

# REVOLUTIONARY MAJOR SET TO BE BORN

Biological engineering to be 1st field created by school in 29 years

By Gareth Cook, Globe Staff | February 16, 2005

Once the cutting-edge materials of engineering were steel girders, then transistors. And next, the Massachusetts Institute of Technology is gambling, it will be DNA and cells -- the stuff of life.

The university is expected to approve today an undergraduate major in biological engineering, the first time it has created an entirely new field of study in 29 years.

For many years, universities around the world have been building up programs that apply engineering to problems in medicine, an effort yielding such advances as new prosthetic limbs. But now MIT, the institution that helped establish chemical engineering and electrical engineering, is trying to fashion a fundamental synthesis of engineering with biology.

"They are revolutionizing the academic curriculum," said Geert W. Schmid-Schonbein, a professor at the Whitaker Institute of Biomedical Engineering at the University of California, San Diego, which is home to one of the country's top biomedical engineering programs.

The university's move, which is expected to come in a faculty vote today, represents its confidence in a fascinating field -- and also, perhaps, a glimpse of the future. One recently hired MIT researcher studied how animals make shells, and now exploits the tricks she learned to make advanced materials. Another is building tiny chips with living liver cells that could be used to test drugs. Still another uses DNA sequencing machines, specially designed to decode the genetic information of large numbers of tiny creatures, to create models of vast, shifting ocean microbe populations that play a crucial role in the life of the planet.

Many universities are feeling pressure to change their approaches to scientific research as new styles of research become popular. More and more scientists are being drawn into projects that fall between the traditional academic boundaries. At the same time, the government, which funds most scientific research in the country, has been actively pushing universities to foster work between the disciplines.

This pressure has been especially intense in biology, which is emerging as the preeminent science of the new century, with rapid strides in many areas, and enthusiastic funding from the government and philanthropists. In 2003, for example, Harvard Medical School created its first academic department in two decades: systems biology, an emerging field that also borrows from engineering and biology.

"This is a time of integration," said Venky Narayanamurti, Harvard's dean of engineering and applied sciences.

Today's vote at MIT has its origins at least a decade ago, said Linda Griffith, a professor of biological and mechanical engineering, who helped organize the biological engineering proposal. Griffith was part of a group of faculty who realized that biology represented both an opportunity and a problem. Griffith, who has long been interested in tissue engineering, said that she was convinced that there is a lot of fascinating -- and necessary -- research to do at the interface between the two fields.

But, Griffith and others said, there was not a coherent academic program in place to prepare students for the field. "We started with a blank slate," said Griffith.

In 1998, MIT established a Biological Engineering Division, which is headed by Douglas A. Lauffenburger, as part of a program of building up faculty in the area. The division now has the equivalent of about 20 faculty slots, a dramatic increase considering how new a program it is, said Robert A. Brown, MIT's provost and a powerful champion of the program.

If the degree program is approved, the number of undergraduates who can major in biological engineering will be limited to 20 to begin with, Griffith said. Any student interested in the major will have to pass a difficult course called Thermodynamics of Biomolecular Systems. If more than 20 undergraduates who want to enroll in the major make it past that class, there will be a lottery. More undergraduates will be allowed in over time, Griffith said.

The program will be officially known as a "course of study," a distinction reserved for the most established fields. The last time a new course of study was approved at MIT was 1976, with the approval of Linguistics and Philosophy.

Brown said he expected the work to flourish, but that the university would be monitoring the program closely, and watching to see how its graduates did in the search for jobs. Brown said people in industry that the university consulted were very enthusiastic.

Brown, a chemical engineer who has pushed for incorporating biology into a range of disciplines at MIT, said he saw the emergence of biological engineering as a sign of biology's maturity. It was only when chemistry advanced, with a strong quantitative approach first championed in Europe, that it was possible to begin chemical engineering. Now, he said, biology has reached the same critical point.

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