Graduate Program Review  
Texas Tech University

Program Reviewed: Chemistry

Onsite Review Dates: 3/8-10/2015

Name of Reviewers

Internal:

Please include name, title, and Department

External: Dr. Jeffery L. White, Professor, Department of Chemistry, Oklahoma State University

Please include name, title, and Department

I. Academic Unit Description and Strategic Plan

Please evaluate the following by marking an X in one of the blanks for each item:

Vision, Mission and Goals

___ Excellent  ___x__ Very Good  ___ Good  ___ Needs Improvement

Strategic Plan

___ Excellent  ___x__ Very Good  ___ Good  ___ Needs Improvement

Please comment on the positive components and suggested areas of improvement.

The department’s goal to reach a top 60 departmental ranking and AAU status is laudable, and can be achieved by building upon the productive tradition within the department while simultaneously embracing a more open, interdisciplinary structure moving forward. Five new emphasis areas are proposed, although most are not unique to TTU. Strategic hiring in certain emphasis areas should not supersede getting the very best available faculty members, as those individuals will help the department achieve these goals irrespective of the specific sub-discipline or “hot area” in which they reside. Good people are the number one priority in hiring, not topical areas. Further, the strategic plan can be realized by increased efforts in recruiting good domestic students, which is not mentioned in the departmental goals. The department appears to focus only on increased efforts for recruiting international graduate students.

The possibility of reaching goals articulated in the vision and strategic plan could be increased by examining leadership at both the college and departmental level, and the relationship of that leadership to the faculty, faculty morale, and the ultimate trickle-down impacts on the health of the graduate program. This statement will be expanded in later sections.
II. Program Curriculum

Please evaluate the following:

**Alignment of program with stated program and institutional goals and purposes**

___ Excellent   __x__ Very Good   ___ Good   ___ Needs Improvement

**Curriculum development coordination and delivery**

___ Excellent   __x__ Very Good   ___ Good   ___ Needs Improvement

**Program learning outcomes assessment**

___ Excellent   ___ Very Good   __x__ Good   ___ Needs Improvement

**Program curriculum compared to peer programs**

___ Excellent   __x__ Very Good   ___ Good   ___ Needs Improvement

*Please comment on the positive components and suggested areas of improvement.*

The breadth of graduate courses is sufficient, and the qualifications of the faculty in those areas are excellent. However, it appears that the timely offering of necessary graduate courses is compromised by the heavy service teaching load in the department.

This reviewer found the graduate student population, as represented by the minority that attended the discussion session, to be surprisingly naïve about how to (1) effectively select a research advisor, (2) secure funding for external presentation opportunities, and (3) proactively seek post-graduate employment opportunities. The department should implement a more extensive graduate student orientation program during the early part of the first semester to address these deficiencies, and consider implementing a temporary advisor “rotation” program so that each graduate student can experience multiple research group advisors prior to committing to a specific major advisor.

This reviewer does not understand the motivation for creating a new Master’s program in chemical biology, as by definition this will pull resources from the Ph.D. program. Students that pursue such programs are often less than desirable, or choose such a program as a part of a medical school holding pattern. The “bachelors-to-masters” 3+2 option might be a way to make this a desirable new addition to the overall graduate program, without diluting resources required to improve the Ph.D. program.

III. Faculty Productivity

*Please evaluate the following by marking an X in one of the blanks for each item:*

**Qualifications**

__x__ Excellent   ___ Very Good   ___ Good   ___ Needs Improvement

**Publications**

___ Excellent   __x__ Very Good   ___ Good   ___ Needs Improvement
Please comment on the positive components and suggested areas of improvement.

The faculty is traditionally productive, with good publication quality and output, and a history of strong extramural funding. The latter has declined recently (1/2 as many total awards in 2013 as in 2010, for example), presumably due to some departures and retirements of productive faculty members. **However, it is clear that the number of grant submissions per faculty member per year must increase moving forward** (as noted in the self-assessment), especially if the faculty member does not have extramural funding. Research faculty members that do not have current major funding **should be required to submit major grant proposals each year**.

Establishing new connections through industrial research collaborations is another route to help reach overall departmental goals as it relates to the graduate program. Providing guidance to new faculty for seeking renewable sources of funding, rather than just “early career” starter grants, is recommended.

### IV. Students and Graduates

*Please evaluate the following by marking an X in one of the blanks for each item:*

<table>
<thead>
<tr>
<th>Time to degree</th>
<th>__ Excellent <em>x</em>_ Very Good ___ Good ___ Needs Improvement</th>
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<tbody>
<tr>
<td>Retention</td>
<td>__ Excellent <em>x</em>_ Very Good ___ Good ___ Needs Improvement</td>
</tr>
<tr>
<td>Graduate rates</td>
<td>__ Excellent <em>x</em>_ Very Good ___ Good ___ Needs Improvement</td>
</tr>
<tr>
<td>Enrollment</td>
<td>__ Excellent <em>x</em>_ Very Good ___ Good ___ Needs Improvement</td>
</tr>
<tr>
<td>Demographics</td>
<td>__ Excellent ___ Very Good <em>x</em>_ Good ___ Needs Improvement</td>
</tr>
</tbody>
</table>
Number of degrees conferred annually
___ Excellent   x__ Very Good   ___ Good   ___ Needs Improvement

Support Services
___ Excellent   ___ Very Good   _x__ Good   ___ Needs Improvement

Job Placement
___ Excellent   ___ Very Good   _x__ Good   ___ Needs Improvement

Student/ Faculty Ratio
___ Excellent   _x__ Very Good   ___ Good   ___ Needs Improvement

Please comment on the positive components and suggested areas of improvement

As stated above in Section II, increasing graduate student awareness of post-graduate career possibilities needs to be improved, and would further strengthen a program that has been productive in producing well-trained Ph.D. graduates. One solution would be to increase the frequency with which the student meets with his/her advisory committee, and add meetings that do not include a high-stress component (i.e., as usually occurs during orals, seminars, or defenses). Stated differently, while the major advisor is and must remain the chief mentor for the student, increased interaction with other faculty in the department and in related departments would benefit students and give them a broader, better informed perspective.

Again, increased efforts to recruit domestic graduate students should be emphasized moving forward. The most obvious barrier to accelerating this pipeline is the inability to make 12-month stipend offers to recruits. The department routinely supports ca. 95% of its graduate students for 12 months each year they are in good standing, but this is only guaranteed in the offer letter for the first year. Improving initial conditions by recruiting a higher quality domestic student would positively impact all aspects of the graduate program, and the most straightforward route to achieve this would be to compete with other universities and offer 12 month stipends guaranteed for four years, assuming the student remains in good standing.

V. Facilities and Resources

Please evaluate the following by marking an X in one of the blanks for each item:

Facilities
___ Excellent   ___ Very Good   ___ Good   _x__ Needs Improvement

Facility Support Resources
___ Excellent   ___ Very Good   ___ Good   _x__ Needs Improvement

Financial Resources
Please comment on the positive components and suggested areas of improvement

The department has many excellent facilities, including magnetic resonance and mass spectrometry for example, that are capable of supporting high quality research and graduate student training. In addition, in house glass blowing and machine shop facilities are among the best relative to peer institutions.

Improvements are required in the overall support of existing facilities, like shared “core” facilities, by both heavy faculty users and the department. Some cases were mentioned where junior faculty startup funds were cannibalized to help repair or support shared facilities, as presumably no other funds were available for repair and maintenance. This is unacceptable.

An increased focus on safety due to recent incidents is noteworthy, and the department should be applauded for looking for ways to decrease the number of graduate student desks in labs. This will require an infusion of funds from the university to renovate existing laboratory infrastructure.

One important safety area appears to have been overlooked. The TA/undergraduate student ratio in organic teaching labs (and possibly some freshman chemistry labs) is too low. There is only one TA per 24-30 students in some organic sections, which poses serious safety concerns. This could be easily remedied by adding an extra TA for those sections.

VI. Overall Ranking

Please provide summative conclusions based on the overall review.

Overall, the department is in a transition phase as many promising young faculty are in place, and several senior faculty have either recently retired or moved to other institutions. A strong, productive faculty core exists, but is discouraged by recent college/university level funding decisions, and the impact those decisions have had on space, facilities, and the quality of the current graduate student pool. In addition, the strong divisional allegiances (physical, analytical, organic, inorganic, biochemistry) inhibit a healthy interaction between all faculty in the department. Senior faculty members suggest that the department functions outside of these distinctions, and that the divisions only serve to organize teaching efforts. Junior faculty and graduate students suggest otherwise, and state that a strong “territorial” atmosphere exists along divisional lines within the department. The current Interim Department Chair is not a full professor, but holds the rank of Associate Professor. This generates problems as certain issues involving senior faculty (e.g., mentoring of junior faculty, allocation of space, teaching conflicts, etc.) cannot be appropriately addressed, and it appears to this reviewer that the Chair (as interim leaders often do) seeks to avoid conflict first and foremost, without addressing the underlying problems. There appears to be no communication between the Dean of the College and faculty. Indeed, many departmental members stated that the only time the Dean has addressed the faculty was to tell...
them to increase their extramural funding. There is no evidence that the Dean attempts to communicate with the faculty through the department head. The Dean was unaware of any initiatives in the department outside of the traditional divisions listed above, even though they do exist.

Many of the challenges facing the graduate program at TTU are common to other comprehensive research universities across the United States, and currently, the department appears comparable to the three peer institutions mentioned in the internal review. While the department, by all TTU measures, is still the most productive faculty in the College, the decisions made in the immediate future will determine if the department and its graduate program move forward toward their goal of achieving AAU and top-60 status relative to comparable external departments. **However, it is clear to this reviewer that maintaining the current status quo will ensure failure in reaching these goals, as is hopefully evident from feedback provided in the previous sections.**

**Please provide summative recommendations based on the overall review.**

Ultimately, the health of a graduate program in chemistry depends on the health, morale, and productivity of its faculty. Becoming a productive faculty member in the competitive world of chemistry is not trivial, and requires commitment from the individual, the department, and the university. Graduate students thrive in environments where faculty members thrive, and faculty thrive when they can be creative, competitive, and reasonably compensated. Compensation takes many forms, including the obvious salary, but also in facilities, support for programs and new hires, communication with administration, and a voice in administrative decisions. **To achieve AAU status and standing as a top-60 graduate research chemistry department, this reviewer submits the following recommendations, most of which are discussed in detail above:**

1. The Dean of the College, the current Interim Chair of the Department, and the faculty at all ranks should meet, discuss, and lay out a plan forward for hiring a distinguished external candidate to serve as the new Chair. (This might be done in concert with seeking a second Welch Chair, if allowed.) At a minimum, a distinguished internal candidate at the rank of full Professor could be identified to lead. It is unfair to an Associate Professor’s career to serve as a permanent department head, and it leads to unhealthy relationships within the department (examples of which are currently evident).

2. The Dean of the College and the faculty need to discuss the current financial status of the College, how this status is currently influencing funding allocations to the department relative to the level prior to the 2010 cuts, and how this connects to recent initiatives to withhold full IDC allocations to individual faculty members (especially at the junior faculty level), the latter of which can serve as effective bridge funding between major granting periods.

3. Faculty members need honest feedback on why merit compensation does not exist, particularly following years of high grant output. Again, this requires active communication channels between the Dean and the department, as well as transparent budget processes. (2012 salary data was provided for all Associate Professors in the department and compared to Associate Professors in Biology, Physics, and Mathematics. Consistently, chemistry salaries were lower even though Chemistry had more extramural funding.)

4. Faculty need to continue recent efforts to reverse decreased funding trends, with the most recent data suggesting this is headed in the proper direction. **Increased proposal submission per faculty member per year is expected.**
5. Graduate students should be offered 12 month appointments for four years in a Ph.D. program, assuming the student remains in good standing.
6. A formal mentoring program pairing a junior faculty member with a successful senior faculty member from within the department should be implemented.
7. Increased effort in identifying and recruiting regional domestic graduate students is required.
8. Improved orientation for incoming graduate students is required (details above), and the department should consider implementing temporary rotations as a tool to assist students with selecting their major advisor.
9. The number of TA’s in undergraduate teaching lab sections should be increased, i.e., two TA’s per undergraduate lab section, particularly for organic teaching labs.
10. Insufficient hood space exists in the building, so funds for renovating existing labs and adding fume hoods is required.
11. An audit of programs currently residing in the interdisciplinary ESB building is needed; no chemistry groups have space in that building at this time and it is not clear why this is the situation.
12. Emphasis on hiring the best new faculty, independent of targeted “cluster hire” areas, should be the operative hiring policy. A critical mass of diversity in research areas is the hallmark of all strong research departments.
13. Teaching loads and large service load courses in particular should be minimized for research active faculty.
14. Rules for determining teaching loads should be enforced.
15. Non-research active faculty should not be allowed to have more than one departmentally-supported graduate student in their group for an extended period of time.