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June 18, 1999

To: Lee L. Huntsman
Provost

From: Marsha L. Landolt
Dean and Vice Provost

Re: Department of Chemical Engineering 10-year Review

Recommended Action: At its meeting of June 3, 1999, the Graduate School Council recommended that the BS, MSChE and PhD degree programs in the Department of Chemical Engineering continue. The department is sound, anticipates significant growth in the coming years and is headed in a promising direction. I concur with the Council's recommendation and have every expectation that this department will grow and continue to improve over the coming decade.

The self-study (with addendum from the incoming Chair, Professor Rogers), the report of the review committee (including letters from the external reviewers), and the Department's response to the report are attached.

Background. The Department of Chemical Engineering is comprised of 14 faculty serving approximately 160 undergraduate majors (the second largest undergraduate program of its kind on the West Coast) and 60 graduate students (most studying for the PhD). Thirty-seven percent of undergraduate majors transfer from other institutions. Approximately 65 BS, 6 MS and 10 PhD degrees are awarded annually. Graduates of all degree programs are highly sought and have no trouble finding employment in the field. Research awards were approximately $3.5 M for the year preceding the preparation of the self-study. The department has exceptionally good alumni relations, accounting for an endowment of over $6.4 M.

The department's faculty and programs were ranked at the interface between the first and second quartile of similar departments in the 1993 NRC rankings. However, the review committee suggests that the undergraduate program in particular should be ranked among the best in the nation and that the national reputation of the department as a whole has improved substantially since 1993. Indeed, recent hires suggest that the perceived quality of the department will only improve.

The department has and will continue to benefit from the vigorous leadership of Professor Rogers, appointed as Chair shortly before the site visit. The Chair and the faculty clearly are committed to the welfare of students at all levels. Students, in turn, compliment the rigor of the program and are attracted by it. Approximately 70% of majors graduate with research experience. Twenty-nine percent of BS ChemE graduates have participated in industrial co-op or industrial intern positions while they were students. The department has undertaken initiatives to alter the

format of course offerings so that certain core courses will be available to students while away from campus in co-op positions. With the aid of Tools for Transformation funding, three courses are to be offered *via* distance learning formats. One of these has been piloted with good results. This transition will eliminate the need for a two-track system of course offerings (core courses offered twice for each class) which previously had supported the involvement of students in co-ops. This innovation is characteristic of several that the department has undertaken in the past year to substantially improve efficiency and enhance offerings.

The review committee found the senior design course to be a "true gem." In it, undergraduates collaborate with graduate students to solve a problem brought by engineers from industry. The course was lauded as an outstanding example of an experiential and collaborative approach to education. The process control course was similarly singled out for praise. In this course, theoretical exposition is tightly linked to experiment through computer simulation. By contrast, the Unit Operations Laboratory was identified as weak. The chair has responded vigorously by appointing a single faculty member to take charge and transform the course over the next two years to the quality of the two courses cited above. This individual has been freed from other teaching responsibilities. In addition, three grant applications have been written to obtain external funds for replacement of outmoded equipment in the Unit Operations Lab. In other areas, the department has been successful in obtaining NSF and other outside funding to support equipment purchases for undergraduate education. Indeed, since the time of the review, funding has been obtained to overhaul the undergraduate computing lab with the purchase of 26 new Pentium III machines and installation of a high-speed communications net. There is no reason to doubt the likely success of the effort to re-equip the Unit Operations Lab.

The research active faculty have vigorous programs and several faculty are recognized as being nationally or internationally outstanding. However, the committee viewed the current level of research support to be insufficient for a graduate program of first rank. The committee cited the lack of involvement of some faculty in funded research. The chair recognizes the problem and is addressing it to the extent of his power.

The major challenge facing the department is the growth in demand for the major. Undergraduate enrollment in chemical engineering has grown by 42% over the past 8 years. This rate of growth (approximately 4.5% per year) is expected to continue well into the future. Based on the rejection rate of qualified applicants, it could grow even faster. The department is also expanding access to the MSChE program by combining packages of TA (from Chemistry) and RA (Chemical Engineering) support. Primarily as a consequence of the anticipated growth of the undergraduate program, the Dean and the Chair expect that the faculty will need to increase in number to a total of seventeen during the next several years. Next year, the department will develop a hiring plan to accommodate the expected growth as well as the replacement of retiring faculty. The department is not taking the simple view of replacing existing strength, but rather is analyzing the development of the field such that the most appropriate hires will be made. Although the planning process is just beginning, the areas of biochemical and computational chemical engineering are likely to be expanded. It appears that the anticipated faculty expansion will be accommodated within existing and projected budgets, but there is a question regarding funding for additional TAs.

In support of the anticipated growth, the department intends to pursue donations even more vigorously than it has in the past. Specifically, they seek to initiate a fund drive to underwrite a 10,000 square foot fourth floor addition to Benson Hall to accommodate new faculty and educational programs. At the Graduate Council meeting, Dean Denton voiced her support for the development plan, indicating that this project can be combined with other fundraising initiatives in the College. The department will enhance its appeals to alumni (the source of the current

endowment) and will seek industrial funding for named professorships. Given the past record, success is likely.

The department has responded vigorously and positively to the recommendations of the review committee. They are improving already strong educational and research programs. Two unmet challenges exist, for which the department seeks University support. First, funding is needed to award competitive start-up packages to new hires (estimated at $300,000 each). Second, additional TA support is needed to fund growth in undergraduate enrollment and a graduate program that should expand with new faculty hires.

Attachments

c: Richard L. McCormick, President
J. W. Rogers, Professor and Chair, Department of Chemical Engineering
Debra Friedman, Associate Provost for Academic Planning
John T. Slattery, Associate Dean for Academic Programs
Denise Denton, Dean, School of Engineering
Frederick L. Campbell, Dean, Undergraduate Education
Members of the Review Committee
Graduate School Council
Augustine McCaffery, Assistant to the Dean
Beatrice Greenwald, Assistant to the Dean
(All without attachments)