Program Reviewed: Chemical Engineering

Onsite Review Dates: 2/25/14-2/26/14

Name of Reviewers

Internal:
Please include name, title, and Department

External:
Please include name, title, and Department
Kimberly Ogden, Professor, Department of Chemical and Environmental Engineering, University of Arizona, Tucson, AZ 85721

I. Academic Unit Description and Strategic Plan
Please evaluate the following:

Vision, Mission and Goals
___ Excellent  x Very Good  ___Appropriate  ___Needs Improvement

Strategic Plan
___ Excellent  ___ Very Good  x Appropriate  ___Needs Improvement

Please elaborate if you have identified any items in this section as Excellent.

The goals of the department as explained in the program overview are concrete and provide direction for the department.
Please elaborate if you identified any items in this section as Needs Improvement. Provide recommendations in the area of Strategic Planning.

Click here to enter text.

Other comments (optional)
The chemical engineering field is quite diverse. Therefore, the department may want to consider if there are target research areas for the individuals they are hiring in the next few years that correspond to the vision and mission of the college and university. Although they are recruiting an individual for a Jack Maddox Distinguished Chair in collaboration with the chemistry department, the strategic plan may benefit from including some of these specific types collaborations and research directions for the future.

II. Program Curriculum
Please evaluate the following:

Alignment of program with stated program and institutional goals and purposes
__ Excellent __ Very Good x Appropriate __ Needs Improvement __ N/A

Curriculum development coordination and delivery
__ Excellent __ Very Good _ Appropriate _ Needs Improvement __ N/A

Program learning outcomes assessment
__ Excellent __ Very Good x Appropriate __ Needs Improvement __ N/A

Program curriculum compared to peer programs
__ Excellent __ Very Good x Appropriate __ Needs Improvement __ N/A

Please elaborate if you have identified any items in this section as Excellent.
Click here to enter text.

Please elaborate if you identified any items in this section as Needs Improvement. Provide recommendations in the area of Program Curriculum.
Overall, the curriculum is appropriate for students entering the program with undergraduate chemical engineering degrees. The area that needs improvement is the path for graduate students that enter the
program without a chemical engineering BS degree. These students are required to take the graduate level core courses without the appropriate pre-requisite material and hence success in these courses is difficult for these students. The students either spend a tremendous amount of time learning the undergraduate material on their own, drop the course, or receive low grades. A “remedial” or leveling track must be developed for these students. Although this will take a bit of mentoring time, this should be tailored to the individual student. It is anticipated that the number of students that enter with non-chemical engineering backgrounds may increase as the department moves more into biological engineering research areas.

*Other comments (optional)*
The number and topic areas of the required courses are on par with other chemical engineering programs.

III. Faculty Productivity

*Qualifications*

_ x_ Excellent  __ Very Good  __Appropriate  __Needs Improvement  __N/A_

*Publications*

_ x_ Excellent  __ Very Good  __Appropriate  __Needs Improvement  __N/A_

*Teaching Load*

__ Excellent  __ Very Good  _ x_ Appropriate  __Needs Improvement  __N/A_

*External Grants*

_ x_ Excellent  __ Very Good  __Appropriate  __Needs Improvement  __N/A_

*Teaching Evaluations*

__ Excellent  _ x_ Very Good  __Appropriate  __Needs Improvement  __N/A_

*Professional Service*

__ Excellent  _ x_ Very Good  __Appropriate  __Needs Improvement  __N/A_
Community Service

__ Excellent   __ Very Good   x_Appropriate   __ Needs Improvement   __ N/A

Please elaborate if you have identified any items in this section as Excellent.
The faculty, all but 2 to 3 members, have excellent funding and publication records. These individuals publish approximately 4 peer-reviewed papers per year and support approximately 5 graduate students at the rate of $27,500 per year as well as a couple of post doctoral fellows. The amount of funding obtained from the National Science Foundation by these individuals is admirable. The quality of the Assistant faculty members is outstanding, many have obtained CAREER awards. Furthermore, the recruitment of an NAE member to the department that is devoted to mentoring graduate students is outstanding.

Please elaborate if you identified any items in this section as Needs Improvement. Provide recommendations in the area of Faculty Productivity.
Click here to enter text.

Other comments (optional)
Click here to enter text.

IV. Students and Graduates
Please evaluate the following

Time to degree

__ Excellent   __ Very Good   x_Appropriate   __ Needs Improvement   __ N/A

Retention

__ Excellent   __ Very Good   x_Appropriate   __ Needs Improvement   __ N/A

Graduate rates

__ Excellent   __ Very Good   x_Appropriate   __ Needs Improvement   __ N/A
Enrollment
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Demographics
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Number of degrees conferred annually
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Support Services
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Job Placement
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Student/ Faculty Ratio
__ Excellent  __ Very Good  x Appropriate  __ Needs Improvement  __ N/A

Please elaborate if you have identified any items in this section as Excellent.
Click here to enter text.

Please elaborate if you identified any items in this section as Needs Improvement. Provide recommendations in the area of Students and Graduates.
Click here to enter text.

Other comments (optional)
The number of graduate students is increasing and is in-line with the strategic plan for the university. The one area of suggested improvement is increasing the number of MS students. One potential group of students is petroleum engineering BS students. Some may be interested in the 150 unit program - a combined petroleum/chemical engineering BS/MS. These students as well as students that do not have chemical engineering BS degrees may increase the number of domestic students in the graduate program.
V. Facilities and Resources

Please evaluate the following:

Facilities
__ Excellent   __ Very Good   __ Appropriate   x Needs Improvement   __ N/A

Facility Support Resources
__ Excellent   __ Very Good   __ Appropriate   x Needs Improvement   __ N/A

Financial Resources
__ Excellent   __ Very Good   __ Appropriate   x Needs Improvement   __ N/A

Staff Resources
__ Excellent   __ Very Good   __ Appropriate   x Needs Improvement   __ N/A

Please elaborate if you have identified any items in this section as Excellent. Click here to enter text.

Please elaborate if you identified any items in this section as Needs Improvement. Provide recommendations in the area of Facilities and Resources.

Although the quantity of laboratory space on a square footage basis is adequate for the existing faculty members, the quality could be improved. The remodeled laboratories on the 2nd floor of Livermore are great, but the basement laboratories are not of high quality and some others have exhaust hoods that do not circulate well. The faculty also do not have contiguous space. This can affect the productivity of the graduate students that spend a bit of time “commuting” between buildings, and decreases the camaraderie of the graduate students since they are spread out through various buildings and do not have a graduate lounge or area.

In terms of facilities/equipment support, the department would benefit from some technical support. They currently do not have a technician in the department to help maintain equipment and potentially train new students. The response time for repairs for leaks or hoods was mentioned as being long, and could be improved but other matters were more pressing for the department.

In terms of staff resources, the two full time staff members in the department received excellent reviews. However, the number of staff members seems quite low; and to the best of my understanding is low compared to other departments at TTU. One staff member is responsible for all of the payroll and
$4.3 M worth of contracts and grants. In addition, this individual helps new faculty learn the financial system of the university. The other one takes care of everything else. Travel reimbursement is backlogged (3 months or so); graduate students order all supplies and are responsible for procurement. This is challenging for faculty that work in the area of biological engineering and may become more challenging as regulations regarding purchasing of chemicals and chemical inventory are put into place. Faculty do many things that staff traditionally would do and this is not sustainable. As the department grows, the faculty need more support and this may help with retention, which is of paramount concern to the department chair and the dean.

Other comments (optional)
Click here to enter text.

VI. Overall Ranking

Overall Ranking
x_ Excellent  __ Very Good  __Appropriate _ Needs Improvement

Please provide summative conclusions based on the overall review.
In conclusion, the chemical engineering graduate program is excellent, especially given the resources available. The majority of the faculty are very productive in terms of scholarly publications, and have substantial funding from federal sources such as NSF. The graduate students are very happy with their mentors and research projects. The growth in terms of faculty hires is warranted. The department has been very successful in recruiting excellent assistant faculty and most recently, senior faculty as well.

Please provide summative recommendations based on the overall review.
The most pressing issue for the program is faculty retention. It is difficult to pinpoint one specific reason for faculty turnover and to provide a recommendation or set of recommendations that would address this issue. The faculty should be rewarded for doing all of the right things. They are bringing in research funds, teaching well, growing their graduate program, and participate in service activities. The “rewards” are not simple, because not all are tangible. For example, there was not any discussion about salary being an issue, however, things like quality laboratory space, and staff support were discussed. Developing a tangible plan with the department to improve the quality of their space and provide more staff support may help with retention.

Some more specific recommendations include:
• Developing a graduate seminar program where the graduate students give presentations to help break down the silos between research groups, and
• Developing a plan to ensure the success of graduate students that enter without a chemical engineering Bachelors degree.