



Biomedical Engineering

ENG CORNELL ENGINEERING

Degree Programs and Research Areas

1. Educational and Scholarly Mission and Goal
Mission: To educate students to understand the human body as an integrated multiscale system and to use that understanding to design better therapeutic strategies, devices, and diagnostics to improve human health.
Goal: To act as an intellectual bridge between engineering and biology and medicine
2. Degree Programs and Research Areas
We offer MS/PhD and M.Eng. degrees and a BME minor for BS students
3. Research Areas:
 - Micro- and Nanobiotechnology
 - Biomedical Imaging, especially in Vivo Cellular Imaging
 - Molecular, Cellular, and Tissue Engineering
 - Biomaterials and Drug Delivery
 - Biomedical Mechanics

Trends

- Department founded in 2004 with 3 primary tenure track faculty, 3 senior lecturers, one "joint" faculty with Cornell Weill Medical College (CWMC), one senior scientist, and one secondary faculty member
- Moving into new space (Weill Hall)
- PhD enrollment: 18 in 2004 to 68 in 2008
- M.Eng. enrollment: 8 in 2004 to 55 in 2008
- BME minors: About 45 to 55 grads/year
- Research Expenditures: \$1,778,271 in 2004-05, growing to \$4,843,426 in 2007-08

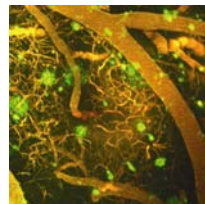
Achievements

- Successfully hired 8 new tenure track faculty
- Obtained DOE GAANN and NIH Training (T-35) grants
- Active linkage of BME programs with Cornell Weill Medical College (CWMC) and Veterinary Medicine
- All BME tenure track faculty have at least one joint research project with CWMC
- Established unique clinical immersion term for BME PhD students at CWMC
- Course jointly taught with CWMC faculty
- Established novel curriculum including a first rate teaching lab
- Raised almost 30 million dollars in gifts for BME
- In the last 2 years 4 junior faculty have received American Heart Association Scientist Development Awards (4 for 4; national rate is ca. 10%)
- Other awards: NSF Career=2; Whitaker Initiation Grants=2; NYSTAR Watson Awards=1; Coulter Awards=1; Honorary Doctorates=1



BME PhD students spend their first summer at the CWMC working with clinicians

Students working in BME teaching laboratories



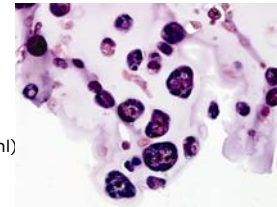
Imaging Alzheimer's disease: Blood vessels (yellow) and amyloid plaques (green), the hallmark of Alzheimer's disease, imaged in the brain of a mouse (Schaffer)

Priority Goals

- Grow to at least 15 tenure-track faculty with appropriate space
- Develop a plan for a BS degree in BME and become a national leader in BME education
- Achieve a top ten ranking among our peers
- Foster effective intercampus collaborations



3-D rendering of a micro-CT image of ten-day old embryonic chick heart (Butcher)



Tumor cells encapsulated in alginate gels (Fischbach-Teschl)



The human body can be represented as a series of cell-containing compartments linked by microfluidic channels (Shuler)

Challenges

- Continued recruitment and retention of outstanding faculty in a competitive environment
- Strengthening ties to CWMC and Veterinary Medicine
- Increase external research funding in a difficult funding environment
- Sufficient space to accommodate growth to 15 faculty and our academic programs

Opportunities

- To lead in developing an intellectual framework for the emerging field of BME
- Research that provides the basis for improved health care at a price society can afford
- To develop a BS in BME that attracts to Cornell the best and brightest students from a diverse background
- To build collaborative research with industrial partners, especially for the M.Eng. program
- Use our intellectual leadership to develop BS, M.Eng., and PhD curricula as a basis for national prominence