

**Resolution to Create a
Master of Engineering Degree Program
In the Existing Major Field of Biomedical Engineering**

WHEREAS, the Committee on Academic Programs and Policies has reviewed a proposal for the creation of a Master of Engineering Degree Program in the Existing Major Field of Biomedical Engineering, and

WHEREAS, the Committee recommends creation of this new degree program,

THEREFORE, BE IT RESOLVED that the Faculty Senate approves the creation of the Master of Engineering Degree Program in the Existing Major Field of Biomedical Engineering and urges the administration to place this on the agenda of the Board of Trustees for approval.

Rationale: Bioengineering and biomedical engineering in particular are emerging areas of scientific and technological opportunities that cross the traditional boundaries of biology, chemistry, physics, medicine, and engineering. Biomedical engineering is an intellectual endeavor in which scientists and engineers in different disciplines can explore entirely new territories by working together. Cornell University's outstanding faculty in engineering, human and veterinary medicine, and the life sciences and its strengths in interdisciplinary research and graduate field structure provide unique opportunities for the institution to develop and lead biomedical engineering in the next century.

Critical to this success is the existence of a structure designed to catalyze teaching and research efforts related to biomedical engineering, serve university-wide instructional needs, and act as the identifiable entity to promote these university-wide efforts: the Biomedical Engineering Program (BMEP). The BMEP was activated in April 2002 with Michael L. Shuler as Director and Donald L. Bartel as Associate Director.

Cornell University's Biomedical Engineering Program (BMEP) is a university-wide unit that bridges biology, medicine, and engineering. The program is responsible for:

- coordinating and delivering educational programs in Biomedical Engineering (BME);
- collaborating and coordinating with other programs in facilitating the transfer of life science concepts into engineering and engineering approaches into the life sciences, and catalyzing interactions associated with medicine and human health between biologists, physical scientists, and engineers;

- taking leadership within the Cornell bioengineering community on matters relating life sciences and human health and medicine; and
- promoting and enhancing the visibility of the BME community and BMEP program for attracting faculty, students, and research funds.

The BMEP director works with colleges to identify university-wide curricular needs in BME related areas and facilitate inclusion of those needs into undergraduate and graduate course offerings. BMEP develops and delivers new courses to meet instructional goals.

To prepare students for professional practice as biomedical engineers is a challenge as the breadth and depth of knowledge required to be effective is difficult to impart in a four year BS degree program. The BMEP is designed to address this challenge by offering an M.Eng. degree in Biomedical Engineering.

Educational Goal of M.Eng. in BME

We expect to prepare students for professional practice in BME. Students in the program will acquire a broad perspective of the biomedical engineering discipline that complements their undergraduate training in engineering *or* science, and an in-depth knowledge of an essential area in biomedical engineering. Graduates will be equipped to design biomedical devices and develop therapeutic strategies within the bounds of health care economics, the needs of patients and physicians, the regulatory environment for medical devices and pharmaceuticals, and stringent ethical standards of biomedical engineering practice.

Students will acquire breadth in biomedical engineering by participating in a bioengineering seminar and by satisfying specific course requirements in the curriculum. Students will acquire depth by extending undergraduate specializations, by selecting one of three areas for concentrated study, and by completing a design project in their selected area of concentration. Design projects will be carried out in teams to take advantage of the diversity of student backgrounds and, when possible, projects will be done in collaboration with industrial partners.

We expect the program will attract a diverse applicant pool, including students with the following educational backgrounds:

- i) Cornell undergraduate engineering students who minored in BME
- ii) Cornell undergraduate engineering students who did not minor in BME
- iii) Non-Cornell students who majored in biomedical engineering
- iv) Non Cornell students who majored in traditional engineering disciplines
- v) Cornell undergraduate biology students who completed a program of study in BME (currently in discussion)
- vi) Undergraduates from Cornell and other universities who majored in biology (or a closely related life sciences field) but did not complete a BME program of study
- vii) Undergraduates from Cornell and other universities who majored in physics or chemistry.

We believe that a M.Eng./BME degree program will serve Cornell well. Historically, BME programs attract higher levels of women (> 40%) and under-represented minorities than other engineering disciplines.

The BS/M.Eng. Option

The current M.Eng. option in bioengineering does not fill the role projected for the M.Eng. in BME. The M.Eng. in BME will serve a different student population than the current bioengineering option.

Addition of the M.Eng. degree in Biomedical Engineering will enable the BMEP to provide students the opportunity to complete a BS in one of the traditional departments (in COE, BEE, or in Biological Sciences) while completing a minor or program of study in BME and then to complete a Master of Engineering in BME. It is believed the BS/M.Eng. combination will serve students well who expect to enter professional practice as biomedical engineers by providing a strong combination of biology and engineering.

An M.Eng. BME and the BS/M.Eng. combination will enhance diversity in the COE. Additionally, BME attracts many of the best students. Two anecdotal examples are the University of Wisconsin and Georgia Tech. At the University of Wisconsin a GPA of 3.5 is required for undergraduates to affiliate with BME. At Georgia Tech over half of the entering freshman projected a BME major; enrollment in BME was capped at 50/year resulting in a minimum GPA of 3.7 to affiliate. Should Cornell lack an attractive BME option, we believe it would be detrimental to the diversity and quality of the student pool available to the COE. Implementation of a M.Eng. in BME is critical to our strategy for Cornell to remain attractive to the broad base of prospective engineering freshman.

Another component of the strategy of a BS/M.Eng. combination is practical. The alternative would be to begin, as most others have, a BS in BME. Based on discussion with BME advisory board members we believe that a 5 year BS/M.Eng. will be a more marketable degree for BME students than the BS in BME. With a BS/M.Eng. combination and a BME minor available to all students, the presence of BME enhances all units. Thus, establishment of a M.Eng. is a critical element in a strategy to develop a “win-win” situation for BMEP and all other units associated with the COE.