Department of Chemical and Nuclear Engineering

Response to the Academic Program Review Report

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The Department of Chemical and Nuclear Engineering (ChNE) underwent a visit with a program review team on April 27-29, 2009 as part of the periodic UNM Academic Program Review process. The department was quite open with the team about strengths and weaknesses, and their report was similarly open and frank. Though, I believe the committee may have made some inappropriate conclusions based on very limited data, their report for the most part provided a valuable outside perspective that the Department will use to improve the quality of programs and operations. The Department has already taken action on many of the recommendations of the APR Review Team, and more will follow. Below is a point-by-point response to the APR report, concluding with an Action Plan that addresses the most critical recommendations.

Summary Points

Department /Center Relationships

The Department is glad that the team recognized the crucial role that the Centers have played in creating the highly-productive research environment that ChNE enjoys. They also noted that we have outstanding and productive faculty. What they might not have fully appreciated is that the Centers have also played a crucial role in our ability to retain our most outstanding faculty. The team also recognized that the department's financial challenges have been exacerbated by the changes in F&A policies, and by the lack of clear institutional policies for splitting or sharing of returned F&A between home departments of faculty and Centers where they may choose to submit their grants. During Fall 2009, the ChNE Chair met with the Directors of all Centers affiliated with ChNE to discuss the financial situation and prognosis of the department, and possible ways for the Centers to help ensure financial sustainability of the department operations. All Center Directors are committed to supporting the department; however no standardized policies have been adopted yet. Ideally, from the department's perspective, clear policies should be implemented at the institutional level. However, in the absence of institutional policies to address this problem, the Department and affiliated Centers have identified several ways to jointly support the department, including partial Center support of department staff, Center contributions to department operational expenses that all share (such as copying and telephone service), and voluntary F&A splits on proposals. These are all band-aid measures – a fair policy at the institutional level would be a much more effective solution to the broad problem of strained department-center relations due to F&A return.

Graduate Recruiting

The department shares concerns about graduate recruiting for both chemical engineering and nuclear engineering. This topic was addressed by a break-out group at the Department retreat

held on September 3, 2009. Several strategies were identified to improve graduate recruiting. These included earlier admissions, increasing stipends, exploring National Laboratory fellowships, continuation of recruiting postcards that were first sent out last year, and an improved web page. The department has a web page Committee that is working on improvements to our web page, as well as a strategy for regular updates. We have yet to act on a new stipend policy, but that is under consideration. The APR team also highlighted the need for the department to be able to bring in and support new graduate students without prior assignment to a particular research advisor or grant. This has been discussed by the faculty, and there is agreement about the desirability of such an approach, and recognition that this is what is needed to truly compete with what other chemical and nuclear engineering graduate programs. However, under the current financial situation of the department, we do not have departmental resources to do this. We continue to discuss creative ways to try to implement such a plan, but don't see it being feasible in the near future.

Advisory Council and Strategic Plan

The department Advisory Council has been reconstituted, and met on November 5, 2009. The agenda for this productive meeting included a broad introduction to the department and its associated Centers, and a discussion of the ABET Program Objectives and Program Outcomes of the chemical engineering and nuclear engineering programs. The Advisory Council plays an important role in the continuous improvement process that must be documented for our accreditation under ABET (Accreditation Board for Engineering and Technology). The Advisory Council will tentatively meet again in Fall 2010, with as-needed electronic communications during the interim period.

The department began preliminary discussions about strategic planning at the Department retreat on September 3, 2009. The Chair is fully in agreement on the desirability of a Strategic Plan for each program, and will continue discussions with faculty and the Advisory Council in Spring 2010 about the best way and time to initiate this.

Faculty Mentoring

The APR team pointed out that a consistent faculty mentoring program was lacking in the department. The Chair recognizes and agrees with that need. A dedicated faculty discussion on this topic is planned during Spring 2010. In the meantime, the Chair included the assigned faculty mentor into the Annual Review process in Spring 2009 for all untenured faculty. This new process, which was initiated after consulting with the untenured faculty, added another perspective to the Annual Review and brought the mentor into the loop in terms of performance data for the year. This should make the mentor better informed and more effective.

Specific APR Questions

Question 1a: How does the undergraduate program for chemical and nuclear engineering compare with other well-respected programs across the country?

Chemical Engineering: After a generally complimentary introduction on this question, the APR team reported some rather strong conclusions based on limited information. These were discussed by the faculty at the department retreat on September 3, 2009. We believe that on many of these specific points the APR did not have sufficient data or understanding to support

their conclusions or concerns. Nevertheless, the department will keep an eye on these issues. Brief specific responses follow.

1. Senior seminar and ethics: there may well be instances of the use of solution manuals, something that is occurring nationwide with the electronic availability of these documents. Professors in the courses where this has been a problem dispute the allegation that "faculty did nothing about it". In fact, many are utilizing other texts for problems or creating their own homework problems to control this. Faculty are also encouraged to explicitly address academic dishonesty in their syllabi.

2. The department faculty believe the allegation that some courses were not being taught with sufficient rigor, and that this brought into question the preparation of our students, was completely baseless and inappropriate. No course materials were examined by the team, and their allegation appears to be based on their own pre-conceived notion of what the appropriate average GPA should be. We are proud of the record of achievement by our graduates in industry, graduate and professional schools, and we believe that speaks directly to the quality of preparation of our students. The ABET accreditation process, which includes alumni and employer/graduate school surveys on the performance of our students, is yet another quality check.

3. It is the opinion of the Chair that the complaint about faculty missing classes was probably an isolated situation. However, the expectations with regard to teaching will be emphasized to faculty in the annual review process.

4. All of our faculty teach or co-teach at least one class a year, and most teach 2-3 courses per year. However, some faculty do not teach at the undergraduate level each year. We maintain a teaching plan for both programs that extends several years into the future, and allocate teaching based on expertise, overall workload, and the need to cover core courses while offering a reasonable collection of elective classes for both undergraduate and graduate students. Students usually do have opportunities do be exposed to "high-performing" faculty (which the Chair interprets to mean research-intensive) through topical elective classes, though these may not be offered every year.

5. We make an effort to discuss graduate school in the Senior Seminar course. However, graduate school and other career guidance discussion is an area where the department could do more.

6. Our Undergraduate Program Committee, in consultation with the faculty and Advisory Council, will examine the current chemical engineering concentration areas. There has been a shift of interests in recent years, and consolidation of the number of concentrations may be appropriate. There is not currently flexibility to add more specialized courses to the concentrations – the students, in consultation with their advisor, must use their technical electives to achieve this.

7. We are aware of some deficiencies in the lecture-lab connections, and are working on that, especially in thermodynamics which appears to be the biggest problem.

8. We do view the opportunities for undergraduate research experience as one attractive and valuable feature of our undergraduate program.

Nuclear Engineering: We certainly agree with the spirit of the teams suggestions that the NE program stature will be served by faculty exerting themselves on the national stage, by better

promotion of our programs, and by growth of the programs and increased visibility. Though we have constraints on number of faculty and budget, the Chair will nevertheless call on the nuclear engineering faculty to develop a plan to move in the direction of these suggestions. Responses to specific comments follow.

1. We are happy to hear the students are generally happy with the program and faculty.

2. We have been aware of the issues associated with the teaching of this course. We anticipate an instructor change for that course starting next year, and suggestions on content modifications will be taken up by the NE Undergraduate Program Committee.

3. We are happy to hear the students feel they are listened to.

4. We are also happy to hear that NE students find the 101 course to be a positive experience. That is consistent with our impression based on carryover enrollments in both programs.

Question 1b. How does the graduate program for chemical engineering and nuclear engineering compare with other well-respected programs across the country?

Chemical Engineering Response: The team identified several things that the chemical engineering faculty have been discussing at some length in the context of improving our graduate recruiting and admission policies. We recognize that the PhD student/faculty ratio is low compared to leading programs (this was highlighted in our Self Study). It is also true that the fraction of post-docs and research faculty may be higher than some places – this is partially coupled to the graduate recruiting problem that we are working on, and partially related to the types of research faculty are engaged in. The chemical engineering graduate program is taking steps to improve quality and quantity of graduate students, and has already seen a sizeable change in Ph.D/M.S. student ratio.

As with the undergraduate program, the team felt compelled to conclude that average GPA indicated a lack of rigor in the graduate courses. Again, this was done without inspection of course materials, or knowledge of our students. We reject this assessment, and believe the team was out of line here.

Nuclear Engineering Response: The team suggestion regarding meshing of the research areas of the faculty is well received. The nuclear engineering faculty will undertake some strategic planning in this regard during Spring 2010 and following semesters in the context of several anticipated faculty openings in the next 5 years.

We are always looking for new ways to expand our interactions with the national laboratories. Some interesting suggestions were made, though many would require higher level action within both the University and the Labs.

Question 2: Are the undergraduate laboratory facilities and experiments adequate and competitive with other strong programs? Do you have suggestions for improvements in this regard?

Chemical Engineering Response:

We appreciate the compliments of our undergraduate laboratories and the 4-semester laboratory experience that we provide. We are implementing new experiments in the laboratory when

funding permits, and have plans to incorporate other research-based experiments into the laboratory where they fit the objective of the course.

Nuclear Engineering Response:

We appreciate the positive comments regarding the NE undergraduate laboratory experience. We are very aware of the contributions of Prof. Busch, and will be discussing in Spring 2010 a hiring plan to strategically address his eventual retirement.

Question 3: What strategies might help us to improve the success of our graduate student recruiting?

Chemical and Nuclear Engineering Response:

Both programs are very aware of issues related to recruiting graduate students. This issue was one of several focus group discussions at the Fall 2009 department retreat, and it has been discussed in faculty meetings since that time. The review team made several useful suggestions which we continue to keep under consideration. Our lack of resources prevents implementation of some of their ideas at this time, especially relating to the initial support of graduate students; however we recognize the desirability of this model. Several things have been done to help with graduate student recruiting since the APR visit. Both programs have developed a new postcard for promoting the graduate program, and the chemical engineering program has changed the priority admission deadline for Fall have to January 15 which appears to be increasing to early application pool.

Question 4: Do we have enough faculty to compete effectively for funding opportunities in the various research focus areas that we have targeted? If adding faculty were possible, what research areas would you recommend strengthening?

Chemical and Nuclear Engineering Response:

We concur that the approach of using Centers has helped the Department compete effectively for research funding. As Chair, I also agree with the recommendation that any next hire should be in Nuclear Engineering. This is especially true in light of the developments in the nuclear energy area since the APR visit. NE enrollments are growing, and there are prospects for years of strong demand in nuclear engineering that should continue to drive growth in both enrollments and research funding. With a recently announced resignation in the nuclear program, we are actively planning to hire to fill strategic needs of the program. This will not be a net faculty addition, but will address some strategic holes related to upcoming retirements in the NE program.

Question 5: What are best or suggested practices for effective coordination of departmental administration and the administration of affiliated centers in order to maximize the positive impacts of these centers? Specific issues that are of interest include financial coordination and cooperation, balancing of faculty workload expectation and duties, and reporting/credit for productivity.

Chemical and Nuclear Engineering Response:

The APR team made some useful suggestions related to the challenges associated with the strong presence of Centers in the department, and the financial impacts of an unequitable F&A return policy. Many of these issues were discussed at the Fall 2009 Department Retreat, and a financial summit between the Chair and Center directors in the department was held in Fall 2009, with another planned in Spring 2010. The basic issues related to F&A return, selection and continuance of centers should be dealt with at the institution level, and that is currently happening in an OVPR task force. However, within the department, all parties are committed to maintaining the vibrancy of both the departments and the centers. We are exploring creative ways for the Centers to help sustain the department.

Question 6: What are the suggested practices for effective administration and coordination of interdisciplinary degree programs that are largely supported or led by department faculty? Specific issues that are of interest include impact on enrollments in department programs, student credit hour generation, and faculty workload credit.

Chemical and Nuclear Engineering Response:

We are aware that our chemical engineering faculty is multidisciplinary, but view this as a strength that allows us to integrate cutting edge multidisciplinary research with our traditional course offerings. The chemical engineering program maintains a teaching plan that projects out several years to ensure that we have our core chemical engineering curriculum covered. The suggestion of a more formal workload policy is currently being adopted. Formal strategic planning has not been conducted yet, but the suggestion that this should be done before additional hiring is welcome. The strategic points raised with regard to the medical physics program have been discussed and would certainly be addressed as part of any future strategic planning exercise. At this time the nuclear engineering program finds that the graduates and student credit hours generated are worth the limited investment, and sees strategic value with cultivating ties to the medical school.

Question 7: Do you see opportunities that either of the programs in the department is not recognizing or capitalizing on?

Chemical and Nuclear Engineering Response:

The suggestions with regard to identifying research programs that leverage the union of chemical and nuclear engineering make good strategic sense if significant faculty replacements or additions could occur. At the moment, the department has a relatively young group of faculty and not very much natural overlap in research, so it is difficult to envision much progress in building such programs in the near future.

Additional Comments:

Written annual reviews of all faculty were conducted in Spring 2009 and will be conducted going forward. There has been a mentoring program for many years in the department; however, the quality and uniformity of the mentoring can certainly be improved. The mentoring program

processes will be brought up for detailed discussion and modification with the faculty during the 2009-2010 academic year.

The team raised several questions related to use of departmental resources. These are all useful and logical questions that we will be considered as part of our curriculum and strategic planning processes.

The ABET concerns about the lack of regular interaction with the Advisory Council is understandable. We have reinstated an Advisory Council which met in Fall 2009. We tentatively plan electronic communication with the Advisory Council in Spring 2010, and a second meeting after the Fall 2010 ABET visit. As a result of input from the APR team, our Advisory Council, and a mock ABET team, we are revising our Program Educational Objectives (as suggested by the APR team).

The additional suggestions listed by the team are all acknowledged for their potential value. Many have been considered already, and come up from time to time, and others will be taken up in the future by the faculty.