Outside Review of the Doctoral Program of the Department of Chemistry and Biochemistry of Texas Technical University (TTU)

February 2-3, 2009

submitted to

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Background
The review committee was created to assess the strengths and weaknesses of the doctoral program of the Department of Chemistry and Biochemistry of Texas Technical University in Lubbock, TX, and to make suggestions for its future directions. The committee met over two days, February 2 and 3, 2009, at TTU, and included internal reviewers:

Prof. Michael Farmer (Chair), Department of Agricultural and Applied Economics & Range, Wildlife and Fisheries Management, Texas Technical University

Prof. Cal Barnes, Department of Geosciences, Texas Technical University

Prof. Darryl James, Department of Mechanical Engineering, Texas Technical University

in addition to the external reviewer, who is the author of this document, and the only Chemistry faculty on the committee. Thus, this document reflects the views and impressions of the author only. A separate document prepared by the internal committee members will be submitted under separate cover.

In this report, the individual review criteria are rated on a scale excellent / very good / good / satisfactory / unsatisfactory. The review is based on

- an extensive self-evaluation of the department entitled “Graduate Program Review of the Department of Chemistry and Biochemistry” (Professor Dominick Casadonte, Chair, 2008) which was distributed in advance to the members of the review committee
- meetings of the committee with the Chair of the Department
- a meeting with the graduate faculty
- a meeting with graduate students
- faculty and graduate student questionnaires distributed with the self-evaluation
- a tour of departmental facilities
Overall quality and direction of program

- **Rating: Excellent to very good**

The faculty in this department is a strong group of researchers with credentials that range from good to excellent, and a strong commitment to both research and teaching. The current Chairman is well respected among the faculty, and has developed a clear vision and mission for the department, and deserves a good deal of credit for implementing these visions, and significant improvements in the department’s operation. During the past five years, the Department has made progress in building strength in a few selected areas of modern chemistry, a move which is viewed very positively by this reviewer, and which directed the recent hiring of several assistant professors, and allocation of resources. These areas are computational/theoretical chemistry, nanomaterials and bio-organic / organic chemistry. In the first of these, the department has exceptional strength, and more than critical mass in the others. The University has allocated resources for the computational facility, and it is essential that this new, and some of the existing departmental facilities, be properly managed and administered by technical staff.

Assessment of faculty quality in relationship to students

- **Rating: Very good**

The Chemistry faculty is highly motivated and dedicated to the mission of the Department. The faculty generates more than $3M from external sources, has consistently done so over a prolonged period of time, and has been one of the two most highly funded departments in the college. Most faculty members are research active; some are highly research oriented who publish regularly and operate substantial research programs. The Department has a strong teaching component at the undergraduate and graduate levels. Substantial educational programs funded by external grants are in place.

The quality at the graduate faculty, measured in terms of research and graduate student mentoring and in terms of instructional quality, was rated good to very good by graduate students interviewed. The main criticism voiced was the small size of the graduate division in the inorganic and the physical/theoretical chemistry programs, which limits the course offering. This, in turn, causes many courses to be offered only in a two-year rotation; thus, PhD students well into their third year of graduate school are still involved in course work. Methods to overcome this aspect will be highlighted below in the “Suggested Changes” section.

The reason that the faculty is not ranked higher in this reviewer’s assessment is the fact that, although some of the recently hired junior faculty members are doing exceedingly well, there seems to be a fraction of un-funded, low productivity faculty members at the assistant and associate professor level. To fulfill the vision of the department, namely to break into the top 50 departments nationwide, the productivity and participation of these faculty members must increase. To achieve that, the entire research active department
(not just the Chair) has to extend its expertise and efforts in terms of mentoring, joint research endeavours and joint grant applications.

Faculty members who do not participate in grant-funded research or teaching efforts will have to bear a significantly higher teaching/service load to maintain the quality of efforts by the research-active faculty. Thus, differential teaching loads, ranging from 2/2 to 1/0 for research inactive to highly active/outstanding research efforts should be re-introduced.

Existence of policies and practices in support of graduate students

- Rating: Good – very good

The self-evaluation, the departmental chair and the interviewed faculty members all pointed to the fact that incoming students are not guaranteed 12-month compensation as the limiting factor that affects quality and quantity of graduate students in the program. Interestingly, graduate students in the program did not weigh this factor as highly as the faculty did.

Nevertheless, this aspect needs to be addressed by the University Administration, which has to understand that quality graduate students are an absolutely necessity for the health of a science program. It is incomprehensible that the administration expects the department to absorb an annual double digit increase in undergraduate teaching without committing the necessary resources, which (for laboratory-based courses) will be graduate teaching assistants. The enormous increase in laboratory teaching (which may force the department to add Saturday or night laboratories) requires a concomitant increase in teaching resources, which will require an increase in number of qualified graduate assistants (TA’s), and the commitment by the administration to guarantee these TA’s 12 months support.

Refusal in doing so jeopardizes the department’s ability to compete with other Texas-based universities for quality graduate students. The administration (both at the level of the College of A&S and the Graduate School) needs the courage and commitment to guarantee the graduate salaries over 12 months, in particular, since over the past decade or so, funds were always available to pay the graduate students for 12 months. Thus, this point is really a “zero-cost” improvement (see below), but an extremely urgent one, and should be one of the highest priorities addressed by the Deans and the Provost.

Based on graduate student comments and responses in the questionnaire, it appears that the majority of the PhD students are quite satisfied with the graduate program in chemistry and biochemistry as it exists at this time. However, to this reviewer is appears that the diagnostic exams, courses, literature seminars, the cumes and a proposal are not administered effectively, since a student spends about 3.5 years before all these requirements are satisfied. Although this reviewer is the last person to suggest to “water down” any graduate program, it is necessary to streamline it. The national average for
“admission to candidacy” (that is, passing of all qualifiers for the degree of PhD) is more like 2 years, with many programs trying to reduce this even further).

To achieve this goal, required graduate courses need to be offered more frequently. Unless the graduate student population increases to allow regular classes, some course may have to be offered as “reading classes” or on-line courses, and the advising of graduate students needs to be streamlined. Also, it appears that having a fixed cume-subject schedule (as in physical chemistry) is not practical for such small student cohorts.

Adequacy of staff support, physical facilities, library resources, equipment, research facilities and program budget

- Rating: good

While the department maintains excellent support facilities (machine, electronic and glassblowing shops, research stock-room) and employs a support staff much larger than similarly-sized programs, there was significant dissatisfaction among the faculty about some shops, in particular the electronics shop. Given the University’s policy of staff positions, it may be impossible for the department to replace the personnel which was found to be unsatisfactory. However, the chair should make all possible efforts to submit “unsatisfactory” annual reviews for staff, or reports staff to H&R, whose performance is deemed unsatisfactory.

To support existing facilities (X-ray, NMR, etc), and the departmental parallel computing cluster to be established, the department requires highly trained facility managers or system administrators. These positions, along with service contracts for existing departmental facilities, should be borne by the college from F&A costs (the idea behind F&A originally was for such purposes, not as a general income fund for the University).

Some faculty member voiced a minor complaint that on-line access to some journals is more restricted to A&S faculty than, for example, to faculty in health-related areas. This should be easily correctable by the library services. One graduate student also requested availability of Mathematica under a site license (presently, only Matlab and Maple are available).

Research equipment and facilities were generally deemed adequate, and were found to be comparable to those in programs of similar size.
Suggested Changes
Many of the suggested changes enumerated here depend on the willingness of the administration at or above the Deans’ (A&S, research and graduate school) level for support, since the department has reached its limit of performance under the present financial constraints. Thus, each and every suggestion discussed above, and listed below requires action of the University Administration, and the department cannot implement any of these changes without financial commitment by the administration. To this end, the department in general, and the Chair, in particular, cannot be held responsible for not implementing the suggested changes if the deans’ and the provost’s office do not supply the necessary financial backing to implement the changes.

A. Changes requiring financial commitments from the University
- Increase number of teaching assistantships to account for increasing number of undergraduate laboratories
- Guarantee assistantships for 12 month (see also under “zero-cost” items below)
- Increase F&A return (or reduce the department’s faculty set-up contribution) to permit purchasing of service contracts for instruments and facilities
- Commit staff positions for facility managers / system administrators
- Increase staffing in the Office of Sponsored Programs to help with grant submissions via grants.gov, to effectively administer grants, and help faculty identify possible grant sources.

B. Zero-cost changes
The following changes can be implemented at low or minimal cost:
- Target applications from under-represented minorities into the graduate program by advertising the graduate program specifically at south/central minority institutions.
- Target applications toward, and invite potential graduate students interested in the low-population research areas (i.e., inorganic and the physical/theoretical chemistry divisions), some of which are the department’s choice of areas of excellence. This point should be achievable relatively easily, given that the pool of graduate applications is about 300.
- Re-establish differential teaching loads for non-research active faculty
- Guarantee 12 month compensation for all graduate students. This item is listed as a “zero-cost” item, since in the past funds were always found to pay all graduate students for 12 months. Thus, no further allocation is needed, but a commitment by the administration
- Cross-list introductory graduate and advances undergraduate courses to permit more advanced graduate courses to be offered; explore the possibility for on-line graduate courses
- As voiced by faculty: In order to achieve the departments vision of becoming a “top 50” graduate program nationwide, a set of milestones and measurable goals need to be established that allows the department to gauge its progress.