

Biomedical Engineering

CORNELL ENGINEERING

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

Degree Programs

We offer MS/PhD and M.Eng. degrees and a BME minor for BS students

Research Areas

- Micro- and Nanobiotechnology
- Biomedical Imaging, especially in vivo cellular imaging
- Molecular, Cellular, and Tissue Engineering
- Biomaterials and Drug Delivery
- Biomedical Mechanics

Significant Trends

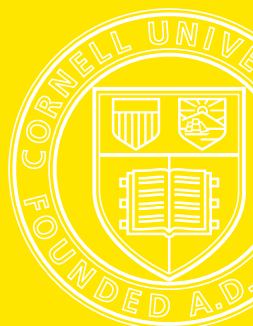
- Department founded in 2004 with 3 primary tenure track faculty. Currently 11 primary tenure track faculty, 3 senior lecturers, one “joint” faculty with Cornell Weill Medical College (CWMC), one senior scientist, and one secondary faculty member
- Moving into new space (Weill Hall)
- PhD enrollment: 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



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

“I have learnt one thing that I will always remember when I design instruments and devices in the future: keep everything simple and ready to use. It’s not that the surgeons don’t understand how it works but it’s the simple fact that in the OR there is no time.”

-Abhishek Ramkumar, BME Ph.D. Candidate



Departmental & Faculty Achievements (2004 to 2008)

- 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 ~10%)
- Other awards: NSF Career=2; Whitaker Initiation Grants=2; NYSTAR Watson Awards=1; Coulter Awards=1; Honorary Doctorates=1

Priority Goals

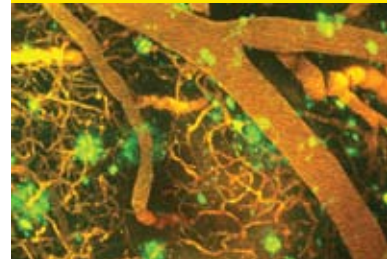
- Grow to at least 15 tenure-track faculty with appropriate space
- Develop a plan for a BS degree in BME and become a national leader in BME education
- Achieve a top ten ranking among our peers
- Foster effective intercampus collaborations

Challenges

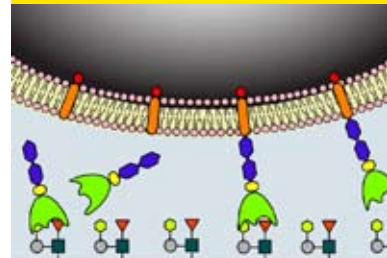
- Continued recruitment and retention of outstanding faculty in a competitive environment
- Strengthening ties to CWMC and Vet Medicine
- Increase external research funding in a difficult funding environment
- Sufficient space to accommodate growth to 15 faculty and our academic programs

Opportunities

- To lead in developing an intellectual framework for the 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



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)



Schematic of receptor-mediated adhesion between a cell and biomaterial surface. (King)