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To: Phyllis M. Wise, Provost
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From: Elizabeth Feetham, Acting Dean and Vice Provost
The Graduate School

Re: Department of Materials Science and Engineering 10-Year Review

Summary and Recommended Action

At its meeting of March 3, 2005, the Graduate School Council met with members of the team that reviewed the Department of Materials Science and Engineering's Bachelor of Science (B.S.), Master of Science in Materials Science and Engineering (M.S.M.S.E.), and Doctor of Philosophy (Ph.D.) degree programs, the Department Chair, and the Acting Dean of the College of Engineering. The Council unanimously recommended that the continuing status of the degree programs be reaffirmed, with the next review scheduled in the 2014-2015 academic year.

In the context of constrained resources and the Department's desire to make new faculty hires, the Council recommended that the Department develop a new strategic plan. The plan should define faculty objectives and clarify the future intellectual direction of the unit, particularly, whether faculty hires should be directed toward strengthening existing program areas or expand into new program areas. Further, the strategic plan should address the mentoring process of junior faculty, how the Department will achieve an appropriate balance in undergraduate and graduate enrollment, and postdoctoral fellows, initiatives to be taken to increase underrepresented groups within these student populations, and provide a clearer articulation of the pathway to the Ph.D. program. Considering the importance of the issues, the Council recommended that the Chair submit an interim progress report by the end of Spring Quarter 2006 to the Deans of the College of Engineering and the Graduate School.

I concur with the Councils' recommendations and comments.

Background

The Department of Materials Science and Engineering has a long history that began with in 1893 when the Board of Regents established the School of Mining Engineering. The School's status changed and it was renamed the College of Mines in 1911. The academic unit's name was changed a number of times in subsequent years—in 1968 it was renamed the Department of Mining, Metallurgical and Ceramic Engineering, and to its current designation of the Department of Materials Science and Engineering in 1983. During the 2003-2004 academic year, the Department had 10 tenure-track faculty and 3 research faculty, approximately 81 undergraduate majors and 60 graduate students.

During the last decade, the field of materials science and engineering has matured, distinguished by an increased focus on interdisciplinary research. In the last five years, the Department transformed the curriculum to an integrated materials science and engineering academic unit. The Department of Materials Science and Engineering has one of the largest undergraduate programs in the country. It has the highest percentage of underrepresented minority students compared to other College of Engineering departments. The Department merged two separate BS programs into a BS in Materials Science and Engineering. Focus of the program is on experiential learning, research, communication skills, and team-based laboratory work and projects. At the graduate and research level, new programs were initiated in polymers, biomaterials, nanomaterials, photonics and magnetic materials.

Review Process

The review committee included five members, three internal and two from peer institutions. The committee Chair was Professor Richard Gammon, School of Oceanography/Department of Chemistry, and other internal committee members included Richard Ladner, Professor of Computer Science and Engineering, and Oscar Vilches, Professor of Physics. External committee members included Dawn Bonnell, Professor of Materials Science and Engineering, University of Pennsylvania, and Ashok Saxena, Dean of the College of Engineering, University of Arkansas. The review site visit was conducted on April 12 and 13, 2004 at which time the review committee met with the Department faculty, students and staff, and key University administrative faculty. Prior to the review site visit the internal committee members met with faculty in other departments that have collaborative relationships with the MSE faculty.

Review Findings

The review team noted the Department made significant improvement since the 1993 review. They commended the Department for its successful restructuring of the undergraduate curriculum, the excellent recent faculty hires, leadership of the Chair, Professor Rajendra Bordia, and the collegiality they found among faculty, students and staff. The Department's faculty has steadily increased collaborative research efforts with research centers, other academic units, and with external industrial colleagues. The quality and quantity of faculty research funding has increased, particularly with recent hires, and teaching excellence is valued and visibly rewarded.

The review committee found the Materials Science and Engineering undergraduate program to be high quality with potential to improve on its quality. Its graduates are recruited by industry, government and prestigious graduate schools. Undergraduate students have a bimodal distribution with one group consisting of high-GPA students that choose MSE as their major and a second group that have low-GPAs, with MSE not their first choice as a major. The Department proposes to raise entrance requirements from the current 2.5 GPA. The committee questioned the college-wide implications for low-GPA students noting that the Department may be providing an important service to students who are unable to get into the more popular majors. They urged the Department and College administration to consider this issue.

The review committee noted the significant decline in applications to the graduate program which mirrored the national trend; however, this situation has recently begun to turn around. The Department's new faculty hires should contribute to increasing applicants to the program. The committee found that time to completion of the Ph.D. programs was taking longer than the national norm. The Department currently admits graduate students into the M.S. and then to the Ph.D. program. The committee recommended that the Department consider shortening the time to completion of the Ph.D. and institute a more direct path by eliminating the Master's degree or equivalence requirement.

The committee raised the issue about the need for the postdoctoral fellows to be better integrated within the Department to enable closer interaction with graduate students and to provide better mentoring for them. An increase of postdoctoral fellows has increased in recent years, a positive change for the Department. The lack of space, however, has also hampered their integration within the academic unit.

Compared to other Materials Science and Engineering departments nationally the UW Department is small in size. The size of these programs is a factor in national rankings. The review team considered that an increase of two to three new faculty positions in strategically chosen research areas could help raise the Department's national ranking within the top 20 Materials Science and Engineering programs. The Department must determine the research direction for future faculty hires since faculty do not have a clear consensus where growth in research areas should occur. The review committee recommended that the Department develop a new strategic plan that would address research areas for new faculty hires. Before any new resources are allocated, the strategic plan should be reviewed and approved by the College and University administration.

Council Recommendations

The Graduate School Council noted the review committee's report did not reflect a response to issues articulated in the committee's charge such as mentoring of junior faculty. The Council expressed concern that the Department would be penalized due to the review committee not responding to these issues. The Council supported the review committee's recommendation that the Department develop a strategic plan and strongly urged that it address the Department's future intellectual direction. Defining its intellectual direction is essential to the Department determining research areas for new faculty hires. Additionally, the strategic plan would assist the College of Engineering Dean's office in understanding the Department's future direction and in considering resource allocations. The Council noted that

the Department's desire to attract the best graduate students and to increase research funding is tied to improving its national ranking; furthermore, an increase in faculty positions is a factor that impacts national ranking.

c: Mark A. Emmert, President
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Susan E. Jeffords, Vice Provost for Academic Planning, Office of the Provost
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Members of the Materials Science and Engineering Review Committee
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