystems</th>
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<tr>
<td>Structure-Function in Lungs</td>
<td>Ion-Channel kinetics</td>
<td>Cell &amp; Tissue Engineering</td>
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<td>Noninvasive Diagnostics</td>
<td>Neural Firing Systems</td>
<td>BioMEMs</td>
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<td>Blood Cell Biology</td>
<td>Neuromuscular Control</td>
<td>Cell Encapsulation</td>
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<td>Arrhythmia Control</td>
<td>Functional Activities</td>
<td>Programmable Cell Environments</td>
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<td>Nonlinear Dynamics</td>
<td></td>
<td>Biotherapeutics &amp; Drug Delivery</td>
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</table>
During the period 7/1/05 – 6/30/06 the BME Faculty had 91 new and continuing funding awards for a total of $20,588,810 and over $33 Million in research proposals were submitted (Inclusive of grants of Dr. Carlo J. De Luca of the NMRC). Awards and proposals were received from and submitted to Federal Agencies such as NIH, NSF, DOD, NASA, and DOE, private agencies such as the Whitaker Foundation, Coulter Foundation, and Juvenile Diabetes Research Foundation International, and Private Industry such as Sequenom Inc, BioKit, and Merck Inc.

BME Grant Funding by Agency
<table>
<thead>
<tr>
<th>PI</th>
<th>PROJECT TITLE</th>
<th>SPONSOR</th>
<th>AWARD</th>
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<tr>
<td>Bigio</td>
<td>Optical Measurement of Fast Drug Kinetics...</td>
<td>NIH</td>
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<td>Optical Spectroscopy for Mgmt of Cancer Tmtnt</td>
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<td>Optical Pharmacokinetics System (R. Reif)</td>
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<td>Optically-Guided Diagnosis and Treatment...</td>
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<td>Graduate Student Support (S Gioux)</td>
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<td>Collins</td>
<td>Nonlinear Dynamics Enhanced Sensory Perception</td>
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<td>Noise and Dynamics in Eukaryotic Gene Expression</td>
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<td>Rev Eng Lung HIV Cytokine/Chemokine Network</td>
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<td>How Organisms Adapt to New Enzymes and Pthws</td>
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<td>Reverse Engineering the Bacterial SOS Network</td>
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<td>Motor Control and Muscle Activity in Elderly Subj</td>
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<td>Reverse Engineering of Protein Networks</td>
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<td>Support for the Center for BioDynamics</td>
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<td>Rapid Reverse Eng of Genetic Networks via STP</td>
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<td>Micro-Viscometric Study of the ESL in Microvessels</td>
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<td>Closed-Loop Contr/Blood Glucose Typ1 Diabetes</td>
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<td>Automated Hemodynamic Analysis ...</td>
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<td>Delisi</td>
<td>Structure Function Relationships in Evolutionary...</td>
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<td>Microdevices: controlled, targeted Oral Drug Deliv</td>
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<td>Decoding gene regulatory circuits controlling...</td>
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<td>Gardner</td>
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<td>Gene Annotation Using Evidence Integration...</td>
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<td>Klapperich</td>
<td>Artificial Nerve from Human Cortical Cells...</td>
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<td>Research Assistantships for High School Students</td>
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<td>Airway Reactivity and Heterogeneity in Asthma</td>
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<td>Graduate RA Support for N. Spencer</td>
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<td>BioKit Sponsored Research Agreement</td>
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<td>Suki</td>
<td>Ventilation Improves Lung Physiology and Biology</td>
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<td>Lung Structure-Function in Mice via Acoustic...</td>
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<td>Mechs of Progression in Late Stage Emphysema</td>
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<td>Weng</td>
<td>Alt Promoter Usage in Tissue-Specific Gene Expres</td>
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<td>Id cis-elements Resp for Striatum Spec Gene Expres</td>
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<td>CAREER: Integ Appr to Predictive Prot-Prot Dock</td>
<td>NSF</td>
<td>151,386</td>
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<td>White</td>
<td>Open Source, Real-time Experimental Control Syst</td>
<td>NIH(Cornell)</td>
<td>91,766</td>
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<td></td>
<td>GABAergic Circuits in Auditory Cortex</td>
<td>NIH (UWisconsin)</td>
<td>53,840</td>
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<td>GTReal Workshop</td>
<td>NIH</td>
<td>18,000</td>
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<tr>
<td>Wong</td>
<td>Physico-Compu Perspective of Breast Cancer...</td>
<td>DOD (UPenn)</td>
<td>98,524</td>
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<td>Bioengineered Subtrata to Probe Cellular Behavior</td>
<td>NIH</td>
<td>323,000</td>
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<td>Bioengineered Subtrata to Probe Cellular (suppl)</td>
<td>NIH</td>
<td>48,450</td>
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<td>DNA Microarray Expression (suppl)</td>
<td>NIH</td>
<td>5,400</td>
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<td>Novel Microstructured Mimics of Arterial...</td>
<td>AHA</td>
<td>38,000</td>
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<td></td>
<td>Novel Microstructure for Vascular Tissue Eng</td>
<td>NASA</td>
<td>145,250</td>
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CAB

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<tr>
<th>PI</th>
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<tbody>
<tr>
<td>Frank-Kamenetskii</td>
<td>Fluorescence In Situ Detection of Short DNA Seq</td>
<td>NIH</td>
<td>162,236</td>
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<td>Hybrizid of Oligonucleotide Probes w/Duplex DNA</td>
<td>NIH</td>
<td>403,750</td>
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<td>Specific Detection of Microbes in Patient Specimen</td>
<td>Coulter Foundation</td>
<td>117,833</td>
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<td>Kasif</td>
<td>Sequenom Sponsored Research Agreement</td>
<td>Sequenom</td>
<td>250,000</td>
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<td>CAB TOTAL</td>
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HRC

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<tr>
<td>Colburn</td>
<td>Bilateral Cochlear Implants: Physiol and Psychophy</td>
<td>NIH (MEEI)</td>
<td>72,236</td>
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<td></td>
<td>Bilateral Cochlear Implants: Improving Perform</td>
<td>NIH (MEEI)</td>
<td>83,797</td>
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<td></td>
<td>Binaural Hearing</td>
<td>NIH</td>
<td>599,059</td>
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<td>Mountain</td>
<td>Active Filtering in the Cochlea</td>
<td>NIH</td>
<td>501,089</td>
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<td></td>
<td>Cell Form and Gene Expression in Hair Cell</td>
<td>NIH(Children’s)</td>
<td>31,908</td>
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<td></td>
<td>EarLab: A Virtual Hearing Laboratory</td>
<td>NIH</td>
<td>490,152</td>
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<td>Mds Beaked Whale Hearing Responses u/w Noise</td>
<td>DOD/ONR</td>
<td>83,469</td>
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<td>Sen</td>
<td>Auditory Cortical Processing of Comm. Sounds</td>
<td>NIH</td>
<td>386,950</td>
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<td>Cortical Processing of Complex Sounds and...</td>
<td>NOHRF</td>
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BMERC

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<tr>
<td>Smith, T.</td>
<td>Graduate Student Support for A. Bhutkar</td>
<td>NIH (Harvard)</td>
<td>35,867</td>
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<td>Identification, Modeling and Prediction of …</td>
<td>NSF (Jackson Lab)</td>
<td>50,153</td>
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<td>ITR: The Eukaryotic Core</td>
<td>NSF</td>
<td>740,467</td>
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<td>Vajda</td>
<td>Comp Mapping of Proteins for Binding of Ligands</td>
<td>NIH</td>
<td>236,557</td>
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<td>Research Support Core: Bioinformatics and …</td>
<td>NIH</td>
<td>215,557</td>
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<td></td>
<td>A Multistage Approach to Protein-Protein Docking</td>
<td>NIH</td>
<td>242,208</td>
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<td>Improved Protein Mapping for Fragment-Based...</td>
<td>NIH(SolMap Pharm)</td>
<td>32,589</td>
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<td>BMERC TOTAL</td>
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NMRC (Prof. DeLuca only)

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<tr>
<td>DeLuca, C.</td>
<td>Micro-gravity Induced Changes Control of Muscles</td>
<td>NASA</td>
<td>431,347</td>
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<td></td>
<td>Harnessing Motoneuron Activity: Lab to Clinic</td>
<td>NIH</td>
<td>49,647</td>
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<td>NMRC TOTAL</td>
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<td>480,994</td>
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<td></td>
<td>GRAND TOTAL</td>
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<td>20,588,810</td>
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</table>
The Biomedical Engineering Department faculty published 134 articles in peer reviewed journals, 20 Books or Book Chapters, and made over 221 Invited lectures, and filed for or were awarded 11 patents. The Department sponsored 8 Seminar Series consisting of the high profile Distinguished Scientist in BME Seminar Series, the 12th annual F. A. Bourke Distinguished Lecture in Biotechnology, the Center for BioDynamics Seminar Series, the Hearing Research Center Seminar Series, the NeuroMuscular Research Center Seminar Series, the Center for Advanced Genomic Technologies Seminar Series, the Brain and Vision Seminar Series, and the Center for Nanoscience and Nanobiotechnology Seminar Series.

### PUBLICATIONS

**Irving Bigio**


**Mark Bitensky**


**Natalia Broude**


**Charles Cantor**


Steve Colburn


James Collins


Charles Delisi

Wang, YE, C Zhang, J Berzofsky and C DeLisi, Selecting Stable Molecular Targets for Treatment and Prevention of AIDS, *Genome Informatics*, 16, 254, 2005

Holloway, D. M. Kon and C DeLisi, Integrating Genomic Data to Predict Transcription Factor Binding, *Genome Informatics*, 16, 83, 2005


Kirca, G and C DeLisi. Simple Discriminant Functions Identify Small Sets of Genes that Distinguish Cancer Phenotypes from Normal, Genome Informatics, 16, 245, 2005

Carlo Deluca


Micah Dembo


Thomas Einhorn


Evan Evans


Maxim Frank-Kamenetski


Timothy Gardner


Mark Grinstaff


Andrew Jackson


Simon Kasif


Catherine Klapperich


Kenneth Lutchen


Jerome Mertz


David Mountain


Christopher Rassaglia


Kamal Sen


Barbara Shinn-Cunningham


Temple Smith


Dimitrije Stamenovic


Joe Tien


Selim Unlu


Sandor Vajda


Lucia Vaina


Herbert Voigt


Zhiping Weng


John White


Joyce Wong


**Irving Bigio**


**Steve Colburn**


**Thomas Einhorn**


**Maxim Frank-Kamenetskii**


**Catherine Klapperich**

**Kenneth Lutchen**


**Barbara Shinn-Cunningham**


**Cassandra Smith**


**Dimitrije Stamenovic**


**Bela Suki**


**Tom Szabo**


**Herbert Voigt**


**John White**


**Joyce Wong**

INVITED LECTURES

Irving Bigio


“Elastic scattering spectroscopy for the noninvasive detection of cancer,” Department of Bioengineering Colloquium, University of Illinois: Urbana-Champaign, (January, 2006)

“Optical spectroscopy for noninvasive detection of cancer,” Department of Biomedical Engineering, University of Arizona, (Feb. 2006)

“Applications of optical spectroscopy in the detection and treatment of prostate cancer,” NIH/AdMeTech Prostate Cancer Brain Trust workshop; Bethesda, MD, (March 2006)


“Elastic scattering spectroscopy for noninvasive detection of cancer,” University of Pennsylvania, Department of Biophysics and Biochemistry, (March 2006).

“Optical monitoring of drug concentrations in the brain,” Columbia University Medical School, Dept. of Anesthesiology; (April 2006)


“Elastic scattering spectroscopy for noninvasive detection of early cancer and pre-cancer,” Stanford University Medical School, (June 2006)

“Optical spectroscopy to monitor PDT pharmacokinetics and therapy,” Progress and Clinical Translation of In-Vivo Imaging Symposium, Philadelphia, (June 2006)

Charles Cantor

Fred Hutchison Cancer Research Center, Seattle, WA, August 2005.

Guanzhou Institute of Biomedicine and Health, Guanzhou, China, August 2005.


Dana Farber Cancer Institute, Boston, MA, September 2005.

University of California at Davis, Genome Center and Bioinformatics Program, Davis, CA, October 2005.

University of California at Irvine Department of Microbiology and Molecular Genetics, Irvine, CA, October 2005.

Roswell Park Cancer Institute, Buffalo, NY, October 2005.

University of Texas at Dallas, Department of Chemistry/NanoTech Institute, Dallas, TX, October 2005.

Sonic Clinical Institute, Sydney, Australia, November 2005.
Genemappers Conference, Mt. Buller, Australia, November 2005.
National Cancer Research Centre, Tokyo, Japan, November 2005.
Kyoto Prefectural University of Medicine, Kyoto, Japan, November 2005.
Peter Mac Hospital, Sydney, Australia, November 2005.
Rachford Lecture, Cincinnati Childrens Hospital, Cincinnati, OH, December 2005.
Genome Institute of Singapore, Singapore, January 2006.
3rd Military Medical School, Chongquing, China, January 2006.
St. Jubes Hospital, Memphis, TN, January 2006.
Malaysia Genome Institute, Kuala Lumpur, Malaysia, February 2006.
Nanyang Technical University, Singapore, February 2006.
Texas Medical Center, Houston, TX, March 2006.
University Health Networks, Toronto, Canada, March 2006.
Fudan University, Shanghai, China, April 2006.
Tianjin University Medical School, Beijing, China, April 2006.
Peking Union Medical School, Chinese Academy of Medical Sciences, Beijing, China, April 2006.
Washington University School of Medicine, St. Louis, MO, April 2006.
Arizona State University, Biodesign Institute, Tempe, AZ, April 2006.
Auckland University, Auckland, New Zealand, April 2006.
International Conference on Nutrigenomics & Gut Health, Auckland, New Zealand, April 2006.
University of New South Wales, Sydney, Australia, May 2006.
New York State Center of Excellence in Bioinformatics and Life Sciences Symposium, Buffalo, NY, June 2006.

**James Collins**


"Integrating Synthetic Biology and Systems Biology", Bauer Center for Genomic Research, Harvard University, Cambridge, MA, December 14, 2005.

"Engineering Gene Networks: Integrating Synthetic Biology and Systems Biology", Biomedical Engineering Department, Tufts University, Medford, MA, March 6, 2006.

Commencement Address, University Professors Program, Commencement Convocation, Boston University, May 14, 2006.

"Noise-enhanced sensorimotor function." International and American Societies of Biomechanics Congress, Cleveland, OH, August 1-5, 2005.

"The future of biomedical engineering is wet and small." Annual Fall Meeting of the Biomedical Engineering Society, Whitaker Plenary Lecture, Whitaker Celebration, Baltimore, MD, September 30, 2005.


"Synthetic biology and systems biology: bottom-up and top-down approaches to interdisciplinary research." Inaugural Symposium on Interdisciplinary Research, Boston University, Boston, MA, April 28, 2006.


**Steve Colburn**

2005 Conference on Implantable Auditory Prostheses
Asilomar Conference Center, California July 31, 2005

Sixth International Workshop on Auditory Brainstem Processing, Seeley Lake, Montana, September 26, 2005

International Binaural Symposium, University of Manchester, United Kingdom, October 30, 2005

Keynote Speaker, Purdue University symposium on "Acoustics: the Wave of the Future," May 18, 2006

"Modeling the impaired auditory system" at Walter Reed Hospital, May 23, 2006

**Edward Damiano**

Microviscometric analysis of particle image velocimetry data: Application to microvascular hemodynamics. Molecular Biology, Cell Biology, and Biochemistry Program, Boston University, Boston, Massachusetts (November 28, 2006).


Analysis of the microfluidics near vascular endothelium in vivo and in vitro reveals inadequacies of the endothelial-cell culture model. Division of Engineering, Brown University, Providence, Rhode Island, April 20, 2006.

**Carlo Deluca**

Keynote Speaker - Control of Motor Units Remains Invariant During Fatiguing Isometric Contractions. European Workshop on Movement Science, July 4, 2005

Department Reviewer – Institute of Biomedical Engineering, University of New Brunswick, July 13, 2005

Session Chair- International Society of Biomechanics XXth Meeting/American Society of Biomechanics 29th Meeting, Cleveland, OH, July 31, 2005

Invited Speaker - MEDI Conference, Hartford, CT, Oct 25-26, 2005


**Micah Dembo**

Anatomy and Cell Biology Seminar, Tufts Univ.
School of Med, Boston MA, May 2005
**Thomas Einhorn**

Leo Leung Memorial Lecturer, Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, Pennsylvania
May 5, 2005

Keynote Lecturer, 2nd World Veterinary Orthopaedic Congress and 33rd Annual Veterinary Orthopaedic Society Meeting, Keystone, Colorado, February 26, 2006

**Evan Evans**


Biomedical Engineering, Georgia Institute of Technology, Nov./Dec. 2005

Worms, and Bilayers, Workshop on Polymers, Enschede, the Netherlands, Sept. 2005

Symposium on Protein Nanomechanics, Madrid, Spain, Oct. 2005

International Physics School on Colloids in Biomedicine, Les Houches, France, Apr. 2006

NanoForce Canada Summer School, Montreal, Canada, May 2006

**Maxim Frank-Kamenetskkii**

"Fluctuational opening of base pairs in DNA". International Conference ‘2nd Moscow Conference in Computational Molecular Biology (MCCMB’05)’. Moscow, Russia, July 18-21, 2005.

“Biophysics of the DNA molecule” Seminar at Physics Department of Northeastern University. Boston, October 20, 2005

“Biophysics of the DNA molecule” Seminar at Physics Department of Yeshiva University. New York, December 28, 2005


**Tim Gardner**

“Role of Stacking and Base Pairing in DNA Stability”. Seminar at Panum Institute, University of Copenhagen, Denmark, May 9, 2006.


"Decoding transcription networks from expression data." GlaxoSmithKline, August 2005.


“Decoding transcription networks from expression data.” Broad Institute, September 2005.

“Decoding prokaryotic transcription networks from expression data: application and validation at the genome scale.” Workshop on gene network models and their applications. Sixth International Conference on Systems Biology, October 2005.


“Genome-scale identification of microbial regulatory pathways.” ORFeome Meeting, Center for Cancer Systems Biology, Harvard University, December 2005.


“Shotgun mapping of transcription regulation: applications to drug discovery.” Department of Molecular and Cell Biology, Boston University Goldman School of Dental Medicine. April 2006.


Mark Grinstaff

“Dendritic Macromolecules as Ophthalmic Adhesives.” Fourth International Dendrimer Symposium, Mount Pleasant, MI, 2005


“Biodendrimers for Medical Applications.” University of Eindhoven, Eindhoven, NL, 2005

“Dendritic Polymers as Ophthalmic Adhesives.” Glaucoma Foundation Think Tank Meeting, New York, NY, 2005

“New Adhesives for Ocular Wound Repair.” SPE: Joining of Medical Plastics Conference: Welding, Bonding, and Failure Prevention, Providence, RI, 2005

“Charge-Reversal Amphiphiles for Gene Delivery.” MEDI 2005 Conference, Hartford, CT, 2005

“Dendritic Polymers as Ophthalmic Sealants.” MEDI 2005 Conference, Hartford, CT, 2005

“Guiding Biology on Synthetic Surfaces using Interfacial Biomaterials.” AVS 52nd International Symposium, Boston, MA, 2005

“Dendritic Polymers as Ophthalmic Sealants.” The Schepens Eye Research Institute, Harvard Medical School, Boston, MA, 2005

“Dendritic Polymers for Medical Applications.” MIT: Program in Polymer Science and Technology, Boston, MA, 2005

“Dendritic Polymers as Ophthalmic Sealants.” Medical Applications of Nanotechnology, Center for Vision Research, University of Florida, Gainsville, FL, 2005

“Dendritic Polymers for Medical Applications.” CIBAvision, Atlanta, GA, 2006

Catherine Klapperich


“Preparing for a Career in Research” Keynote address, JSHS Symposium, Boston University, 1 April 2006.

“Cellular Interactions with Synthetic Biomaterials,” Molecular Biology, Cell Biology & Biochemistry Program Faculty Seminar, Boston University, 17 February 2006.

“Nanomechanics of Hydrated Biomaterials,” CIMIT Forum, Massachusetts General Hospital, Boston, MA, 3 January 2006.


Ken Lutchen


Jerome Mertz


“New techniques in confocal microscopy,” Lester Wolfe workshop in laser biomedicine, Femtosecond Microscopy and Microsurgery: Make it fast! Massachusetts General Hospital, Boston, MA (April 18, 2006)


“Second harmonic imaging with a femtosecond laser”, International Workshop on Nanophotonics and Nanobiotechnology, Istanbul, Turkey (June 28-July 8, 2005)

“Nonlinear microscopy”, Dynamic and functional imaging of live cells, INSERM workshop #161, La Londes les Maures, France (June 29-July 6, 2005)
David Mountain

“Simulating Neural Responses to Biosonar Signals.” Acoustical Society of America Spring Meeting, Providence RI, June 7, 2006

Christopher Passaglia

"The spectral properties of retinal discharge noise and the impact on visual information transmission", Workshop on Advanced Methods of Neurophysiological Signal Analysis & System Modeling, University of Southern California, Biomedical Simulations Resource Center, June, 2006

Kamal Sen

Lecture on Neural Discrimination of Natural Stimuli, Methods in Computational Neuroscience, 2005 Woods Hole, MA

Lecture on Neural Discrimination of Birdsongs, Workshop on Birdsong, Computational and Systems Neuroscience Meeting, 2006 Park City, Utah

Lecture on Neural Discrimination of Natural Sounds, 2006, Computer Science Colloquium Series, Department of Engineering and Applied Sciences, Harvard University.

Barbara Shinn-Cunningham

Spatial auditory attention, 2006 spring meeting of the Acoustical Society of America, special session on Auditory Attention

The real reason you should invest in a surround-sound system, 2006 spring meeting of the Acoustical Society of America, special session on Surround Sound Systems

Space is just another auditory feature, workshop on “Difficult Issues in Auditory Scene Analysis,” held in conjunction with the Computational and Systems Neuroscience meeting, Park City, Utah, 12 March 2006.

Searching for cross-modal analogies: Spatial attention in complex auditory scenes, Visual Attention Seminar Series, Brigham and Women’s Hospital, 15 March 2006.

Divide and conquer: Attention in complex auditory scenes, Seminar Series of the Institute for Hearing, Speech and Language and the Department of Speech-Language Pathology and Audiology, Northeastern University, Boston, 23 March 2006.

Communicating in a natural cocktail party: Relating human and avian behavior to neural response, colloquium for the Center For Adaptive Systems, Department Of Cognitive And Neural Systems and the Center Of Excellence For Learning In Education, Science, And Technology (CELEST), Boston University, Boston, 14 April 2006.

Auditory attention and spatial hearing, Telluride Neuromorphic Engineering Workshop, Telluride, Colorado, June 2006

Temple Smith

Key note speaker, European Conference on Computational Biology, Madrid, Spain, September 27-October 1, 2005

Invited speaker, Scientific Roundtable presented by Genome Technology magazine, Boston, MA, March 13, 2006

Dimitrije Stamenovic

A Model of Rheological Behaviors of Living Cells based on the Molecular Dynamics of a Tensed Cytoskeletal Polymer Chain, First South-East European Conference on Computational Mechanics SEECCM-06, June 28-30, 2006, Kragujevac, Serbia.

A series of Lectures in the Bioengineering Program of the Faculty of Mechanical Engineering, University of Belgrade, Serbia, entitled:
   b) Biomedical Engineering Aspects of Cellular Mechanics, June 26, 2006.
   c) Applications of Fractional Calculus to Biorheology June 28, 2006.

Bela Suki

Lung tissue viscoelasticity: from fibers to constitutive equations. Presented at the Annual meeting of the Biomedical Engineering Society in Baltimore, September 2005.


Connective tissue mechanics of the normal and emphysematous lung. Presented at the University of Kyoto, Kyoto, Japan, 2006.

Effects of Strain on the Pulmonary Epithelium. Presented at the Medical School of Okayama, Nagoya, Japan, 2006.

Effects of Strain on the Pulmonary Epithelium. Presented at the Medical School of Nagoya, Nagoya, Japan, 2006.


**Tom Szabo**

Understanding and selecting ultrasound imaging transducers, 2006 AIUM Annual Convention, Washington, D.C.

**Joe Tien**

University of Windsor, Department of Chemistry (2006)

CIMIT Forum (2006)

Louisiana Tech University, Biomedical Engineering Program (2006)

BMES Annual Meeting, Baltimore (2005)

NIH/NIBIB Grantees Meeting (2005)

**Selim Unlu**

Applications of Microresonators: From Photodetectors to Biological Sensing and Imaging, JSPS – UNT Joint Symposium on and Nanoscale Imaging of Semiconductor and Biological Systems, Bilkent University, Ankara, Turkey, (January 2005)

Nanoscale Imaging of Semiconductor and Biological Systems, University of California, San Diego, (January 2005)

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Hampton Roads LEOS Chapter, September 2005.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Ottawa LEOS Chapter, October 2005.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Central New England (Boston) LEOS Chapter, October 2005.


Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Northern NJ LEOS Chapter, February 2006.

Nanoscale Imaging of Semiconductor and Biological Systems, Lehigh University, Electrical and Computer Engineering Department, March 2006.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Santa Clara Valley LEOS Chapter - jointly with EDS Chapter, May 2006.

60
Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Italian LEOS Chapter, Milan, Italy, May 2006.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Denver LEOS Chapter - jointly with Rocky Mountain OSA (RMOSA), May 2006.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Turkish LEOS Chapter, Ankara, Turkey, June 2006.

Nanoscale Imaging of Semiconductor and Biological Systems, LEOS Distinguished Lecture at Corning and Rochester LEOS Chapter, June 2006.

Numerical Aperture Increasing Lens Microscopy: Applications in Si IC imaging and QD spectroscopy, International Workshop on Nanophotonics and Nanobiotechnology, June 28-July 8, 2005, Istanbul, Turkey

Resonant Cavity Biosensor, International Workshop on Nanophotonics and Nanobiotechnology, June 28-July 8, 2005, Istanbul, Turkey

**Lucia M. Vaina**

Neuroplasticity after occipital lobe infarct: dynamic retinotopic mapping. 27 June 2005 “International Neuropsychological Symposium, Alghero, Sardegna, Italy

Neurology: past, present, future. 12 July, University Vasile Goldis, Aarda, Romania

Functional imaging of stroke patients. Ferico Secondo University-Medical School, Napoli, Italy and the Italian Society of Neurology

**Sandor Vajda**

Cluster selection and in-cluster refinement for discrimination in protein-protein docking. 3rd Conference on Modeling Of Protein Interactions In Genomes, June 26-28, 2005, Lawrence, KS.

Improved protein mapping for binding site characterization and fragment-based drug design. Virtual Screening, Cambridge Healthtech Institute, Boston, March 30-31, 2005

Characterization of protein-ligand interaction sites using computational solvent mapping. American Chemical Society Meeting & Exposition, August 28 - September 1, 2005, Washington, DC

The role of water in fragment-based drug design. American Chemical Society Meeting & Exposition, August 28 - September 1, 2005, Washington, DC

Computational mapping of proteins for exploring the role of binding site plasticity in molecular recognition and information transfer. DIMACS Workshop on Information Processing by Protein Structures in Molecular Recognition, June 13 - 14, 2005, DIMACS Center, CoRE Building, Rutgers University.


Computational mapping of proteins for fragment based drug design. Saint Jude Research Hospital, Memphis, TN, June 20, 2006.


**Zhiping Weng**

Co-chaired the Transcription Regulation analysis group of the ENCODE consortium. Made two presentations at the meeting on results of the group. July 14-21, 2005

Computational Analysis of Transcriptional Regulation in Eukaryotes, Practical Summer Workshop in Functional Genomics at Ohio State University. Aug 3, 2005.


Structure, function, and evolution of transient and obligate protein-protein interactions, Brown University, Oct 26, 2005
Analysis of bidirectional promoters in the human genome, ORFeomes and Systems 2005, Nov 30, 2005

Protein-protein interactions: from evolutionary conservation to complex structure prediction, Centocor, Dec 15, 2005.

Scaling ENCODE conference with Prof. Mike Snyder from Yale University, as co-chairs of the ENCODE Transcriptional Regulation Analysis Group. Jan 12, 2006

Molecular interactions: from transcriptional regulation to protein-protein docking, Yale University, Jan 17, 2006

Protein-protein docking: algorithm development and testing, Center for Computational Sciences at Boston University, Feb 3, 2006.

Global computational analysis of p53 binding sites in the human genome, Structural Bioinformatics and Computational Systems Biology Workshop, National Chiao-Tung University, Taiwan, Feb 25, 2006.

Transcriptional regulation in human ENCODE regions, Genome Institute of Singapore, March 16, 2006


Molecular interactions: from transcriptional regulation to protein-protein docking, Genome Center at Univ. California Davis, May 23, 2006

**John White**

Biomedical Engineering Society, Session on Computational Neuroscience (2005)

Biomedical Engineering Society, Special Session on Frontiers in Neural Engineering (2005)

Duke University, Dept. of Biomedical Engineering (2006)

National Institute for Mental Health (2006)

Arizona State University, Department of Bioengineering (2006)

Northwestern University, Seminar Series in the Dynamics of Complex Systems in Science and Engineering (2006),

**Joyce Wong**

Biophysical Chemistry Division, Halifax CSC Meeting 89th Canadian Chemistry Conference and Exhibition in Halifax, Nova Scotia, CANADA May 27-31, 2006

International Workshop: Bridging Nanoscale Forces and Interfacial Phenomena to the Macroscopic World, Celebrating the work of Jacob Israelachvili, Cancun, MEXICO, May 2006

ALZA Corporation, December, 2005, Mountain View, CA

Twenty Fifth New England Complex Fluids Workshop, December, 2005, Harvard University, Cambridge, MA

Symposium on Functional Solid-Supported Bimolecular Lipid Membranes, sponsored by Max Planck Institute in Polymer Science, September, 2005, Schloß Ringberg, Bavaria, GERMANY

Gordon Research Conference in Biomaterials, July, 2005, Plymouth, NH
**Irving Bigio**  
Disclosures: “Polar nephelometer based on a rotational confocal imaging setup”, “Biopsy forceps incorporating an optical spectroscopy fiber probe”, “Biopsy snare incorporating an optical spectroscopy fiber probe”

**Mark Bitensky**  
Pending Application No. 11/211,000, “Particle Separating Devices, Systems and Methods”, Filed August 24, 2005, jointly assigned to Boston University and Massachusetts General Hospital.

**Charles Cantor**  
US20060094014A1 - Nucleic acid supported protein complementation  

**Edward Damiano**  

**Timothy Gardner**  

**Jerome Mertz**  
Provisional patent #US60/715,953 (filed Sept. 9, 2005), Title: Dynamic Speckle Illumination Microscopy, Inventors: **Jerome Mertz**, Cathie Ventalon  
Provisional filing BU06-01 (filed Jan. 22, 2006), Title: Graded-field contrast microscopy, Inventors: **Jerome Mertz**, Kenyehh Chu, Ran Yi

**David Mountain**  

**Temple Smith**  
Pending, Application No. 10/763,039, “Alien Sequences”  
Pending, “Extended Genetic Algorithm”

**Joe Tien**  

**Joyce Wong**  
Zalipsky, S. and Wong, J.Y. Microparticles and nanoparticles containing a lipopolymer U.S. Provisional Patent
RESEARCH LABORATORIES

APPLIED BIODYNAMICS LABORATORY
James J. Collins
The Applied BioDynamics Lab focuses on developing nonlinear dynamical techniques and devices to characterize, improve and mimic biological function. Our specific interests include: (1) systems biology - reverse engineering naturally occurring gene regulatory networks, (2) synthetic biology - modeling, designing and constructing synthetic gene networks, and (3) developing noise-based sensory prosthetics.

BIOMEDICAL OPTICS AND BIOPHOTONICS LABORATORY
Irving Bigio
The focus of our research is the development of minimally-invasive diagnostics and therapeutics based on optical and photonic technologies. With noninvasive optical measurements there is minimal risk to the patient, but significant medical benefits are possible. Some of our ongoing projects include:

• "Optical biopsy": development of fiber-optic probes that perform spectroscopic measurements on tissue in vivo and noninvasively to instantly diagnose cancer and other pathologies in specific organs.
• "Optical pharmacokinetics": fiber-optic probes designed to measure drug concentrations in tissue
• Sensors to monitor the response of tumors to specific treatments.
• Optical methods for noninvasive imaging of neuronal activation and brain function.
• Optical methods for identifying different types of infectious agents.

BIOMICROSCOPY LAB
Jerome Mertz
• Development of nonlinear microscopes based on femtosecond lasers.
• Application of two-photon excited fluorescence (TPEF) microscopy to deep imaging in brain tissue and visualization of endogenous fluorescence for clinical applications.
• Applications of second-harmonic generation (SHG) microscopy to cell membrane potential imaging and the photocontrol of chromophore orientation dynamics in membranes.
• Investigation of interferometric contrast mechanisms based on optical coherence tomography (OCT) or nonlinear detection (Auto-confocal microscopy). Application to thick tissue imaging.

BRAIN AND VISION RESEARCH LABORATORY
Lucia M. Vaina
Fundamental and applied research of visual information processing and perceptual learning in humans:

• Eye-movements and visual-perceptual abilities of neurological patients: measurement and rehabilitation.
• Structural and functional neuroimaging for functional-anatomical mapping of the visual motion system
• Functional plasticity in the human visual system: characteristics, computational models, and applications to rehabilitation.
• Computational methods for aiding visually-guided navigation in visually-impaired patients
CELLULAR AND SUBCELLULAR BIOENGINEERING LABORATORIES

CELLULAR AND SUBCELLULAR MECHANICS LABORATORIES
Micah Dembo, Evan Evans, Joyce Wong

Experiments use extremely sensitive mechanical probes, novel materials and advanced optical microscopy to expose the physical actions and material properties of single cells and of the ultra fine macro molecular machines sensors and transducers that drive and control cellular and subcellular processes. Advanced computational methods are needed for data processing to obtain solutions for equations and for the final physical analysis used to establish definitive mechanistic interpretations of experimental data. A core teaching laboratory for training in nano-to-micro mechanical instrumentation has been set up to enable students and faculty to develop new research projects in biomedical engineering.

• We have a goal of achieving force measurements with resolution on the scale of the thermal energy divided by a molecular dimension (approximately 10E-10 gm wt!). We are also trying to develop non-invasive detectors that will be capable of measuring displacements with resolution of a few nanometers at very high temporal rates
• We are conducting studies to investigate the role of structural mechanics in regulating biochemical pathways, biological adhesion phenomena, cytoskeletal deformation and active cellular motility
• We are developing novel materials that mimic the interfacial properties of natural biomaterials and we are studying the interactions of cells with such artificial substrata
• We are developing novel biomaterials as substrata for control of cell adhesion and cell motility. For example, materials with patterned surface modifications are used to investigate the effect of their physical, chemical, and mechanical properties on interactions with living cells

MICRO AND NANO BIOSYSTEMS AND CELL AND TISSUE ENGINEERING LABORATORIES

THERAPEUTIC MICROTECHNOLOGY LABORATORY
Tejal Desai
The research in the Therapeutic Microtechnology Laboratory combines methods and materials originally used for micro-electro-mechanical systems to create implantable biohybrid devices for cell encapsulation, templates for cell and tissue regeneration, and novel protocols for the surface modification of biomaterials.

GRINSTAFF LABORATORY
Mark Grinstaff
The Grinstaff group pursues highly interdisciplinary research in the areas of biomedical engineering and macromolecular chemistry.

• designing, synthesizing, and characterizing novel biodendrimers. Ongoing evaluations for the repair of corneal lacerations, anti-cancer drug delivery, DNA delivery, and temporary biodegradable scaffolds for cartilage repair.
• creating novel polymeric coatings termed “interfacial biomaterials” that control biology on plastic, metal, and ceramic surfaces.
• designing electrochemical-based sensors/devices using conducting polymer nanostructures and specific DNA structural motifs.

BIOMEDICAL MATERIALS RESEARCH LABORATORY
Catherine Klapperich
The Biomedical Materials Research Laboratory is focused on materials research activities in the broad areas of tissue engineering and biomedical device design. The laboratory is equipped for polymer and hydrogel synthesis, microfluidic device rapid prototyping, fabrication of tissue engineering scaffold materials, molecular analysis and tissue culture. The laboratory houses a dynamic mechanical analyzer for time and temperature sensitive testing.
of gel and polymer macroscale mechanical properties. This facility is a fully functional laboratory for integrated mechanical, chemical and biological testing of biomaterials. The laboratory is adjacent to the shared bio-micro/nanofabrication center. This cleanroom contains a mask aligner, AFM, DekTak Profilometer, e-beam evaporator and a spin coater. The lab also maintains a Hysitron Triboscope Nanoindentation Instrument located in the Low Vibration Area of the Photonics Center. Laboratory projects include experiments and modeling of the contact problem for nanoscale probes on soft hydrated biomaterials, cell-biomaterial interactions in tissue engineering materials, and diagnostic microfluidic device design.

**BIOMIMETICS MATERIAL ENGINEERING LABORATORY**
Joyce Wong
Our objective is to elucidate the underlying physical forces between cells and their substrata that govern cellular behavior. We use of bioengineered substrata with the aim of revealing fundamental principles for the rational design of materials for tissue engineering, targeted drug delivery, biosensors, and new 'biologically-inspired' materials.

**ORGANOGENSESIS LABORATORY**
Joe Tien
Research applying techniques adopted from microlithography, self-assembly, microfluidics, and developmental biology to develop methods of assembling cells into ordered, three-dimensional aggregates and use these aggregates as artificial tissue and as in vitro models of disease. Current work focuses on the fabrication of branched networks such as vasculature and pulmonary trees, and spatially complex organoids such as liver acini.

**FIELDS AND TISSUES LABORATORY**
Solomon R. Eisenberg
Research in the area of electrically mediated phenomena in tissues and biopolymers:
- Computational modeling of current distributions in the heart and thorax during electrical defibrillation
- Finite element modeling of magnetically induced currents in inhomogeneous anisotropic tissues and bodies
- Microcontinuum and microstructural models of electromechanical interactions in connective tissues; tissue mechanics

**MOLECULAR BIOTECHNOLOGY LABORATORY**
Cassandra L. Smith
Research in the Molecular Biotechnology Laboratory brings novel approaches and tools from the interface of genomics, genetics and biotechnology to complex disease studies. Current research interests include understanding how and why genomic DNA instability contributes to multifactorial neurological diseases like schizophrenia that have both genetic and environmental components. Another project focuses on the specific delivery of therapeutic reagents to cancer cells using aptamers which are small DNA mimics of antibodies. Other projects focus on the development of novel DNA and RNA detection and analysis methods.
NEURONAL DYNAMICS LABORATORY
John A. White
Research on the electrophysiological and pharmacological properties of ion channels and how these properties shape activity patterns in networks of nerve cells:
- Electrophysiological, immunocytochemical, and computer modeling studies of putative neuromodulatory systems in the hippocampal region
- Electrophysiological, computer modeling, and theoretical studies of how the stochastic nature of ion channels affects the response properties of neurons and neuronal networks
- Computational and theoretical studies of the factors underlying synchronous activity in neuronal networks
- Electrophysiological and computational studies of the effects of additive noise in sensory networks

PULMONARY BIOENGINEERING LABORATORIES

AIRWAYS AND LUNG TISSUE DYNAMICS LABORATORY
Andrew C. Jackson
- Prediction of the respiratory system's behavior through detailed morphometrically based computer models that include the acoustic properties of the branching airways.
- Use of systems identification techniques to extract physiologically relevant parameters from complex mechanical impedance data.
- Measurements of airway and lung tissue properties using broad spectrum forcing functions and gas dilution in human adults and infants as well as non-human primates.

CELL AND TISSUE MECHANICS LABORATORY
Dimitrije Stamenović
Fundamental and applied research of soft tissue rheology and mechanical properties of cells:
- Rheology of macromolecules of the cytoskeleton and of living adherent cells.
- Microstructural modeling of cytoskeletal mechanics.
- Cell contractile stress as a determinant of cellular mechanical behaviors.
- Applications of fractional calculus in studies in rheological studies of cells.
- Theory of elasticity and continuum mechanics.

PULMONARY PHYSIOLOGY AND DYNAMICS LABORATORY
Bela Suki
- Roles of collagen remodeling and network breakdown in pulmonary emphysema
- Measurements and nonlinear modeling of the rheological properties of soft tissues including lung tissues and tissue engineered constructs
- Imaging of the extracellular matrix components such as collagen and elastin fibers
- Statistical mechanical modeling of various physiological phenomena such as avalanches in airway reopening and fluctuations in cellular contraction in recurrent airway diseases
- Acoustic morphometry of the airway structure
- Surfactant secretion in epithelial cells induced by dynamic stretching
- Noise-enhanced life-support systems including mechanical ventilation
RESPIRATORY AND PHYSIOLOGICAL SYSTEMS IDENTIFICATION LABORATORY
Kenneth R. Lutchen
• Development of measurement, monitoring, and signal processing techniques that provide new insights on the structural airway and tissue conditions of the healthy and diseased lung
• Advanced application of mechanistic and morphometrically based models for interpreting the structure-function relations in the lung with emphasis on the mechanisms that compromise breathing capability and ventilation
• Advancing linear and nonlinear systems identification science, sensitivity analysis, and optimal experiment design to evaluate the efficacy of applying models to physiological data with emphasis on structural lung models and cardiovascular dynamics
• Understanding the origins of linear and nonlinear properties of physiological systems

VASCULAR INTERFACE AND MICROHEMOFLUIDICS LABORATORY
Edward R. Damiano
One of the major thrusts of our research is to investigate cellular and molecular interactions at the interface between blood and the vascular endothelium in order to advance our understanding of cardiovascular health and disease. Specific interests include (1) studying the role of the endothelial surface layer (ESL) in inflammation, (2) determining the extent of the ESL on endothelial-cell monolayers in vitro and throughout the vasculature in vivo, (3) analyzing the implications of the ESL for microvascular hemodynamics, and (4) studying the role of the ESL in atherosclerosis and in the vascular complications of hyperglycemia. Another major research thrust of our research is centered around designing, testing, and implementing a fully automated closed-loop control system for regulating blood glucose in type 1 diabetes

VISUAL & CIRCULATORY BIOPHYSICS LABORATORY
Mark W. Bitensky
Our vision research program focuses on the purified gene products of vertebrate rods and those protein ensembles that they form. We are working specifically with proteins that are implicated in the regulation of rod photoreceptor sensitivity. Our work in circulatory biophysics has four foci: (1) Devising new and more effective ways to store red blood cells for longer time periods with less deterioration. (2) Utilizing the evolutionary optimization of red blood cell circulatory properties to develop novel preventive and therapeutic strategies. (3) Red cells are proving to be potent antigen presenting cells and are finding new uses in vaccine development. (4) Utilizing microchannel systems to produce diagnostic devices that can rapidly and accurately evaluate red cell demographics, membrane area, cytosolic volume and membrane properties

VISUAL INFORMATION PROCESSING LABORATORY
Christopher L. Passaglia
Our objective is to elucidate how neurons process and encode visual information in normal and dysfunctional states. Research is primarily directed at retinal neurons. For different stimulus patterns we measure the corresponding retinal activity pattern using tiny electrodes inserted into the retina or optic nerve and use linear and nonlinear systems analysis techniques to characterize the neural mechanisms that give rise to the recorded activity patterns. We then incorporate these mechanisms into computational models of the retinal network in order to evaluate our understanding of visual information processing.
RESEARCH CENTERS

BIOMOLECULAR ENGINEERING RESEARCH CENTER (BMERC)
Established in 1991

Temple F. Smith & Sandor Vajda, Co-Directors
The BioMolecular Engineering Research Center (BMERC) has two major research objectives: to develop statistical and other computational approaches that will detect syntactic and semantic patterns in DNA, RNA, and protein sequences; and to use statistical/computational approaches to identify structure, function, and regulation in these molecules. In meeting these objectives, the BMERC is continually developing new computer-assisted analytical approaches that address basic problems in molecular biology.

STRUCTURAL BIOINFORMATICS AND LIGAND DESIGN LABORATORY
Sandor Vajda
The focus of this laboratory is the development and application of computational tools for the analysis of protein structure and protein-ligand interactions. Some of the particular problems we currently study are the evaluation of binding free energy in protein-protein complexes, development of efficient docking algorithms, computational solvent mapping of proteins using molecular probes to identify the most favorable binding positions, method development for fragment-based drug design, construction of an enzyme binding site database, and improving the prediction of protein active sites.

CENTER FOR ADVANCED BIOTECHNOLOGY (CAB)
Established 1992
Charles Cantor, James Collins, Maxim Frank-Kamenetskii

CANTOR LABORATORY
Charles Cantor, Natalia Broude
Development of mass spectrometry of nucleic acid chips as a new general diagnostic platform for genetic diseases, cancer, and infectious disease
- Molecular engineering of streptavidin, a general prototyping system for solid state biochemistry, DNA and antibody based assays
- Creation of sensitive detection and molecular amplification systems aimed, ultimately, at methods for inexpensive single molecule analyses

COLLINS LABORATORY
James Collins
- Design and construction of synthetic gene networks
- Development of experimental-computational approaches for reverse-engineering naturally occurring gene regulatory networks

FRANK-KAMENETSKII LABORATORY
Maxim Frank-Kamenetskii
Experimental and theoretical studies of DNA structure and function. New principles of DNA-drug interactions, Equilibrium and kinetic specificity of DNA-ligand interaction, Complexes of a DNA mimic, peptide nucleic acid (PNA), with duplex, Modulation of activity of proteins working on DNA using PNAs, Molecular beacons and their applications, DNA nanostructures based on PNA, Applications of the PNA technology for genome analysis and DNA detection.
GARDNER LABORATORY
Timothy Gardner
Microbial organisms are something of a double-edged sword for humankind. They can cause debilitating or fatal infections; but they are also the source of many therapeutic drugs, may be used to detoxify polluted environmental areas, and may even offer solutions to the world's expanding demand for energy. To identify novel treatments that overcome bacterial resistance, and to unlock the full catalytic potential of microbes for bioremediation and energy production, a clearer understanding is needed of the complex systems of genes, proteins and metabolites underlying cell function. We are currently focused on developing computational and experimental tools for mapping and modeling system-wide properties of gene regulatory networks in microbes.

CENTER FOR ADVANCED GENOMIC TECHNOLOGY (CAGT)
Established 2002
Faculty: Gary Benson, Charles DeLisi, Simon Kasif, Daniel Segre, Zhiping Weng.

Some of the most spectacular recent strides in the biological sciences have been made possible by a synthesis of experimental engineering (e.g. microarrays, high throughput sequencers, robotics), computation (databases, machine learning algorithms and optimization) and experimental biology. The Center for Advanced Genomic Technology will provide a home for such integrated approaches, thus advancing the triad of research, education and technology transfer in cell systems biology. It will expand upon and replace the Molecular Engineering Research laboratory, which was founded 11 years ago, and has now been outgrown.

BIOMOLECULAR SYSTEMS LABORATORY
Charles Delisi
Developing and applying computational/mathematical methods, and high throughput experimental methods, to analyze changes in gene and protein expression profiles of cells in response to various endogenous and exogenous signals. Developing and applying new DNA and peptide microarray technologies for fingerprinting the complete molecular state of a cell. The long range goal is to relate expression patterns to pathways, pathways to networks and networks to function.

PROTEIN ENGINEERING LABORATORY
Zhiping Weng
We focus our research on molecular interactions, such as (1) interaction between regulatory proteins and their DNA/RNA target sites (2) protein-protein interaction (3) protein-peptide interaction (4) interaction between protein structure building blocks. ZLAB has two major projects:
- Gene Regulation - Develop computational methods for understanding the molecular mechanism of gene regulation.
- Protein Docking and Design - We develop methods to compute binding affinities between protein molecules. In the wet-lab component of ZLAB, we produce mutant proteins according to computational predictions and test their binding affinities. The ultimate goal is to establish in vitro evolution procedures to fine-tune computational predictions.

COMPUTATIONAL GENOMICS LABORATORY
Simon Kasif
The research we pursue in partnership with major genomic centers (TIGR, MIT Genome Center) and several other laboratories involves the analysis, computational representation and modeling of biological systems. We are interested in human cells (including cell differentiation, apoptosis and signal transduction) as well as bacterial pathogens (bacterial pathways and genomic organization). 1) Computational Functional Genomics: gene identification, functional classification and gene expression analysis. 2) Computational comparative genomics: methods for comparing complete genomic sequences at different levels of detail. 3) Discovery and modeling of biological pathways using probabilistic networks. 4) Genomic Biotechnology: new computer-assisted genomic and proteomic technologies.
Nanoscience and nanotechnology research and development are leading a revolution in basic materials science and engineering. New advancements with designed functionality are poised to enable a huge range of applications in everything from developing fundamental building block in the electronics, photonics, and materials sectors, to sensors, biomimetic and biocompatible platforms throughout the biomedical and health sector.

The strength of Boston University’s efforts in interdisciplinary nanoscience and nanotechnology form an axis that begins in basic materials science, surface science, physics, chemistry, and engineering, extending into molecular and cellular biology, biophysics, and the technologies of microfluidics, MEMS, and onto manufacturing. Our strengths are in developing and using nanotechnology advances in materials and platforms with our capabilities in biomedical engineering to focus on applications in understanding subcellular processes, biomolecular function and human physiology.

The new Center for Nanoscience and Nanobiotechnology is established to advance academic and technological research and development in nanoscience and nanobiotechnology. The Center serves as a hub for nanoscience researchers from the Charles River and Medical Campuses and build activities that develop interdisciplinary research and training. The Center will connect scientists from disparate disciplines with each other in seminars, meetings, joint visitor programs and seeded projects to enhance the development of interdisciplinary nanoscale research. The Center will lead large, interdisciplinary proposal development and run funded programs for both research and training, as well as support individual researchers in their efforts by linking them with resources throughout the University and beyond. The Center will also build linkages between the research and technological commercialization resources at BU including the Photonics Center, the Technology Commercialization Institute, and Fraunhofer and with external partners and industrial affiliates.

The Boston University Hearing Research Center (HRC) includes 20 faculty members from 6 departments in 4 Boston University schools and colleges. The HRC was formed in 1995 for the development and dissemination of knowledge that will improve the nation's auditory health and allow the fullest utilization of the sense of hearing. The specific goals of the HRC are:

- the encouragement and support of the highest quality research in hearing science and its applications
- the development and support of educational activities, particularly graduate education, in these areas
- the encouragement of collaborative research and teaching activities among faculty and staff from all appropriate units at the University

### AUDITORY NEUROPHYSIOLOGY LABORATORY
Herbert F. Voigt

- Experimental and theoretical studies of the neuronal circuitry in the cochlear nucleus
- Single-and multi-unit recording and analysis techniques used to study the responses of neurons and neural nets to acoustic stimulation
- Intracellular recording and marking techniques associate specific neurons to their physiology
- Computational neural models test hypotheses of cochlear nucleus function.
**BINAURAL HEARING LABORATORY**  
Steve Colburn, Nat Durlach, Barbara Shinn-Cunningham  
Research focuses on studies of binaural interaction, including phenomena such as sound localization for which monaural processing also plays a major role. The goal of these studies is an integrated understanding of binaural interaction and its role in human sound perception including the interpretation of acoustic cues in complex sound environments.

**BIOMIMETIC SYSTEMS LABORATORY**  
David C. Mountain & Allyn E. Hubbard  
Developing large-scale biophysically-based models of the auditory pathways to aid the interpretation and design of physiological and psychophysical experiments and to study auditory models as preprocessors for automated recognition of acoustic signals. Studying natural acoustic signal sources and acoustic environments to understand evolutionary pressures shaping the auditory pathway and to develop computer simulations of natural environments for use as input to auditory models.

**COCHLEAR BIOPHYSICS LABORATORY**  
David C. Mountain, Allyn E. Hubbard  
The long range goal is to improve understanding of the hearing process through a synergistic combination of engineering and physiological techniques (1) Identify, quantify, and model the mechanisms responsible for mechanical sensitivity and frequency selectivity of the mammalian cochlea (inner ear). (2) Research on otoacoustic emissions.

**NATURAL SOUNDS AND NEURAL CODING LABORATORY**  
Kamal Sen  
Electrophysiological techniques are used to record neural responses in the songbird brain. Theoretical methods from areas such as statistical signal processing, systems theory, probability theory, information theory and pattern recognition are applied to characterize how neurons encode natural sounds. Computational models are constructed to understand the processing of natural sounds both at the single neuron and the network level, to model neural selectivity and discrimination, and to explore the role of learning in shaping the neural code.

**NEUROMUSCULAR RESEARCH CENTER (NMRC)**  
Established 1984  
*Carlo J. De Luca, Director*

The NMRC was established in October 1984. Its mission is to increase our understanding of human motor control and improve the quality of life for the neuromuscularly impaired. It pursues these goals by performing basic and applied research, and by developing new techniques and technology in electromyography and biomechanics. The NMRC has active collaborations with various hospitals and clinics in the Boston area as well as research groups in seven countries throughout the world. The NMRC is organized into seven laboratories. Each laboratory is supervised by a faculty member with a scientific staff of research faculty, research assistants, and graduate students, drawn from engineering, medicine, psychology and allied health. The NMRC attracts scientists and researchers from universities throughout the world and has a staff of over 20 professionals and students.

**The Design Lab** is supervised by L. Donald Gilmore. This laboratory develops novel instrumentation that is used by the staff in its investigations. Several devices and specialized electrodes for detecting and analyzing EMG signals have been developed here; for example, the quadrifilar needle electrode, the parallel-bar surface electrode, the Double-Differential detection technique and the Muscle Fatigue Monitor.
The Injury Analysis and Prevention Lab is supervised by Professor Lars I.E. Oddsson. It is dedicated to studies of injury mechanisms related to postural control during slips and falls, lifting and other types of manual load handling. Biomechanical, neurophysiological and epidemiological tools are used to develop a better understanding of mechanisms causing injury. In addition, assistive technologies as well as training methods to improve balance function in individuals with gait and balance problems are developed in the lab. The lab is equipped with "BALDER" a custom-built balance platform used to impose postural perturbations, a video based motion analysis system (APAS), various exercise and strength testing devices as well as EMG equipment.

The Motion Analysis Lab is dedicated to developing and implementing engineering and mathematical concepts to study the neural control and biomechanics of posture and locomotion. It is equipped with two motion analysis systems. The facility also has two permanently installed force platforms, two portable platforms, accelerometers, and EMG equipment.

The Motor Control Lab is supervised by Professor Gerald L. Gottlieb. It is dedicated to the study of voluntary control of human limbs. The aim is to partition and characterize the three major determinants of movement: higher motor centers, reflex mechanism, and muscle properties. The Linear Synergy hypothesis originated in this lab. A specially designed servomotor powered manipulandum is used to study single-joint movements of the upper limb. A motion analysis system is used to study unconstrained movements of the arms and body. This work explores both the normal motor control and the behavior of patients with diverse movement disorders.

The Motor Unit Lab is supervised by Professor Carlo J. De Luca and Alexander Adam. It is dedicated to studying how the brain and spinal cord control the activation of muscle fibers to produce muscle force. The Precision Decomposition Technique was developed here. It is used to identify all the action potentials of concurrently active muscle fibers from the complex EMG signal detected during a muscle contraction. This technique has achieved international recognition and has been used to understand the code used by the central nervous system to excite muscle fibers. The Common Drive and the Onion Skin phenomena of motor unit control were discovered in this lab. Current interests include studies of motor unit control during muscle fatigue.

The Muscle Fatigue Lab is supervised by Professor Serge H. Roy. It is dedicated to developing and implementing surface EMG techniques for objectively measuring muscle fatigue. Current interests include the fatigue process of lower back muscles associated with lower back pain, and the effects of prolonged space flight on antigravity muscles. The Back Analysis System and a novel procedure for monitoring fatigue during Repetitive dynamic activities evolved in this laboratory.

The Surface EMG Lab is supervised by Professor Carlo De Luca. It is dedicated to exploring novel applications of the surface EMG signal. The use of the Median Frequency of the surface EMG signal to track muscle fatigue was developed here. Current interests include the use of EMG signal sensors and Accelerometers to identify specific functional activities performed by an individual during the normal course of the day.
### Distinguished Scientist in BME Seminar Series

| Date: Wednesday – September 14, 2005 | Matthew R. Glucksberg, PhD  
Northwestern University  
- Professor and Chairman, Robert R. McCormick School of Engineering and Applied Sciences, Biomedical Engineering |
| Time: 5 – 6 pm | **Seminar Location:** LSEB – 24 Cummington St (B01 Basement)  
**Title:** A NEW SPECTROSCOPIC TECHNOLOGY FOR MONITORING OF GLUCOSE AND OTHER ANALYTES |

| Date: Wednesday – November 9, 2005 | Banu Onaral, PhD  
Drexel University  
- H.H. Sun Professor and Director, School of Biomedical Engineering, Science & Health Systems |
| Time: 5 – 6 pm | **Seminar Location:** LSEB – 24 Cummington St (B01 Basement)  
**Title:** Near Infrared-Based Functional Optical Brain Monitoring |

| Date: Tentatively Wednesday – February 1, 2006 | George Truskey, PhD  
Duke University  
- Professor and Chair, Department of Biomedical Engineering, Pratt School of Engineering |
| Time: 5 – 6 pm | **Seminar Location:** LSEB – 24 Cummington St (B01 Basement)  
**Title:** Engineering Endothelial Adhesion and Function for Cardiovascular Applications |

| Date: Wednesday – April 5, 2006 | Buddy D. Ratner, PhD  
University of Washington  
- Director, University of Washington Engineered Biomaterials (UWEB)  
Michael L. and Myrna Darland Endowed Chair in Technology Commercialization  
Professor of Bioengineering and Chemical Engineering |
| Time: 5 – 6 pm | **Seminar Location:** LSEB – 24 Cummington St (B01 Basement)  
**Title:** REBUILDING PEOPLE WITH TISSUE ENGINEERING IMPEDEMENTS AND PROGRESS |
The 13th Annual F. A. Bourke Distinguished Lecture in Biotechnology

April 20, 2006
“Smallpox: Is it truly a concern?”
Peter B. Jahrling, Ph.D.
Chief Scientist, NIAID/NIH Integrated Research Facility at Fort Detrick

Center for BioDynamics Seminar Series

Spring 2006 Symposium

Schizophrenia and Dynamics

Monday, March 20th, 1:00pm
BU School of Management, 595 Commonwealth Ave.
Room 426

1:00-1:45 Dr. Don Goff, Mass. General Hospital and Harvard University
“An Introduction to the Phenomenology and Pharmacology of Schizophrenia”

1:45-2:30 Dr. Francine Benes, Harvard Medical School
“Defining Cellular Endophenotypes of Schizophrenia and Bipolar Disorder”

2:30-3:00 Break

3:00-3:45 Dr. Steven Stufflebeam, Harvard Medical School and Martinos Center for Biomedical Imaging
“Disrupted Driven Oscillatory Activity in Schizophrenia”

3:45-4:30 Dr. Miles Whittington, University of Newcastle, UK
“NMDA Receptors, Interneurons and Animals Models of Schizophrenia”

4:30 Reception
### Center for Advanced Genomic Technology Seminar Series

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<th>Title</th>
<th>Speaker</th>
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<tr>
<td>“INFERRING GENE REGULATORY NETWORKS FROM BAYESIAN CLUSTERING OF GENOMIC SEQUENCE AND EXPRESSION DATA”</td>
<td>Mayetri Gupta, PhD</td>
<td>Assistant Professor, Dept. of Biostatistics, School of Public Health, UNC at Chapel Hill</td>
<td>June 22, 2006</td>
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<tr>
<td>“LEARNING VIA QUERIES”</td>
<td>Jiang Chen, PhD</td>
<td>Department of Computer Science, Yale University</td>
<td>June 15, 2006</td>
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<td>“1ST ANNUAL BIOINFORMATICS PROGRAM STUDENT-ORGANIZED SYMPOSIUM”</td>
<td>Edward N. Trifonov, PhD</td>
<td>Head, Genome Diversity Center, Institute of Evolution, University of Haifa, Israel</td>
<td>May 19, 2006</td>
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<td>“DIVERGENCE OF GENE EXPRESSION BETWEEN CLOSELY RELATED SPECIES”</td>
<td>Na'ama Barkai, PhD</td>
<td>Soretta and Henry Shapiro Career Development Chair, Modular Genetics, Weizmann Inst of Science</td>
<td>May 11, 2006</td>
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<tr>
<td>“ALGEBRAIC STRUCTURE OF COMPUTATIONAL PROBLEMS IN HALOTYPE INFERENCE”</td>
<td>Daniel Brown, PhD</td>
<td>Assistant Professor, David R. Cheriton School of Computer Science, University of Waterloo</td>
<td>April 20, 2006</td>
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<tr>
<td>“DISCOVERY AND VALIDATION OF TARGETS FOR ENZYME MEDIATED CANCER IMAGING AND THERAPY”</td>
<td>Lakshman Iyer, PhD</td>
<td>Computational Biologist, Manager of Collaboration and Training, Computational Biology Group, Bauer Center for Genomics Research</td>
<td>April 6, 2006</td>
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<tr>
<td>“ANALYSIS OF GENETIC AND METABOLIC NETWORKS”</td>
<td>Calin Belta, PhD</td>
<td>Assistant Professor, Depts. of Manufacturing Engineering and Aerospace and Medical Engineering, College of Engineering, Boston University</td>
<td>March 23, 2006</td>
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<tr>
<td>“LEARNING SCIENCE FROM PROBE SEQUENCE BASED IMPROVEMENTS OF MICROARRAY ANALYSIS”</td>
<td>Zoltan Szallasi, M.D.</td>
<td>Children's Hospital Informatics Program, Harvard Medical School</td>
<td>March 16, 2006</td>
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<td>“NETWORK INFERENCE AND SENSITIVITY ANALYSIS IN BIOLOGY”</td>
<td>Rudiyanto Gunawan, PhD</td>
<td>Postdoctoral Fellow, Department of Chemical Engineering, University of California, Santa Barbara</td>
<td>March 1, 2006</td>
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<td>“REARRANGEMENTS AND DUPLICATIONS IN TUMOR GENOMES: TOWARDS A CANCER GENOME PROJECT”</td>
<td>Benjamin Raphael, PhD</td>
<td>Postdoctoral Fellow, Department of Computer Science &amp; Engineering, University of California, San Diego</td>
<td>Feb 27, 2006</td>
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<tr>
<td>“ELUCIDATING FUNCTION AND ORGANIZATION OF MOLECULAR NETWORKS: FROM MOLECULES TO A SYSTEM.”</td>
<td>Dana Pe'er, PhD</td>
<td>Postdoctoral Fellow, Department of Genetics, Harvard Medical School</td>
<td>Feb 23, 2006</td>
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<td>Title</td>
<td>Speaker</td>
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<td>&quot;From genome to gene expression: Understanding protein interactions and host-pathogen interactions&quot;</td>
<td>Huiying Li, Ph.D.</td>
<td>Postdoctoral Fellow, UCLA-DOE Institute for Genomics and Proteomics</td>
<td>Feb 16, 2006</td>
</tr>
<tr>
<td>&quot;Data, technology and populations for genomewide association studies&quot;</td>
<td>Itisk Pe'er, Ph.D.</td>
<td>Postdoc Fellow, Prog for Medical and Population Genetics, Broad Institute of MIT and Harvard Univ, Center for Human Genetic Research, MGH</td>
<td>Feb 15, 2006</td>
</tr>
<tr>
<td>&quot;Six ways to touch an elephant -- Modeling different aspects of the biomolecular system&quot;</td>
<td>Chen-Hsiang Yeang, PhD</td>
<td>Postdoctoral Researcher, Center for Biomolecular Science &amp; Engineering, UC Santa Cruz</td>
<td>Feb 10, 2006</td>
</tr>
<tr>
<td>&quot;Integrated modeling in computational proteomics&quot;</td>
<td>Yu Xia, Ph.D.</td>
<td>Postdoctoral Fellow, Department of Molecular Biophysics and Biochemistry, Yale University</td>
<td>Feb 6, 2006</td>
</tr>
<tr>
<td>&quot;Predicting critical aspects of biological mechanisms through Bayesian inference of evolutionary constraints&quot;</td>
<td>Andrew F. Neuwald, Ph.D.</td>
<td>Associate Professor, Cold Spring Harbor Laboratory</td>
<td>Feb 2, 2006</td>
</tr>
<tr>
<td>&quot;Bayesian methods in haplotype inference and disease mapping&quot;</td>
<td>Yu Zhang, Ph.D.</td>
<td>Postdoctoral Fellow, Department of Statistics, Harvard University</td>
<td>Jan 26, 2006</td>
</tr>
<tr>
<td>&quot;Origins and impacts of constraint in molecular evolution&quot;</td>
<td>Boris Shakhnovich, Ph.D.</td>
<td>Res Asst Professor, Bioinformatics Program, BU</td>
<td>Jan 23, 2006</td>
</tr>
<tr>
<td>&quot;The topology of the possible&quot;</td>
<td>Walter Fontana</td>
<td>Professor of Systems Biology, Harvard Medical School</td>
<td>Dec 8, 2005</td>
</tr>
<tr>
<td>&quot;Remote homology inference: What are the limits?&quot;</td>
<td>Nick V. Grishin</td>
<td>HHMI Investigator, Howard Hughes Medical Inst</td>
<td>Dec 1, 2005</td>
</tr>
<tr>
<td>&quot;C. elegans transcription regulatory networks&quot;</td>
<td>Marian Walhout</td>
<td>Assistant Professor, Program in Molecular Medicine &amp; Program in Gene Function and Expression, UMass Medical School</td>
<td>Nov 3, 2005</td>
</tr>
<tr>
<td>&quot;Immunoadhesins and monoclonal antibodies in the treatment of disease: A predictive model for the coupling of target cells to natural killer cells.&quot;</td>
<td>Byron Goldstein</td>
<td>Laboratory Fellow, Los Alamos National Lab</td>
<td>Nov 4, 2005</td>
</tr>
<tr>
<td>&quot;Magic: Integrative and accurate comparative genome mapping&quot;</td>
<td>Firas Swidan</td>
<td>Graduate Student, Computer Science Department, Technion - Israel Institute of Technology</td>
<td>Sept 29, 2005</td>
</tr>
<tr>
<td>&quot;Chromatic and dynamic aspects of the deci&quot;</td>
<td>Edward Marcotte</td>
<td>Assistant Professor, Department of Chemistry and Biochemistry, University of Texas, Austin</td>
<td>July 29, 2005</td>
</tr>
</tbody>
</table>
# Neuromuscular Research Center Seminar Series

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker(s)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, October 27, 2005</td>
<td>Andrew Liu, PhD</td>
<td>Sensorimotor and Human Engineering Issues for Mars Mission Design</td>
</tr>
<tr>
<td>Monday, October 17, 2005</td>
<td>Rolf H. Westgaard, Ph.D.</td>
<td>New insights into the motor control of human trapezius muscle</td>
</tr>
<tr>
<td>Thursday, October 13, 2005</td>
<td>Dr. Kim B. Blair, Director</td>
<td>Teaching and Research at the MIT Center for Sports Innovation</td>
</tr>
<tr>
<td>Thursday, September 15, 2005</td>
<td>Ken Statler, PhD</td>
<td>Chronic Unilateral Vestibular Loss Impairs Vestibular-Somatosensory Reweighting for Postural Control</td>
</tr>
<tr>
<td>Thursday, March 16, 2006</td>
<td>Erika Zemkova, Ph.D.</td>
<td>Sensory Organization Test in Diagnostics of Post-Exercise Postural Stability of Athletes</td>
</tr>
<tr>
<td>Thursday, February 23, 2006</td>
<td>Erika Zemkova, Ph.D.</td>
<td>Our approach to functional diagnostics of sport performance in elite athletes</td>
</tr>
<tr>
<td>Date</td>
<td>Speaker</td>
<td>Title</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>July 15, 2005</td>
<td><strong>Professor Charles E. Smith,</strong> Ph.D.</td>
<td>&quot;Stochastic differential equation models for neural spike activity&quot;</td>
</tr>
<tr>
<td>September 28, 2005</td>
<td><strong>Jennifer M. Groh,</strong> Ph.D.</td>
<td></td>
</tr>
<tr>
<td>October 21, 2005</td>
<td><strong>Peter Tyack,</strong> Ph.D.</td>
<td>&quot;Echolocation of Deep Diving Toothed Whales&quot;</td>
</tr>
<tr>
<td>October 28, 2005</td>
<td><strong>Alex Spector</strong></td>
<td>&quot;Mechanics of Hearing, Mathematical and Computational Methods&quot;</td>
</tr>
<tr>
<td>November 4-5, 2005</td>
<td>BINAURAL BASH</td>
<td></td>
</tr>
<tr>
<td>November 18, 2005</td>
<td><strong>Lisa Olson,</strong> Ph.D.</td>
<td>&quot;Intracochlear pressure, otoacoustic emissions, and forward and reverse cochlear traveling waves&quot;</td>
</tr>
<tr>
<td>December 2, 2005</td>
<td><strong>Bruce Schneider,</strong> Ph.D.</td>
<td>&quot;From Hearing to Cognition: Some Surprising Connections&quot;</td>
</tr>
<tr>
<td>December 9, 2005</td>
<td><strong>Douglas L. Oliver,</strong> Ph.D.</td>
<td>&quot;Laminar organization in the inferior colliculus.&quot;</td>
</tr>
<tr>
<td>December 16, 2005</td>
<td><strong>Arthur Wingfield,</strong> D.Phil.</td>
<td></td>
</tr>
<tr>
<td>January 20, 2006</td>
<td><strong>Maoz Shamir,</strong> Ph.D.</td>
<td>&quot;The challenge of auditory experiments in the MRI scanner and the influence of musicianship on auditory spectro-temporal processing.&quot;</td>
</tr>
<tr>
<td>January 27, 2006</td>
<td><strong>Nadine Gaab,</strong> Ph.D.</td>
<td></td>
</tr>
<tr>
<td>February 3, 2006</td>
<td><strong>Patrick Wolfe,</strong> Ph.D.</td>
<td>&quot;Time-Frequency Representations and Statistical Models for Audio and Auditory Signal Analysis&quot;</td>
</tr>
<tr>
<td>February 10, 2006</td>
<td><strong>Christopher Bergevin</strong></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Speaker</td>
<td>Affiliation</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>February 15, 2006</td>
<td>Prof. Dr. Benedikt Grothe</td>
<td>Chair of Neurobiology, Munich University (LMU)</td>
</tr>
<tr>
<td>February 17, 2006</td>
<td>Michael Buschermöhle</td>
<td>International Graduate School for Neurosensory Science and Systems, University of Oldenburg</td>
</tr>
<tr>
<td>February 24, 2006</td>
<td>Peter Tyack, Ph.D.</td>
<td>Senior Scientist, Woods Hole Oceanographic Institution</td>
</tr>
<tr>
<td>March 03, 2006</td>
<td>Sarah Poissant, Ph.D.</td>
<td>Assistant Professor of Communication Disorders, School of Public Health and Health Sciences, University of Massachusetts, Amherst</td>
</tr>
<tr>
<td>March 17, 2006</td>
<td>Domenica Karavitaki, Ph.D.</td>
<td>Postdoctoral Fellow, Department of Neurobiology, Harvard Medical School</td>
</tr>
<tr>
<td>March 24, 2006</td>
<td>Tianying Ren</td>
<td>Oregon Hearing Research Center, Oregon Health &amp; Science University</td>
</tr>
<tr>
<td>March 31, 2006</td>
<td>Richard Freyman, Ph.D.</td>
<td>Professor, Department of Communication Disorders, School of Public Health and Health Sciences University of Massachusetts, Amherst</td>
</tr>
<tr>
<td>April 14, 2006</td>
<td>Barbara Shinn-Cunningham, Ph.D.</td>
<td></td>
</tr>
<tr>
<td>April 21, 2006</td>
<td>Mal Teich, Ph.D.</td>
<td>Professor, Electrical and Computer Engineering and Biomedical Engineering, Boston University</td>
</tr>
<tr>
<td>May 5, 2006</td>
<td>Shigeyuki Kuwada, Ph.D.</td>
<td>Professor, Department of Neuroscience, University of Connecticut Health Center</td>
</tr>
<tr>
<td>June 1, 2006</td>
<td>Ruth Litovsky, Ph.D.</td>
<td>Department of Communicative Disorders, University of Wisconsin, Madison</td>
</tr>
</tbody>
</table>
GRADUATE PROGRAM

Committee Members and Charge

During Academic Year 2005-06 Department of Biomedical Engineering Graduate Committee members were: Irving Bigio, Chair, Steve Colburn, Maxim Frank-Kamenetskii, Mark Grinstaff, David Mountain, and Joyce Wong.

The Admissions Committee members were: Ed Damiano, Director, Jerome Mertz, Kamal Sen, Joe Tien, Sandor Vajda, Lucia Vaina, and Zhiping Weng. The mission of the admissions committee was:

- Review, admit and recruit all applicants to the M.S., Ph.D., and M.D./Ph.D. graduate programs.
- Identify financial aid candidates for new and continuing students. Forms of financial aid include departmental, college and university fellowships.

The central mission of the Graduate Committee is the governance and administration of the graduate programs (M.S., Ph.D. and M.D./Ph.D.) within the Biomedical Engineering Department. This mission is carried through the following specific activities:

- Develop and maintain quality graduate M.S. and Ph.D. curriculum.
- Develop policies and procedures associated with the curriculum and maintain written set of guidelines.
- Manage, administer and grade the Biomedical Engineering Ph.D. Qualifying Examinations.
- Review student petitions, waivers and appeals.
- Maintain and review academic records of applicants and continuing students, including tracking the degree progress of each student.
- Advertise the graduate programs (web page, Departmental brochures, bulletins, Peterson’s Guides, etc.).

- Contribute to the Annual Reports of the Department and the College of Engineering.

The above list emphasizes day-to-day management of the graduate program. A more global mission is to improve the national ranking of the department’s graduate program. The committee takes on extremely demanding responsibilities.

Recruitment

Recruitment of outstanding students is one of the Admissions Committee’s and Graduate Committee’s most crucial, challenging, and time-consuming tasks. In AY 2005-06, our main goal was to recruit a class of 18-20 new PhD students, while continuing to improve the quality of matriculants. Our second goal was to recruit a small group of MS students, also of outstanding quality. Graduate recruitment was made more challenging by the explosive growth of BME graduate programs in the United States in the last few years, but we were very successful in meeting our goals.

Our recruiting efforts included: updating and continual development of the web site, and the Annual Graduate Recruitment visit (attended by 46 students over two visits; 19 of the visitors are joining our program).

This year our program received 463 applications, of which 97 were accepted (Table 1). We made offers of financial aid to 61 students, including both fellowships and ½ tuition scholarships. We successfully recruited 28 students (24 PhD, 4 MS) to form the entering class in fall 2006. Four new students matriculated in January 2006, and three students switched degree programs in January 2006. As has been typical over the last few years, we have competed directly with the top programs in Biomedical Engineering in recruiting the best students.
Table 1. Recruiting Statistics for AY 2005 – 2006

<table>
<thead>
<tr>
<th>Category</th>
<th>AY 2005 – 2006</th>
<th>Fall 2006 Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS</td>
<td>PhD</td>
</tr>
<tr>
<td>US Male</td>
<td>58</td>
<td>110</td>
</tr>
<tr>
<td>US Female</td>
<td>32</td>
<td>67</td>
</tr>
<tr>
<td>International Male</td>
<td>30</td>
<td>81</td>
</tr>
<tr>
<td>International Female</td>
<td>27</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total number of applicants</strong></td>
<td>147</td>
<td>314</td>
</tr>
<tr>
<td><strong>Admissions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS</td>
<td>PhD</td>
</tr>
<tr>
<td>US Male</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>US Female</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>International Male</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>International Female</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total number of admissions</strong></td>
<td>23</td>
<td>76</td>
</tr>
<tr>
<td><strong>Matriculations</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>MS</td>
<td>PhD</td>
</tr>
<tr>
<td>US Male</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>US Female</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>International Male</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>International Female</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total number of matriculates</strong></td>
<td>16</td>
<td>28</td>
</tr>
</tbody>
</table>
### Table 2. Financial Aid Summary AY 2005 – 2006

<table>
<thead>
<tr>
<th>Financial Aid Summary</th>
<th>Nominated</th>
<th>Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dean’s Fellowships</strong> (stipend &amp; tuition included)</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td><strong>NIH Training Program</strong> (stipend &amp; tuition included)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Total Student Funded:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>WHITAKER BME FELLOWSHIPS</strong> (stipend &amp; tuition included)</td>
<td>41</td>
<td>15</td>
</tr>
<tr>
<td><strong>WHITAKER FOUNDATION FELLOWSHIP</strong> (stipend &amp; tuition included)</td>
<td>1 Salisbury 2003</td>
<td></td>
</tr>
<tr>
<td><strong>TEACHING FELLOWSHIPS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Equivalents (Fall, Spring)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(BME has instituted a teaching requirement for PhD Students)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-Year GTF (both semesters)</td>
<td>MS</td>
<td>PhD</td>
</tr>
<tr>
<td>US: 0</td>
<td>US: 0</td>
<td></td>
</tr>
<tr>
<td>Int’l: 0</td>
<td>Int’l: 0</td>
<td></td>
</tr>
<tr>
<td>Partial Year GTF (one semester only)</td>
<td>MS</td>
<td>PhD</td>
</tr>
<tr>
<td>US: 1</td>
<td>US: 17</td>
<td></td>
</tr>
<tr>
<td>Int’l: 0</td>
<td>Int’l: 6</td>
<td></td>
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<tr>
<td><strong>TUITION SCHOLARSHIPS</strong> (Special Unit 16 for Partial Tuition Awards and Non-Grasp Eligible Grants)</td>
<td></td>
<td></td>
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<tr>
<td>Total Equivalent</td>
<td>MS: 9</td>
<td>PhD: 30</td>
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<tr>
<td>MS: 14</td>
<td>PhD: 93</td>
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<tr>
<td>US: 11</td>
<td>US: 56</td>
<td></td>
</tr>
<tr>
<td>Int’l: 3</td>
<td>Int’l: 37</td>
<td></td>
</tr>
<tr>
<td><strong>RESEARCH ASSISTANTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS: 11</td>
<td>PhD: 6</td>
<td></td>
</tr>
<tr>
<td><strong>MISCELLANEOUS FUNDING SUPPORT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1, supported by industry</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4, independent</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>1 Martin LutherKing Fellowships</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>1 CBD Fellowships</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4 ½ Tuition Scholarships</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>1 Full Tuition Scholarships</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>1 Leave of Absences</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>
Of the 28 matriculating students in fall 2006, 21 are fully funded, 2 students will be funded through LEAP, 2 students will be funded with their own NSF Fellowships, and 3 students have independent funding. 24 of 28 new matriculants are entering the PhD program, 20/24 are from domestic universities. New students come to us from several strong programs, including Ben Gurion University, Bowdoin College, Indian Institute of Technology, Kalamazoo College, Lehigh University, M.I.T., Nanjing University, Northwestern University, Penn State University, Rensselaer Polytechnic Institute, Stanford University, State University of New York, Union College, University of Hong Kong, University of Michigan, University of Florida, University of Pennsylvania, University of Washington (2), Vanderbilt University, and our own Boston University (4).

Numerical scores of entering students have continued to rise. The entering PhD class has a mean undergraduate GPA of 3.7 (US students only).

Recruitment of underrepresented minorities remained a challenge and a priority in AY 05-06. Despite aggressive efforts in advertising and recruiting, we received only a small number of applications from underrepresented minorities.
Table 3. Department of Biomedical Engineering Fall 2006 Matriculates

<table>
<thead>
<tr>
<th>Program</th>
<th>Name</th>
<th>Citizenship</th>
<th>Previous Institution</th>
<th>Degree &amp; Year</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>Rinehold, Brett</td>
<td>US</td>
<td>University of Pittsburgh Boston University</td>
<td>BS Biology 2003 LEAP BME 2006</td>
<td>LEAP Funding</td>
</tr>
<tr>
<td>MS</td>
<td>Ritter, Michael</td>
<td>US</td>
<td>Colgate University Boston University</td>
<td>BA Physics 2005 LEAP BME 2006</td>
<td>LEAP Funding</td>
</tr>
<tr>
<td>MS</td>
<td>Wolfson, Aaron</td>
<td>US</td>
<td>Boston University</td>
<td>BS BME 2006</td>
<td>RA Steve Colburn</td>
</tr>
<tr>
<td>MS</td>
<td>Zavadil, Anne</td>
<td>US</td>
<td>Boston University</td>
<td>BS BME 2006</td>
<td>RA Bela Suki</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Allen, Patrick</td>
<td>US</td>
<td>Union College</td>
<td>BS MechE 2006</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Anderson, Brett</td>
<td>US</td>
<td>University of Washington</td>
<td>BS Bioengineering/EE 2006 Deans Fellowship</td>
<td></td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Boulet, Greg</td>
<td>US</td>
<td>Boston University</td>
<td>BS BME 2006 No Aid</td>
<td></td>
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<tr>
<td>MS/PhD</td>
<td>Campagna, Lisa</td>
<td>US</td>
<td>Boston University</td>
<td>BS BME 2006</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Cusack, William</td>
<td>US</td>
<td>Rensselaer Polytechnic Inst</td>
<td>BS BME 2006</td>
<td>BME Fellow</td>
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<tr>
<td>MS/PhD</td>
<td>Fichtenholtz, Alexander</td>
<td>US</td>
<td>University of Washington</td>
<td>BS Neurobiology 2006 BS Applied &amp; Comp Math 2006</td>
<td>BME Fellow</td>
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<tr>
<td>MS/PhD</td>
<td>Foley, Jonathan</td>
<td>US</td>
<td>Boston University</td>
<td>BS BME 2006</td>
<td>Deans Fellowship</td>
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<tr>
<td>MS/PhD</td>
<td>Garay, Christopher</td>
<td>US</td>
<td>Vanderbilt University</td>
<td>BS BME 2006</td>
<td>NIH Training Grant</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Kinahan, Michelle</td>
<td>US</td>
<td>University of Florida</td>
<td>BS MatSci</td>
<td>NSF Fellowship</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>LaManna, Caroline</td>
<td>US</td>
<td>SUNY, Stony Brook</td>
<td>BE BME 2006</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Larson, Eric</td>
<td>US</td>
<td>Kalamazoo College</td>
<td>BA Math &amp; Physics 2006</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Litcofsky, Kevin</td>
<td>US</td>
<td>University of Pennsylvania</td>
<td>BS Bioengineering 2006</td>
<td>Deans Fellowship</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Lyford, Nicholas</td>
<td>US</td>
<td>Bowdoin College</td>
<td>AB Physics 2002</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Maddox, Ross</td>
<td>US</td>
<td>University of Michigan</td>
<td>BS Sound Engineering 2006</td>
<td>BME Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Modi, Sheetal</td>
<td>US (Per Res)</td>
<td>Stanford University</td>
<td>BS Biomedical Comp 2006 BME Fellow</td>
<td></td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Parmar, Varun</td>
<td>India</td>
<td>Indian Inst of Technology</td>
<td>BTech 2006</td>
<td>Deans Fellowship</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Singer, Alon</td>
<td>Canada</td>
<td>Ben Gurion University</td>
<td>BS Biotechnology 2006</td>
<td>Photonics Fellow</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Ta, Terence</td>
<td>US</td>
<td>MIT</td>
<td>BS ChemE 2006</td>
<td>Pharm TG</td>
</tr>
<tr>
<td>MS/PhD</td>
<td>Truslow, James</td>
<td>US</td>
<td>Oberlin University</td>
<td>BA Physics 2000 LEAP BME 2005 MS BME</td>
<td>RA Joe Tien</td>
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<tr>
<td>MS/PhD</td>
<td>Wong, Ho Ki Keith</td>
<td>Hong Kong</td>
<td>University of Hong Kong</td>
<td>BE MechE 2006</td>
<td>BME Fellowship</td>
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<td>MS/PhD</td>
<td>Xu, Jie</td>
<td>PRC</td>
<td>Nanjing University</td>
<td>BS BME 2006</td>
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<td>MS/PhD</td>
<td>Yao, Raphael</td>
<td>Singapore</td>
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<tr>
<td>MS/PhD</td>
<td>Zubris, Kimberly</td>
<td>US</td>
<td>Lehigh University</td>
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<td>NIH Training Grant</td>
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<tr>
<td>PmsPhD</td>
<td>Weaver, Katherine</td>
<td>US</td>
<td>Penn State University</td>
<td>BS Engineering Science 2005</td>
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Total PhD: 24
- Male: 13
- Female: 6

Total MS: 4
- Male: 3
- Female: 1

Total MD/PhD: 0
- Male: 0
- Female: 0
Initiatives, from Academic Year 2004-2005

- An admissions committee was formed for the first time. Prof. Ed Damiano served as Director of Graduate Admissions, allowing Prof. Bigio to focus more on current students.

- AY 2005-2006 was the 5th year of the NIH training program in Quantitative Biology and Physiology. The program now has 13 trainees total, including 3 underrepresented minorities. Two students, including one minority student, will join in September 2006. The NIH journal club continues to be student run. Program Directors, Ken Lutchen, Irving Bigio and John White met with trainees on a number of occasions throughout the academic year, to have lunch and discuss the program’s strengths and weaknesses. In collaboration with the Provost Office, NIH trainees were given exposure to issues in ethics during the academic year.

- In AY 2004-05 the written PhD qualifying exam was replaced by a new oral qualifier examination, which is closely tied to the core curriculum.

- In October 2005, the NIH Trainees held their second symposium, largely run by the students. More advanced students present their thesis work, along with some outside guests of the students.

- Improving the web page. Recognizing that prospective students get much of their information from the departmental web site, we considered it a priority to update and improve the site. Improvements to the web site included better organization of financial aid information, as well as updates of pages describing faculty research. This project is ongoing.

- In fall 2005, Prof. Bigio offered the graduate students a seminar on effective presentation skills. During the fall 2006, we will continue to offer career planning seminars on grant writing, presentation skills and CV writing.

Graduate Student Accomplishments


Five BME graduate students received special recognition this year. Mr. David Andrew Wellman received a Fellow-Faculty Award from the American Heart Association, which allotted him a five year grant. Ms. Hemali Patel received a student travel award for attending a conference on Molecular Genetics of Bacteria and Phage August 22-26. Mr. Barrett Nehilla received a graduate student grant.
from the American Foundation for Aging Research. Mr. Roberto Reif received the Best Poster award at the Optical Society of America conference March 19-22. Ms. Kerry Lee Anderson also won an award for having a poster in the top three at the Optical Society of America conference.

Table 4 Department of Biomedical Engineering Graduate Student Presentations at Conferences
AY 2005–2006

<table>
<thead>
<tr>
<th>Name</th>
<th>Conference</th>
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<tbody>
<tr>
<td>AFFONCE, Derek</td>
<td>Biomedical Engineering Society</td>
</tr>
<tr>
<td></td>
<td>September 28 – October 1, 2005 in Baltimore, MD</td>
</tr>
<tr>
<td></td>
<td>Poster Title: Parenchymal Tethering vs. Airway Wall Stiffness on In Vivo Airway Dilation During a Deep Inspiration</td>
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<td></td>
<td>American Thoracic Society</td>
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<tr>
<td></td>
<td>May 20-24, 2006 in San Diego, CA</td>
</tr>
<tr>
<td></td>
<td>Poster Title: Effects of Static and Dynamic Physiological Pre-Loading on Airway Smooth Muscle Reactivity</td>
</tr>
<tr>
<td>ANDERSON, Kerry Lee</td>
<td>Optical Society of America: Biomedical Optics Topical Meeting</td>
</tr>
<tr>
<td></td>
<td>March 19-22, 2006 in</td>
</tr>
<tr>
<td></td>
<td>Poster Title: An Optical Method for Assessing Angioenesis: Preliminary Results</td>
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<tr>
<td>AZOUZ, Solomon</td>
<td>American Association of Thoracic Surgeons</td>
</tr>
<tr>
<td></td>
<td>May 2 in Philadelphia, PA</td>
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<tr>
<td></td>
<td>Presentation Title: Prevention of Local Tumor Growth with Paclitaxel Loaded Microspheres</td>
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<tr>
<td>CALABRO, Finnegan</td>
<td>Vision Sciences Society 5th Annual Meeting</td>
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<tr>
<td></td>
<td>May 4-10, 2006 in Sarasota, FL</td>
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<tr>
<td></td>
<td>Poster Title: Perception of Stereomotion Coherence in the Presence of Planar or Volumetric Dynamic Noise</td>
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<td>CAREY, Ryan</td>
<td>ASEE/IEEE Frontiers in Education Conference</td>
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<tr>
<td></td>
<td>October 19-22, 2005 in Indianapolis, IN</td>
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<tr>
<td></td>
<td>Presentation Title: Self-paced Laboratory Modules for Biomedical Engineering Undergraduates</td>
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<tr>
<td>CHU, Ken</td>
<td>Optical Society of America (OSA) Biomedical Optics</td>
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<td></td>
<td>March 19-22, 2006 in Ft. Lauderdale, FL</td>
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<td></td>
<td>Presentation Title: Graded-Field Autoconfocal Microscopy</td>
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<td>CHUNG, Yoojin</td>
<td>29th Association for Research in Otolaryngology Midwinter Meeting</td>
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<tr>
<td></td>
<td>February 5-9, 2006 in</td>
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<tr>
<td></td>
<td>Poster Title: Network Model of Auditory Space Map in Barn Owl ICs</td>
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<tr>
<td>DEANS, Tara</td>
<td>Sixth International Conference on Systems Biology</td>
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<td></td>
<td>October 19-24, 2005 in Boston, MA</td>
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<td></td>
<td>The American Society for Cell Biology</td>
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<td>December 10-14, 2005 in San Francisco, CA</td>
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<td>Women in Research at The Museum of Science</td>
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<td></td>
<td>April 1, 2006 in Boston, MA</td>
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<td>Poster Title: A Modular, Tunable Mammalian Gene Switch Based on RNAi and Repressor Proteins</td>
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<td>DUNCANSON, Wynter</td>
<td>Society for Biomaterials</td>
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<td>April 26-29, 2006 in Pittsburgh, PA</td>
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<td></td>
<td>Presentation Title: Development and Characterization of Novel Targeted Lipid-Polmer Microcapsules</td>
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<tr>
<th>Name</th>
<th>Event</th>
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<tr>
<td>FREEMAN, Dan</td>
<td>Symposium in Quantitative Physiology and Biology</td>
<td>October 2005 in Boston, MA</td>
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<td>Presentation Title: <em>Light and Contrast Sensitive Gain Controls in the Retina</em></td>
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<td>Association of Research in Vision and Ophthalmology</td>
<td>April 30 – May 3, 2006 in Ft. Lauderdale, FL</td>
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<td>Poster Title: <em>Effects of Remote Gratings on Human Grating Acuity</em></td>
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<td>Poster Title: <em>Utility of MEG and EEG in the Localization of Interictal Spikes: A Simulation Study</em></td>
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<td>KAUFMAN, Jessica</td>
<td>Materials Research Society – Fall Meeting</td>
<td>November 28-December 2, 2006 in Boston, MA</td>
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<td></td>
<td>Presentation Title: <em>Biomimetic Neuroregenerative Tubes to Simulate the Mechanical Properties of Nerve Injury Sites</em></td>
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<tr>
<td>KENYON, Jennifer</td>
<td>The International Society for Magnetic Resonance in Medicine 14th Scientific Meeting</td>
<td>May 6 – 12, 2006 in Seattle, WA</td>
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<td>Presentation Title: <em>Image Functional Modeling (IFM) using Hyperpolarized Helium MRI</em></td>
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<td>American Thoracic Society (ATS) Conference</td>
<td>May 19-24, 2006 in San Diego, CA</td>
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<tr>
<td></td>
<td>Poster Title: <em>Whole Lung Image Functional Modeling (IFM) Using Hyperpolarized Helium MRI: Deep-Inspiration Response in Asthmatics</em></td>
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<tr>
<td>KOHANSKI, Michael</td>
<td>Keystone Symposia Systems Biology: Integrating Biology, Technology, and Computation</td>
<td>March 5-10, 2006 in Taos, New Mexico</td>
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<td>Poster Title: <em>Quinolone-Induced Death in <em>E. coli</em> Involves Iron-Mediated Redox Cycling</em></td>
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<td>Krueger, Andrew</td>
<td>International Conference on Complex Systems</td>
<td>June 25-30, 2006 in Boston, MA</td>
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<td>Presentation Title: <em>Inferring Network Connectivity with Combined Perturbations</em></td>
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<td>LAPRAD, Adam</td>
<td>Biomedical Engineering Society Conference</td>
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<td>Poster Title: <em>An Isolated Airway System to Study Airway Wall Properties</em></td>
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<td>LILLIS, Kyle</td>
<td>NIH Quantitative Biology and Physiology Symposium</td>
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<td>Presentation Title: <em>Post-synaptic Involvement in Short-Term Plasticity</em></td>
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<td>Society for Neuroscience Conference</td>
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<td>Poster Title: <em>Firing Rate Modulates EPSP Magnitude via Glycine Receptors in CA1 Pyramidal Cells</em></td>
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<td>Program in Mathematical and Computation Neuroscience Poster Session</td>
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<td>NSTI Nanotech Conference</td>
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<td>NEWBURG, Seth</td>
<td>The Ninth “Mechanics of Hearing” Workshop</td>
<td>Biomechanics of Dolphin Hearing: Comparison with Other Mammalian Species</td>
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<td>July 23-28, 2005 in Portland, OR</td>
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<td>Biomechanics of Dolphin Hearing: Comparison with Other Mammalian Species</td>
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<td>NORMAN, James</td>
<td>International Workshop on Nanophotonics and Nanobiotechnology</td>
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<td>June 28-July 8, 2005 in Istanbul, Turkey</td>
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<td>Controlling Three-Dimensional Cellular Organization and Growth Using a Composite Polydimethylsiloxane-collagen Tissue Scaffold</td>
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<td>Current Progress in Tissue Engineering and Regenerative Medicine: Scientific and Business Update CIMIT</td>
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<td>September 29-30, 2005 in Boston, MA</td>
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<td>June 25-30, 2006 in New London, CT</td>
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<td>Microstructures in Three Dimensional Gel Suspensions for the Growth of Cells</td>
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<td>Palomares, Kristy TS</td>
<td>27th Annual Meeting of the American Society for Bone and Mineral Research</td>
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<td>September 23-27, 2006 in Nashville, TN</td>
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<td>Mechanobiological Regulation of Molecular Expression and Tissue</td>
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<td>Differentiation During Bone Healing</td>
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<td>52nd Annual Meeting of the Orthopaedic Research Society</td>
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<td>PARAMESWARAN, Harikrishnan</td>
<td>International Conference on Complex Systems</td>
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<tr>
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<td>June 25-30, 2006 in Boston, MA</td>
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<tr>
<td></td>
<td>Presentation Title:</td>
<td>Relating Microscopic an Macroscopic Indices of Alveolar Destruction in Emphysema</td>
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</table>

**Current Status of the Graduate Program**

The graduate program size is currently 142 students; 17 students completed the PhD (Table 6B) this year, and 7 students completed the MS (Table 7). Emphasis has been placed this year on reviewing student status, and encouraging steady progress through the program. To date, 83 PhD’s in Biomedical Engineering have been awarded since 1991, but the rate is increasing significantly.
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANDERSON, Kerry Lee</td>
<td>Optical Monitoring of Tumor Angiogenesis</td>
<td>Prospectus Committee: Irving Bigio, Ph.D., Advisor</td>
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<tr>
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<td>Shyam Sunder Erramilli, Ph.D., John Frangioni, Ph.D., Jerome Mertz, Ph.D., Joyce Wong, Ph.D.</td>
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<tr>
<td>BANGERA, Nitin</td>
<td>Development and Validation of a Realistic Forward Model for EEG/MEG</td>
<td>Prospectus Committee: Anders Dale, Ph.D., Research Advisor and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solomon Eisenberg, Ph.D., Academic Advisor</td>
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<tr>
<td></td>
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<td>John A. White, Ph.D., H. Steven Colburn, Ph.D.</td>
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<tr>
<td>BHATTACHARYYA, Arpita</td>
<td>Fabrication of Polymeric Microfluidic Devices for Diagnostic</td>
<td>Prospectus Committee: Catherine M. Klapperich, Ph.D., Advisor</td>
</tr>
<tr>
<td></td>
<td>Application</td>
<td>John A. White, Ph.D., Thomas Bifano, Ph.D., Lallit Anand, Ph.D.</td>
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<tr>
<td>DESBIENS, Sophie</td>
<td>GABA-B Receptor Regulation by CREB and Estrogen with Applications to</td>
<td>Prospectus Committee: David H. Farb, PhD, Research Advisor and</td>
</tr>
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<td></td>
<td>Cocaine Addiction</td>
<td>John A. White, Ph.D., Academic Advisor</td>
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<td>James Collins, Ph.D., Joe Z. Tsets, Ph.D., Shelley J. Russek, Ph.D.</td>
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<tr>
<td>DUNCANSON, Wynter</td>
<td>Development of Targeted Polymer Ultrasound Contrast Agents</td>
<td>Prospectus Committee: Joyce Wong, Ph.D., Advisor</td>
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<td>Joseph Backer, Ph.D., Robin C. Cleveland, Ph.D., Ed Damiano, Ph.D.</td>
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<td>R. Glynn Holt, Ph.D.</td>
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<tr>
<td>FREEMAN, Daniel</td>
<td>Light and Contrast Sensitive Gain Controls in the Retina</td>
<td>Prospectus Committee: Chris Passaglia, Ph.D., Advisor</td>
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<td>Paul Cook, Ph.D., John A. White, Ph.D., Kamal Sen, Ph.D.</td>
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<tr>
<td>KAUFMAN, Jessica</td>
<td>Quantitative Model of Neurite Extension as a Function of the</td>
<td>Prospectus Committee: Catherine M. Klapperich, Ph.D., Advisor</td>
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<td>Viscoelastic Parameters of the Biomaterial and the Cell-Substrate</td>
<td>John A. White, Ph.D., Joyce Wong, Ph.D., Elise F. Morgan, Ph.D.</td>
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<td>Interactions</td>
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<td>KHAN, Alvin</td>
<td>Cetacean Hearing and the Impact of Naval Sonar</td>
<td>Prospectus Committee: David Mountain, Ph.D., Advisor</td>
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<td></td>
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<td>Assad Obeeri, Ph.D., Allyn Hubbard, Ph.D., Elise F. Morgan, Ph.D.</td>
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<td>LIANG, Zhuang Li</td>
<td>Super-Resolution CT Imaging of Coronary Arteries with Calcification</td>
<td>Prospectus Committee: W. Clem Karl, Ph.D., Advisor</td>
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<td>H. Steven Colburn, Ph.D., Janusz Konrad, Ph.D., Homer Pien, Ph.D.</td>
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<tr>
<td>MANGIARDI, Dominic</td>
<td>Quantitative 2D and 3D Spatial Analysis of Aminoglycoside-Induced</td>
<td>Prospectus Committee: David Mountain, Ph.D., Advisor</td>
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<td></td>
<td>Hair Cell Death and Regeneration in the Avian Cochlea</td>
<td>Douglas Cotanche, Ph.D., Jerome Mertz, Ph.D., Janusz Konrad, Ph.D.</td>
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<tr>
<td>NARAYAN, Rajiv</td>
<td>Discrimination of Complex Sounds by Cortical Neurons</td>
<td>Prospectus Committee: Kamal Sen, Ph.D., Advisor</td>
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<td>H. Steven Colburn, Ph.D., Barbara Shin-Cunningham, Ph.D., John A. White, Ph.D.</td>
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<td>NEWBURG, Seth</td>
<td>Determining the Mechanical Coupling Between Outer Hair Cell Motility and Inner Hair Cell Stimulation</td>
<td>Prospectus Committee: David Mountain, Ph.D., Advisor</td>
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<td>H. Steven Colburn, Ph.D., Allyn Hubbard, Ph.D., Paul Barbone, AME</td>
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<tr>
<td>NORMAN, James</td>
<td>The Role of Reactive Forces in the Control of Fibroblast Proliferation in Three-Dimensional Gels Using Polymeric Micoroids</td>
<td>Prospectus Committee: Tejal A. Desai, Ph.D., Advisor</td>
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<td></td>
<td></td>
<td>Catherine M. Klapperich, Ph.D., Brenda Russell, Ph.D., Dimitrije Stamenovic, Ph.D.</td>
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<tr>
<td>PARAMESWARAN, Harikrishnan</td>
<td>Relating Microscopic and Macroscopic Indices of Alveolar Structure:</td>
<td>Prospectus Committee: Bela Suki, Ph.D., Advisor</td>
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<td>Applications for Emphysema</td>
<td>Wayne Mitzner, Ph.D., Dimitrije Stamenovic, Ph.D.,</td>
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<td>Kenneth R. Latchen, Ph.D., Elise F. Morgan, Ph.D.</td>
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<td>REIF, Roberto</td>
<td>Development of a Method of Optical Pharmacokinetics with Depth</td>
<td>Prospectus Committee: Irving Bigio, Ph.D., Advisor</td>
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<td>Sensitivity</td>
<td>David Boas, Ph.D., Shyamsunder Erramilli, Ph.D., Jerome Mertz, Ph.D., Joyce Wong, Ph.D.</td>
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<td>ROSENBLATT, Noah</td>
<td>The Effects of Mechanical Distending stress on the Rheology of</td>
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<td>Adherent Cells</td>
<td>Bela Suki, Ph.D., Joyce Wong, Ph.D., Adriano Alencar, Ph.D., Ning Wang, Ph.D.</td>
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<td>SCHOENER, Kurt</td>
<td>Novel Methods for Optically Imaging Neuronal Activity of Small</td>
<td>Prospectus Committee: Irving Bigio, Ph.D., Advisor</td>
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<td>Networks with High Spatiotemporal Resolution</td>
<td>David Boas, Ph.D., Jerome Mertz, Ph.D., John A. White, Ph.D.</td>
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<tr>
<td>Name</td>
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<td>SLEIMAN-HAIDAR, Jaafar</td>
<td>Redesigning the TCR/pep-MHC Interface: A Computational and Experimental Analysis of Entropic Influences on Protein-Protein Interactions</td>
<td>Charles DeLisi, Ph.D., Maxim Frank-Kamenetskii, Ph.D., Sandor Vaida, Ph.D.</td>
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<td>THAMMANOMAI, Apiradee</td>
<td>Effects of Variable Ventilation on Lung Physiology and Biology in Mice</td>
<td>Elizabeth Bartolak-Suki, Ph.D.</td>
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<td>TONG, Weiwei</td>
<td>Bioinformatics Studies on Protein Interactions and Identifications</td>
<td>Catherine Costello, Ph.D.</td>
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<td>YAN, Jie</td>
<td>A Monaural Model for Duration Coding in the Auditory Systems</td>
<td>Douglas L. Oliver, Ph.D.</td>
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<td>AROLDO, Stephen</td>
<td>Effects of Strain on the Pulmonary Epithelium</td>
<td>James Collins, Ph.D., Chair; Susan Margulies, Ph.D.; Kenneth Lutchen, Ph.D.; Edward Ingenito, Ph.D.; Joe Tien, Ph.D.</td>
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<td>BELLARDINE, Carissa</td>
<td>A Dynamic Systems Approach to the Development and Application of New Mechanical Ventilator Technologies</td>
<td>Bela Suki, Ph.D., Andrew Hoffman, Ph.D.; Edward Ingenito, Ph.D.</td>
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<td>BLACK, Lauren</td>
<td>Mechanical and Failure Properties of Lung and Engineered Tissues as a Function of Structural Protein Composition</td>
<td>Dimitrije Stamenovic, Ph.D., Chair; Phillip Stone, Ph.D.; Joyce Wong, Ph.D.</td>
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<td>Joyce Wong, Ph.D.; H. Steven Colburn, Ph.D.; Andrew Hoffman, Ph.D.</td>
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<td>GOLDENHOLZ, Daniel</td>
<td>Spatiotemporal Techniques in Multimodal Imaging for Brain Mapping and Epilepsy</td>
<td>Jerome Mertz, Ph.D.; Irving Bigio, Ph.D.; Steve Stufflebeam, Ph.D.; Matti Hamalainen, Ph.D.</td>
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<td>JIN, Ge</td>
<td>The 370C Incubation of Human Red Blood Cells Studies of In Vitro Senescence and Evaluation of Viability of Stored Red Blood Cells</td>
<td>Andrew Jackson, Ph.D., Chair; Marc Heng, Ph.D.; Haya Herscovitz, Ph.D.; Tatsuro Yoshida, Ph.D.</td>
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<td>SCARPACI, Jacob</td>
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<td>Synthesizing Imaging and Computational Models to Link Heterogeneous Mechanical and Ventilation Dysfunction in Asthma</td>
<td>Scott Harris, Ph.D.</td>
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</tbody>
</table>
Future Initiatives

- Improving outreach to minority applicants. Experience in AY 05-06 emphasizes how difficult it is to recruit minority applicants. In the future, we will attempt to recruit students from traditionally minority universities more vigorously, with visits, multiple mailings and personal phone calls to engineering and physics faculty and students at such schools. We will also attempt to make use of personal contacts in other well-known BME departments to encourage their minority students to apply and matriculate at BU.
Undergraduate Program

The undergraduate Biomedical Engineering program continues to be one of the largest programs in the country. Our entering class of 107 is 35% of the College of Engineering’s freshman class. This year, we awarded 67 Bachelor of Science degrees, 25% of the BS degrees awarded by the College of Engineering. Program Statistics appear below in Table 1. Figure 1 shows the BME enrollment history since 1992.

Mission Statement

The faculty of the Biomedical Engineering Department at Boston University is dedicated to providing the highest quality education, research and industrial opportunities for our students. We are committed to remain among the best Biomedical Engineering programs in the world through excellence in teaching and research. We expect our graduates to become well-rounded citizens, leaders and successful practitioners of biomedical engineering or of other fields, if they so choose.

Educational Objectives

- To prepare students to become professional biomedical engineers who have fundamental knowledge of modern engineering and scientific principles and are able to apply these to solve problems in engineering, biology, physiology, and/or medicine.
- To cultivate our students’ problem-solving skills, their creativity, and their ability to think critically and independently.
- To prepare students to be successful in the workplace utilizing non-technical skills, including oral and written communication skills, teamwork, leadership, and ethical and societal responsibility.
- To provide students with practical engineering experience and opportunities through hands-on laboratory courses, internships, co-ops, senior projects, and other research opportunities.
- To evaluate and improve continuously our academic program by incorporating ongoing relationships with our alumni and with industrial and academic partners.
Table 1. Academic Year 2005-2006 Enrollment and Degree Statistics.

<table>
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<tr>
<th>ENROLLMENT - AY 2005</th>
<th>Biomedical Engineering</th>
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<tbody>
<tr>
<td></td>
<td>Female</td>
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<tr>
<td>Freshman</td>
<td>44</td>
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<tr>
<td>Sophomore</td>
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<td>Junior</td>
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<td>Senior</td>
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<th>ENROLLMENT - AY 2005</th>
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<tr>
<td>May 2006</td>
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<td>239</td>
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Figure 1. BME Enrollment History
Undergraduate Committee

The primary responsibility of the Department's Undergraduate Committee is to oversee the undergraduate curriculum in Biomedical Engineering. As such, the committee serves as the focal point for continued review and further development of the undergraduate programs. The committee also oversees ABET accreditation efforts. The committee undertook a number of new and continuing initiatives in Academic Year 2005-2006.

- Based on detailed feedback from undergraduates, we instituted a policy of tighter “quality control” on undergraduate academic advising. Coupled to this effort, we provided those faculty who provide high-quality faculty advising with supplemental discretionary funds in recognition of their efforts.
- Based on student feedback from undergraduates in BME and other majors, and with invaluable assistance from ENG alumnus W. Bradford Ingalls, the College opened the Ingalls Study Center on the ground floor of 44 Cummington Street. This space has been a spectacular success, providing students with space to study, socialize, and watch the World Cup!
- As part of a college-wide effort, we instituted a number of new events to allow students and faculty to get to know each other outside the classroom. These included a number of luncheons, held in the Warren Towers Dining Hall; breakfasts, held in Ingalls; a pizza party in Ingalls; and upperclassmen socials held off-campus in the fall and spring. The student chapter of Alpha Eta Mu Beta held a number of pizza lunches for students and 1-2 faculty per session, in a further effort to break down barriers between faculty and students.
- A committee of 4 BME professors (Passaglia, Bigio, Jackson, and Mertz) implemented extensive revisions of the junior lab course sequence (BE 491-492). The rejuvenated courses were offered in newly renovated lab space in AY 05-06.
- Professor Tim Gardner designed and implemented a new required course for sophomores, BE 209: Principles of Molecular/Cell Biology and Biotechnology. The goal of this course is to provide BME students more applications-oriented coverage of molecular and cell biology, in a way that takes advantage of their quantitative skills. BE 209 was approved in Fall 2005 and first offered in Spring 2006. From all accounts, the course is very successful.
- To reduce class size in BE 200 (Introduction to Probability), and to allow students more flexibility to participate in international exchange programs, we began offering BE 200 in both fall and spring, beginning AY 05-06.
- The department opened a new 54-seat computer lab, to be used for computer-based instruction and open hours. This facility, along with a supplemental 13-seat lab and the student teaching lab, provide BME students with world-class computational facilities.
- We instituted a policy of ongoing review of undergraduate courses. Under this policy, each course is evaluated by an external evaluator at least once every three years, using materials to be collected by BME staff in cooperation with the course instructor and GTFs. In AY 05-06, efforts focused on core undergraduate courses.
- In June 2006, as part of the department retreat, we convened a committee to discuss further ways to improve the undergraduate curriculum and experience. From that committee, we generated several plans and action items:

  a. In the upcoming years, we will work with Philosophy to implement a course in Biomedical Ethics. The course will be taught by Philosophy faculty in collaboration with BME faculty.
  b. In AY 06-07, we will convene a committee (White, Passaglia, Mertz; Mountain, who will be on sabbatical, will serve ex officio) to consider improvements in coverage of electronics. The issue at hand is that students receive insufficient coverage of biomedical applications and issues (e.g., safety) in our current offerings. This committee will also consider improvements in the coordination of senior electives in biomedical instrumentation.
  c. We wish to offer one or more electives in the area of biomaterials and tissue engineering at the junior or senior level. Among the items being considered: converting BE/MN 523 to the 400-level, and beginning a new course on the topic of biocompatibility.
State of the Program

Teaching Activities

The BME department was responsible for teaching 50 courses during the 2004/2005 academic year. These courses and their enrollments are listed in Table 2. The student credit hours for these courses total 6,628. The trend in credit hours taught over the past ten years is illustrated in Figure 2.
Table 2. BME Teaching Summary for Academic Year 2005 - 2006

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<tr>
<th>Course Number</th>
<th>Department Course Name</th>
<th>Course Instructor(s)</th>
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<td>Introduction to Probability</td>
<td>Voigt / Sen</td>
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<td>BE 209</td>
<td>Principles of Molecular Cell Biology and Biotech</td>
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<td>Signals and Systems in BME</td>
<td>Passaglia</td>
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<td>Fundamentals of Fluid Mechanics</td>
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Total Credit Hours Taught (2005-2006): 6108
Summer Research Activities for Undergraduates

Our three major programs that allow undergraduates to participate in research activities during the summer are continuing to provide excellent research experiences: Research Experiences for Undergraduate (REU) sponsored by the National Science Foundation and supplemented by the UROP program, the College of Engineering and the Biomedical Engineering Department; the Undergraduate Research Opportunities Program (UROP) funded by Boston University; and the Freshman Research Opportunities Program, funded by the College of Engineering. In addition, several BME undergraduates are hired during the summer to assist departmental Principal Investigators.

The BME Summer REU program sponsored by the NSF has just been approved for another 5 years. A summer Ethics component of the REU program is also funded by the National Science Foundation and provides an opportunity to introduce REU interns (and others if they wish) to ethical issues that arise in science and engineering. This formal part of the REU program also provides some instruction in technical communication skills and requires each participant to make oral progress and final reports.

<table>
<thead>
<tr>
<th>Highlights of the BME NSF-supported Summer REU Program</th>
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<tbody>
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<td>Training for the use of animals in research</td>
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<tr>
<td>Approaching and Communicating Independent Technical Projects</td>
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<td>LabVIEW workshop</td>
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<td>“Sound and Fury” Cochlear Implant Controversy</td>
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<td>Xenotransplantation</td>
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<td>Effects of Technology on Society</td>
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<td>Taking the GREs</td>
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<td>The Ethical Use of Animals in Scientific Research</td>
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<td>Discussion of Cantor’s Dilemma</td>
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<td>Effective Posters &amp; Presentation</td>
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<td>Myths and Realities of Research Careers &amp; Options for Graduate Education in Biomedical Engineering</td>
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<td>Panel Discussion on Careers in Biomedical Engineering</td>
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<td>BBQ Picnic</td>
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**REU Participants**

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<td>Mach, Justyna</td>
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<td>Orsborn, Amy</td>
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<td>Shinn-Cunningham</td>
<td>Olin College</td>
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<td>Tolson, Jessica</td>
<td>Lutchen</td>
<td>Wheaton College</td>
<td>Physics</td>
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**ENGMEDIC**

The ENGMEDIC program is an early selection program designed to train biomedical engineers who have the MD as their ultimate degree objective. ENGMEDIC admits to the school of Medicine a small number of highly qualified students who have completed two years of the premedical option of the biomedical engineering curriculum. The program is not designed to accelerate the engineering or the medical training, but rather to effect a better transition from undergraduate engineering study to graduate medical training. The BS in Biomedical Engineering is normally earned after 4 years of undergraduate study and the MD after an additional 4 years of study at the Boston University Medical School.

**Internship Program**

The BME Industrial Internship Program is partially supported by a grant from the Whitaker Foundation and directed by Herbert Voigt with the assistance of BME Placement Coordinator, Ms. Elaina Kelley. The program continues to be a great success by attracting companies to BME students and informing the students of careers available to them in industry. Twenty Four students were placed in internships and co-ops this year. The department hosted two industry nights, which are networking events held before the college’s career fair. It is intended to increase company knowledge about the BME program and provide a medium for students to learn more about careers available in industry.
The Industrial Research Fellowship Program

New last year, The Industrial Research Fellowship Program is a program to help students obtain summer research positions in biomedical engineering with potential to extend to Senior Design Projects during the subsequent academic year. This program is made possible by the Donations from the Industrial Supporters of Boston University’s Biomedical Engineering Senior Project Program.

Students will work on research project of their choosing in one of the many on campus laboratories or local industry. The student will be able to choose from a listing of projects and laboratories that are available.

If a student is honored by receiving one of these prestigious Fellowships they will receive a $3000 stipend for the summer and an allowance of up to another $3000 to cover housing costs during the summer or access to on-campus housing at no cost.

Each student will be responsible for presenting a poster at the Undergraduate Research and Industrial Internship Symposium.

The Benefits of the Fellowship Program:

Students benefit in several ways. They are able to perform summer research that will hopefully segue into a Senior Capstone Project, they are able to refine their bioengineering skills in practical and state-of-the-art areas, learn how their academic knowledge translates to real challenges, learn to work with a scientific team consisting of a hierarchy of experience and expertise, and enhance their marketability to future employers.

The Tenth Annual BME Day

BME Day is a nationally recognized event, where the department of Biomedical Engineering opens its doors to the Boston University and local community. 2006’s BME Day took on Friday, February 24th.

BME Day aims to expose individuals outside of the discipline to biomedical engineering, as well as to allow undergraduates and graduates to explore career options in the field. This year’s BME Day highlights included an undergraduate research symposium and banquet with guest speaker Dr. George M. Whitesides, a professor of Bioorganic/Physical Organic Chemistry and Materials Science at Harvard University. Other events included a graduate poster session and luncheon as well as a mock interview workshop. This year’s program was sponsored by the Engineering honor society, Alpha Eta Mu Beta (AEMB), the Biomedical Engineering Society, the College of Engineering and the Department of Biomedical Engineering.

Tracking Alumni

In an effort to obtain reliable statistics regarding the futures of our graduating seniors, the College of Engineering has initiated an exit interview of all such students in late April/early May. The results of these interviews are shown in the table below.

<table>
<thead>
<tr>
<th>Status of ’05-’06 BME Graduates</th>
<th></th>
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<tr>
<td>Employed</td>
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<td>Military</td>
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<td>Seeking Employment</td>
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<td>Not Seeking Employment</td>
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<tr>
<td>No Response</td>
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</table>

_________________________________________________________________
Boston University’s Biomedical Engineering Industrial Advisory Board

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Artech Associates and Venture Advisors
Advent International

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Founder, President and CEO
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Guidant Corporation

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Professor, BU School of Management
Director, Entrepreneurship and Management Institute.

Gregg A. Vandesteeg, Ph.D.
Vice President, Research and Development
3M Health Care
Undergraduate Awards

At the 2006 College of Engineering commencement ceremonies, several of the BME Seniors were recognized for achievements and contributions to the University community and BME Profession.

Alumni Association Student Leader Award
Paul Bower
For seniors who have made outstanding contributions to the College and University through their involvement in activities and organizations.

Anita Cuadrado Memorial Award
Sarah Lucier
In honor of Anita Cuadrado, former Assistant Dean in the College of Engineering Undergraduate Programs Office, this award is presented to one or more undergraduate students within the College of Engineering who best exemplify Anita's generous spirit, commitment to the College and Boston University, and dedication to helping undergraduates.

Adam M. Miller Memorial Award
Paul Bower
For the graduating senior who has best advanced the reputation and prestige of the department through his/her involvement in department, college, university, or professional activities, organizations, as well as through the academic and senior project program.

Rita Schaffer Award
Lin Lin Gao
For best demonstration of exceptional leadership in department or university community; outreach to campus, community or profession; teaching service; exceptional initiative in research; academic achievement; and/or contribution to society:

Outstanding Senior Projects Award
M. Dominika Kuliniski,
For the best senior design project: Isolation of Nucleic Acids Using Electroosmotic Flow in a Thermoplastic Device.

Best Oral Presentations BME Senior Project
1st Place – Sunil Bhat, A Bioinformatics Based Search for Novel Motifs Influencing Gene Expression of Cardiac Sarcomere Promoters
2nd Place – Frank Juhn, Identification of Enhanced Metal Reducing Shewanella oneidensis MR-1 mutants through High-Throughput Optical Screens
3rd Place – Michael Hoskins and Greg Boulet, Proteomic Profiles of Peripheral Leukocytes for Biomarker Discovery in Lung Cancer

Outstanding Dean’s Host Awards
Lisa Campana, Yommy Chiu, Justin Levy
For those who have distinguished themselves by going above and beyond the call of duty.

Recognized by the College for contributions as Senior Student Advisors
Graham Voysey, Aaron Wolfson, Jonathan Foley, Sarah Lucier, Yommy Chiu
The Senior Project Experience

A major strong point of our curriculum continues to be the Senior Project Program. Every BME Senior is required to develop a project proposal with an individual faculty member, local area scientific mentor, or even a bioengineering corporate technical advisor, so long as a BME faculty co-supervisors. The project is then carried out with the guidance of the students technical advisor. This brings together elements of engineering science and engineering design. In coordination with the technical work, this course includes experience in planning, establishing priorities, and formal training in technical communication including proposal, abstract, progress reports and oral and written presentations of the final work. In conjunction with the BME Department's Industrial Advisory Board, this year we have added lectures from our industry partners to expose the students to elements of entrepreneurship, business plans, intellectual property, marketing, and clinical regulatory issues. The project continues over the full academic year and culminates in a Senior Project Conference that is attended by students, faculty, and representatives from BME industry, hospitals, and other academic institutions. The companies that registered for this year's conference are listed below.

1. 3M Health Care  St. Paul, MN
2. 3Wave Optics, LLC  Boston, MA
3. ABIOMED, Inc.  Danvers, MA
4. Advanced Instruments, Inc.  Norwood, MA
5. Artech Associates  Boston, MA
6. BD Biosciences  Billerica, MA
7. Beth Israel Deaconess Medical Center  Boston, MA
8. Bose Corporation  Framingham, MA
9. Boston Medical Center  Boston, MA
10. Boston Scientific  Natick, MA
11. Boston University School of Management  Boston, MA
12. Boston University School of Medicine  Boston, MA
13. Brigham and Women's Hospital  Boston, MA
14. Brown Medical School  Providence, RI
15. Center for Integration of Medicine and Innovative Technology  Cambridge, MA
16. Children's Hospital Boston  Boston, MA
17. Cleveland Clinic Foundation  Cleveland, OH
18. Columbia University Medical School  New York, NY
19. Corning Life Sciences  Acton, MA
20. Cynosure, Inc.  Ashland, MA
21. DEKA Research and Development  Manchester, NH
22. eLoyalty  Lake Forest, IL
23. Eyebionic  Boston, MA
24. Foster Miller, Inc.  Waltham, MA
25. GE Healthcare  Lawrence, MA
26. Genzyme Corporation  Cambridge, MA
27. Guidant Corporation  St. Paul, MN
28. Harvard Medical School  Boston, MA
29. Harvard University  Cambridge, MA
30. Hebrew SeniorLife  Boston, MA
31. Massachusetts Eye and Ear Infirmary  Boston, MA
32. Massachusetts General Hospital  Boston, MA
33. Massachusetts Institute of Technology  Cambridge, MA
34. Medtronic, Inc.  Minneapolis, MN
35. Merck & Co, Inc.  Boston, MA
36. Noramco, Inc.  Athens, GA
37. Perceptive Informatics, Inc.  Waltham, MA
38. Philips Medical Systems  Andover, MA
39. Pulmatrix, Inc.  Cambridge, MA
40. Saint Barnabas Healthcare System  Manasquan, NJ
41. Santa Clara University  Santa Clara, CA
42. SOLX, Inc.  Boston, MA
43. SonaMed Corp.  Waltham, MA
44. The Whitehead Institute  Cambridge, MA
45. TransForm Pharmaceuticals, Inc.  Lexington, MA
46. Tyco Healthcare | Kendall Division  Mansfield, MA
47. United States Surgical  North Haven, CT
48. US Army Research Institute of Environmental Medicine  Natick, MA
49. USDA/APHIS Veterinary Services  Amherst, MA
50. VA Boston Healthcare System  West Roxbury, MA
51. Wolf, Greenfield & Sacks, P.C.  Boston, MA
52. Women and Infants Hospital of Rhode Island  Providence, RI
53. Worcester Polytechnic Institute  Worcester, MA
54. Wyle Labs  Houston, TX

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DEPARTMENT OF BIOMEDICAL ENGINEERING

21st Annual Senior Project Conference
— Friday, April 28, 2006 —

7:45 - 8:10 AM  Continental Breakfast

8:10 AM  Opening Remarks: Dr. Kenneth R. Lutchen

8:15 - 10:30 AM  SESSION I
PHO 206  Patient Monitoring, Bioinstrumentation and Medical Devices

Strengthening Balance while Balancing Strength: A Postural Balance and Strength Training Study in a Microgravity Environment
Amanda Dwyer

Evaluation of an Adjustable Narrowband Filter Banks for Use in Alternative Hearing Aids
Ryan J. O’Shea

Designing a Device for the Continuous and Telemetric Measurement of Intraocular Pressure in Rats with Induced Glaucoma
Katherine Harihar / Justin Levy / Stephen Rocha

Design Application of a System to Track Coupling between Airways and Lung Tissue
Heather Rasich

Designing and Building a Switching System for the Headstage of a Rat
M. Asif Khan

Optimization of Coating and Surface Characterization of Novel Polymers and Proteins for Use on a Medical Device
Michelle Chan

Isolation of Nucleic Acids Using Electroosmotic Flow in a Thermoplastic Device
M. Dominika Kulinski

Development of Vibrating Sandals to Enhance Sensorimotor Function
Alexandra Duritz

The Brain Machine Interface: Using Neural Code to Control an External Device
Matthew Kersus

Mind Classifier: An Automatic Classifying Algorithm for Functional MRI Activation Map
Dongwoo Hahn

Breaking Boundaries: Analogue Brain-Computer Interface Using fMRI
Paul Bower

10:30 - 10:50 AM  BREAK
### SESSION IIA
**COMPUTATIONAL MODELING IN BIOENGINEERING**

**Session Chair:** Doug Cotter

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>Models of Dolphin Hearing</td>
<td>Garth Mashmann</td>
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<tr>
<td>Modeling of Spectro-Temporal Receptive Fields and Simulation of the Population Response in Zebra Finch</td>
<td>Graham Voysey</td>
</tr>
<tr>
<td>Design and Implementation of a Gerbil Song Playback System</td>
<td>Paul Joseph S. DeGuzman</td>
</tr>
<tr>
<td>Computational Modeling for Electrically Stimulating the Auditory Nerve</td>
<td>Mitesh Amin</td>
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<tr>
<td>Modeling Synaptic Plasticity</td>
<td>Patrick Duplessis</td>
</tr>
<tr>
<td>Dynamic Behavior of a Single Polymer Chain as a Model of Rheological Behavior of Living Cells</td>
<td>James Wai</td>
</tr>
<tr>
<td>Pharmacokinetic Modeling and the Effects of Ototoxic Drugs</td>
<td>Ajan Patel</td>
</tr>
<tr>
<td>Application of Personalized Airway Trees in Multiscale Lung to Probe Structure-Function Relations in Asthmatics</td>
<td>Aladin Milutinovic</td>
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<tr>
<td>Quantitative Image Functional Modeling of the Lung with Hyperpolarized 3He MRI</td>
<td>Lisa Campana</td>
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**10:55 AM - 12:40 PM**

### SESSION IIB
**BIOMEDICAL IMAGING**

**Session Chair:** Irving Bigio

<table>
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<tr>
<th>Topic</th>
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<tr>
<td>MRI Phantom for Quantitative MRI: A Study of Materials with Adjustable Diffusion Coefficients</td>
<td>Ryan Irving</td>
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<td>Multimodal Data – Analysis Software Package for Diffusion Weighted MRI</td>
<td>Sahil Jain</td>
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<td>Adaptation of a Two-Photon Microscope for Targeted Excitation and Photobleaching</td>
<td>Jason Taclas</td>
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<td>Real-Time Automated Segmentation of High Resolution CT Images Using Dual-Space Clustering Algorithm</td>
<td>Dhruv Dhanraj Bahl</td>
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<td>Time Course Measurements and Characterization of Various Brain Tumor Cell Lines in Mice Models Using MRI</td>
<td>Eric Aronowitz / Tejash Patel</td>
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<td>Brain Tissue Characterization Using T2 Biexponential Decay in Glioblastoma Multiforme Tumor Mouse Model</td>
<td>Eo-Jin Hwang</td>
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<td>Establishing a Quantitative Reference for the Volumetric Distribution of the Diffusion Coefficient in the Liver and the Spleen</td>
<td>Rodrigo Diaz Garbizu</td>
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<td>Quantitative MRI of Human Parotid Glands Using Dual-space Clustering Segmentation: intra-glandular analysis of T1 and T2</td>
<td>John Fedele / Andrew Konowicz</td>
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<tr>
<td>A Study on Brain Tissue Using Quantitative MRI Techniques</td>
<td>Christopher Gange</td>
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**12:45 PM - 1:25 PM**

**LUNCH BREAK**
1:30 - 3:15 PM SESSION IIIA
PHO 205

Systems Biology and Genomics Engineering

Session Chair: Zhiping Weng

A Bioinformatics Based Search for Novel Motifs Influencing Gene Expression of Cardiac Sarcomere Promoters
Sunil Bhat

Development of a Low-Affinity Avidin-Like Molecule for Use in Binding Assay Experimentation
Jonathan Foley

Transcription Start Sites and Gene Regulation in Drosophila
Laura Bacigalupi

Targeting Breast Cancer Cells Using Aptamers
William Seo

Constraining the Folding Process of Ribosomal RNA
Sherwin Ting

Proteomic Profiles of Peripheral Leukocytes for Biomarker Discovery in Lung Cancer
Greg Boulet / Michael Hoskins

Nanoscale Surface Forces Between Human Serum Albumin, Alkanethiol Self-Assembling Monolayers, and Oligo (ethylene oxide) Monolayers
Hailemariam Negussie

Identification of Enhanced Metal Reducing Shewanella oneidensis MR-1 mutants through High-Throughput Optical Screens
Frank Juhn

1:30 - 3:15 PM SESSION IIIB
PHO 206

Neurosensory Bioengineering

Session Chair: John White

Development of a Perceptually Transparent Hybrid Auditory Display in a Reverberant Room Setting
Aaron Wolfson

A Physiological and Efficient Representation of Spectral Cues in Sound Localization
Krenar Tasimi

Confusion Analysis of the Coordinate-Response-Measure (CRM) Speech Corpus for Intelligibility Studies
John Patrick Gonzales

Influence of Spatial Location Cues on Auditory Object Formation
Sarah Chaudhari

Transfer of Learning Between Sound Source Stimulus Dimensions Important for Localization
Reginald Villacorta

Effects of Reverberation on Spatial Auditory Attention
Priyanka Zutshi

Statistical Modeling and Assessment of Efferent Spike Trains in the Limulus Visual System
Amy M. Tran

Microgravity Induced Changes in the Control of Motor Units
Gavin Hayes

Analysis of Correlated Firing Behavior of Motor Units During Fatiguing Muscle Contractions
Ashley Morgan

Plasticity in the Human Visual System
Sharon Hyzy / Anthony Tanella

3:15 - 3:35 PM BREAK
### SESSION IV

**Biomaterials, Tissue Engineering, Drug Delivery and Biomechanics**

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<th>Time</th>
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<td>3:40 - 5:45 PM</td>
<td>Effects of Mechanical Stretch on Pulmonary Fibroblast Function</td>
<td>Anne Zavadil</td>
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<td>Effects of Stretching on the Mechanical Properties of Extracellular Matrix Sheets During Elastase Treatment</td>
<td>Rajiv Jesudason</td>
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<td>Assessment of Nanoindentation as a Technique for Characterizing the Mechanical Properties of Soft Tissues</td>
<td>Jared Bancroft</td>
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<td></td>
<td>Development of Finite Element and Composite Plus Curved Beam Structural Rigidity Analysis Models for Rat Tibia with Simulated Lytic Defects</td>
<td>Alan Tseng / James Kimbaris</td>
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<tr>
<td>5 Minute Stretch Break</td>
<td>Effects of Tissue Fixation on Bone Mechanical Properties</td>
<td>Bryan Hermannsson</td>
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<td>Study of Cross-Linking in Polyvinyl Alcohol Contour SE Microspheres</td>
<td>Sameer Grover</td>
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<td>Synthesis of Branched Collagen Channel Mimicking Microvasculature</td>
<td>Lin Lin Gao</td>
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<td>Vascular Tissue Engineering</td>
<td>Edward Lee</td>
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<td>A System for Studying the Role of Substrate Mechanics in the Organization of Dynamically Cultured Vascular Smooth Muscle Cells and Extracellular Matrix</td>
<td>Christopher Sip</td>
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<td>Local Incorporation of Anti-neoplastic Agents into Surgical Resection Margins for the Treatment of Mesothelioma</td>
<td>Sarah Lucier</td>
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<td>5:45 PM</td>
<td>Closing Remarks</td>
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<td>Final Conference Comments: Dr. Kenneth R. Lutchen</td>
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**RECEPTION IN THE ATRIUM, 2nd FLOOR, PHOTONICS CENTER**