

Education and Student Affairs Committee
Board of Regents, State of Iowa

Subject: Proposal to Change the Name of the Department of Chemical Engineering at Iowa State University to the Department of Chemical and Biological Engineering

Prepared by: Diana Gonzalez

Date Submitted: December 1, 2004

Recommended Action: Refer Iowa State University's proposal to change the name of the Department of Chemical Engineering to the Department of Chemical and Biological Engineering to the Interinstitutional Committee on Educational Coordination (ICEC) and the Board Office for review and recommendation.

Executive Summary: This proposal (Attachment A, pgs. 2-8) does not involve any change in the curriculum. It does not reflect the need for a new degree or new resources because there is no change in activity.

Reasons for Proposed Change

The name change is requested to reflect more accurately the scope of educational and research programs of the department, using biology and chemistry to do engineering. In addition, the name change will:

- ◆ Aid in recruitment of undergraduate and graduate students who are interested in bioengineering.
- ◆ Promote collaboration for the introduction of biology into other engineering majors.
- ◆ Give competitive advantage in grant submission, especially to the National Institutes of Health.

Link to Strategic Plan: This effort is part of the institutional activities which help the Board of Regents achieve its objective to offer high-quality programs through ongoing program improvement for undergraduate, graduate, professional, and non-degree students and special school students (Objective 1.1).

Background: Many faculty members are using knowledge from the biological sciences to solve chemical engineering problems; biology has become as much of an enabling science as math, physics, and chemistry. Furthermore, graduate and undergraduate students are drawn to biologically-linked engineering when making college attendance decisions so there is a need to make this aspect of the department more apparent.

ATTACHMENT A

DATE: December 2004

TO: Board of Regents, State of Iowa

FROM: Iowa State University

ACTION REQUESTED: Approve Iowa State University's proposal for a change in the name of the Department of Chemical Engineering

The university is requesting approval of a name change for the Department of Chemical Engineering in the College of Engineering. The proposed name for this department is **Chemical and Biological Engineering**. The departmental and college faculty, the College Curriculum Committee, and the College of Engineering Administration have recommended this change. The Faculty Senate and the university administration have also endorsed this request.

We have consulted with both the University of Iowa and University of Northern Iowa, and they support this name change proposal.

The name change is requested to more accurately reflect the scope of educational and research programs toward which the department has evolved. The new name of the department was chosen to depict a biological component already in place; this proposal does not involve any change in the curriculum. The attached memorandum provides further rationale for the name change.

Proposal to Change the Chemical Engineering Department Name to Department of Chemical and Biological Engineering

Summary

- Accurately reflects what we are doing – using biology and chemistry to do our engineering.
- Aids in recruitment of undergraduate and graduate students to Iowa State that are interested in bioengineering.
- Promotes collaboration for the introduction of biology into other engineering majors.
- Gives advantages in grant competition – particularly with NIH.

Rationale for Change

The Chemical Engineering Department at Iowa State University has long had interests in the biological applications of chemical engineering. O. R. Sweeney (1931 establishment of Agricultural Byproducts Laboratory) was looking to add value to agricultural years ago and the building now known as Nuclear Engineering Lab was originally built with USDA funding to support this effort. Richard Seagrave brought in biomedical engineering (1966), George Tsao (1965) and Peter Reilly (1974) added enzyme engineering, Charles Glatz brought in bioseparations (1976), Carol Heath (1993) and Surya Mallapragada (1996) debuted tissue engineering, Jackie Shanks (1999) brought in metabolic engineering and plant biotechnology and has been joined by Ramon Gonzalez (2002) in the former, and Balaji Narasimhan (2001) is doing drug delivery. Brent Shanks, Glenn Schrader, Derrick Rollins, and Dennis Vigil all bring their core expertise to problems in biology or processing of biological feedstocks.

Many of these faculty members are using knowledge from the biological sciences to solve chemical engineering problems. In other words biology has become as much of an enabling science for us as Math, Physics, and Chemistry. We have offered a variety of courses in these areas for years and the recent flexibility of the curriculum permits interested students to graduate with a transcript that is quite comparable to a degree in Biochemical Engineering as offered at some institutions. So the added name is an accurate reflection of what we offer. And unlike some other “appendage” names (Petrochemical, Materials, Environmental) it does reflect the use of a core science – biology.

Furthermore, students – both graduate and undergraduate – are drawn to biologically linked engineering in looking for a place to study. Hence, there is a need to make this aspect of what we are doing evident to those who don't have a full appreciation of the breadth of chemical engineering or our activities here. Competition for students with such interest has become more intense with the establishment of numerous Biomedical Engineering departments. We feel the narrower focus of these programs may well not be best for most students. While we are aware of full range of the chemical engineering discipline, most guidance counselors and high school seniors

are not, and college seniors looking for a graduate program may infer that we have less activity in this area than programs including “bio” in the name. Since Iowa State has no biomedical engineering or bioengineering department or degree, our visibility is poor and very talented high school seniors will be lost to other campuses without having a chance to investigate the opportunities in our department and others in the College of Engineering.

There are two reasons that we feel a chemical engineering degree with an elective package emphasizing “bio” is more appropriate for many students. First, the education will be built on fundamental principles that apply to more than biological systems. That provides the student the flexibility to work in non-biological fields also. Second, “bio”-related companies have become the major employers of ISU Chemical Engineering graduates. Figure 1 shows that in recent years food, pharmaceutical, agricultural and biotechnology firms have employed 42% of our graduates.

There is also a need to support discipline-wide efforts to secure the future place of Chemical Engineering during a time in which many disciplines will be impacted by biology. We are currently seeing a proliferation of biomedical, bioengineering and biosystems engineering programs. Each of those programs has its place and there are advantages in having some accepted meaning emerge to avoid confusion. Chemical Engineering departments are changing their names to include “bio” in various forms (Table 3), but two options are favored. “Biochemical” is the older term but currently seems too narrow. “Biological” nicely reflects biology in the same way that “Chemical” reflects chemistry and the AIChE is introducing the Society for Biological Engineering. “Biomolecular” has been favored by some because it accents our focus on molecular transformations and also because it was defined by an NIH study group some years ago as appropriate. We raised the question with our industrial advisory group two meetings ago and they endorsed a name change while favoring “biological” with “biomolecular” second. The initial round of recent changes favored biomolecular but more recently biological has emerged as the favorite and now is the most frequently taken.

Chemical engineering as a discipline cannot do all of bioengineering. However, chemical engineering is well positioned to have a major impact on: reactors and analytical systems at a variety of scales, metabolic engineering, biomolecular/protein engineering, cell and tissue engineering, use of renewable feedstocks and “green” processing to create a sustainable chemical economy, bioinformatics, and drug delivery. Currently half of our faculty members have research efforts with components in these fields and, over the next few years, our involvement will grow. In pursuing these issues, there is ample opportunity to collaborate, not only with life scientists, but also our colleagues in other engineering departments. Collaborations can be promoted in research, course offerings, a biology for engineers offering, and interdisciplinary minors and majors. We have had numerous discussions with ABE regarding their proposal for a degree in Biosystems Engineering and believe that has led to an understanding of a logical division of our two emphases for incorporation of biology.

We do not feel the need for either a new degree or new resources, because we are not asking to change our activity. We are proposing a name change for the department to more accurately reflect what the faculty and students are doing.

Table 1. Current faculty with “bio” engineering as their *major* research focus. (B. Shanks, R. D. Vigil, D. Rollins, and G. Schrader also have projects with this focus as do our two courtesy appointments – R. Brown and M. Porter).

Name	Rank	Research	Teaching
P. Reilly	Dist. Prof.	Protein engineering	ChE 415, 515L
C. Glatz	Prof.	Bioseparations	ChE 415, 562, 562L
S. Mallapragada	Assoc. Prof.	Tissue engineering	ChE 543, 543L
J. Shanks	Prof.	Metabolic engr (plants)	ChE 525, 525L
B. Narasimhan	Assoc. Prof.	Biomaterials	ChE 543
R. Gonzalez	Asst. Prof.	Metabolic engr (microbial)	ChE 525, 525L

Table 2. Current Bioengineering Coursework (all are every two year offerings except 415 which is offered annually). All 500-level courses are taken by both seniors and graduate students.

ChE Course No.	Title	Description
415	Biochemical Engineering	Survey of enzyme technology and fermentation
525	Metabolic Engineering	Analysis of biochemical reaction Pathways.
543	Biomaterials	Biomedical applications of materials
562	Bioseparations	Purification and recovery in bioprocessing
515L, 525L, 543L, 562L	Laboratory modules for 415, 525, 543, and 562 resp.	Labs developed with NSF funding
426	Unit Operations Lab	Includes experiments in ultrafiltration, fermentor mass transfer, and enzymatic hydrolysis.

Table 3. Sampling (what we were aware of supplemented with those found in a web search) of Chemical Engineering departments with “bio” added to name and the specific choice of name. Parentheses indicates in process.

Biological	Biomolecular	Biochemical	Other
Wisconsin	Illinois	Rutgers	Colorado St.
Tufts	Penn	Iowa	Dartmouth
Colorado	Cornell	Christian Br. U	Nebraska
RPI	Ga Tech	Ariz St U	
Missouri Rolla	John Hopkins	UC Irvine	
Maryland BC	Notre Dame	Univ Coll London	
Poly U	Melbourne	Swansea	
British Columbia			
Maine			
Montana State			
SUNY Buffalo			
Northwestern			
(MIT)			

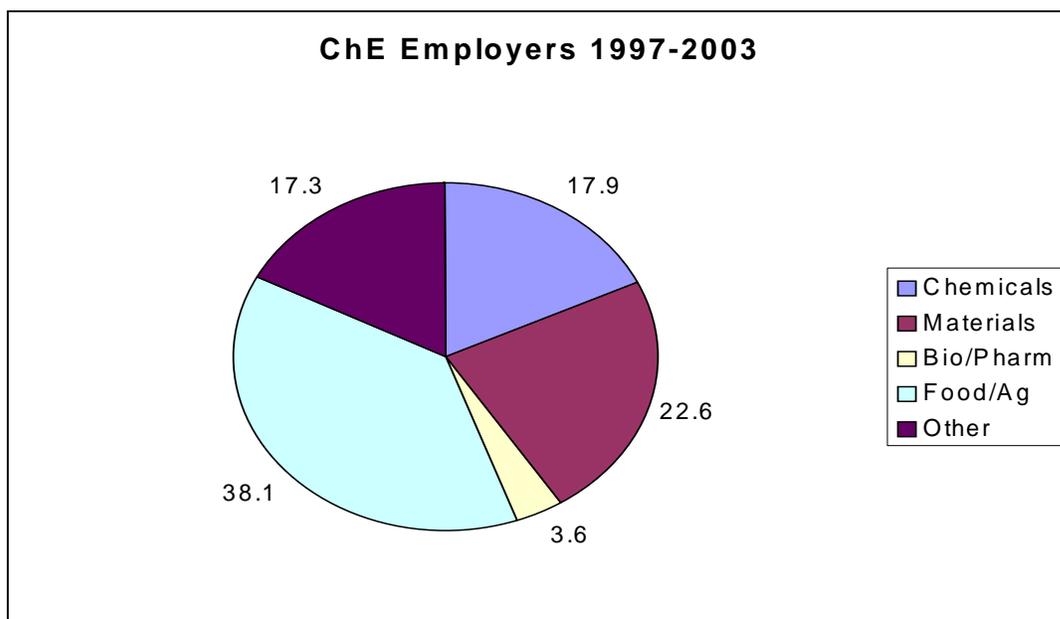


Figure 1. Employment field (by percentage) of ISU Chemical Engineering B. S. graduates 1997 – 2003 showing that 42% of our students have been employed in industries making significant use of biology. Data from Career Services listing of companies employing 3 or more graduates over this time period.

Proposal Addendum: Support from Departmental Advisory Committee

April 23, 2004

Dr. James Melsa
Dean of Engineering
Iowa State University
104 Marston Hall
Ames, IA 50011

Dear Dr. Melsa:

The Chemical Engineering Advisory Council wishes to express its strong support for the proposed change in name from "Department of Chemical Engineering" to "Department of Chemical and Biological Engineering." We feel that this more accurately reflects the research and teaching activities in the Department. It also recognizes the tremendous shift that is occurring in science and technology toward the biological sciences and the need to move the biological sciences from their current phenomenological basis to a much more quantitative base. This is a necessary change as the biological sciences and their related technologies become increasingly important commercially. That change will be driven by the increasing involvement of the engineering disciplines, of which chemical engineering is the key one. The ISU Department of Chemical Engineering has a strong program today and is further strengthening its teaching and research activities in this area. The shift in importance of biological sciences and technology is not a short-term trend, but is a profound long-term shift.

The proposed name change is also expected to increase the national stature and recognition of the Department with respect to attracting more and better undergraduates; it should also increase the Department's ability to recruit higher-quality graduate students. Other chemical engineering departments across the country have made similar name changes and are convinced that it has helped them attract better undergraduates and has improved their competitive position in recruiting graduate students.

For these several reasons we fully support the name change proposed by the Department.

Sincerely,

Gayle McCauley, Chair
Chemical Engineering Advisory Council

cc: Dr. Charles Glatz
cc: Advisory Council Members

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