

Graduate Program Review
Environmental Toxicology (ENTX)

Review Committee:

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Executive Summary:

The committee was charged with a review of Texas Tech's Environmental Toxicology Department's Masters of Science and Ph.D. programs. The committee members met with ENTX administration, faculty and students on February 3rd, having previewed the program's self-study (2005-2011) and other requested documentation. During their visit, committee members toured the ENTX facilities and met with the program Director, faculty, and graduate students. Committee members remarked positively on the open and positive cooperation received from administration, faculty and students.

Department Strengths:

- **Director.** Dr. Ron Kendall, director of ENTX and The Institute of Environmental and Human Health (TIEHH), was praised by committee members for his accomplishments and for his enthusiasm and passion for the department and its development.
- **Grantsmanship & Publications.** Committee members were impressed by the student-student, faculty-faculty, and student-faculty collaboration on grant proposals as well as research.
- **Program Composition.** Committee members commented positively on the department's blend of environmental chemistry, ecotoxicology and human health related molecular toxicology, and as well as for the variety of research areas represented within the department (analytical toxicology, aquatic toxicology, ecology and wildlife toxicology, biomedical toxicology, and ecosystem modeling). The human health toxicology emphasis is seen as important and supportive of the Department's vision of integrating with the medical school.
- **New Construction.** Committee members praised the BSL3 containment facility renovations, the construction of the biohazards laboratory and the new animal facilities. These additions/improvements are anticipated to increase ENTX's competitiveness, particularly for human health-related research funding.
- **Faculty and Staff.** Faculty and students praised the support staff, and students were complimentary of the faculty's dedication, availability, and helpfulness. Graduate students are treated as young professionals and frequently have opportunities to author and coauthor publications.

Areas for Improvement:

- **Department/Institute.** Committee members were confused as to the distinctions and overlap of ENTX and TIEHH and desired increased clarification in this area.

- **Instrumentation.** Problems arise due to students and faculty sharing instrumentation for research as well as coursework purposes. The committee members recommend separate instrumentation to avoid competing needs for the same instruments as well as to reduce unnecessary wear-and-tear.
- **Faculty turnover.** Committee members recommend the Department increase efforts to retain current faculty and establish continuity. Suggestions were made about a less centralized leadership structure, potentially improving transparency and improving faculty members' sense of contribution.
- **Student stipends/admission rates.** Recent increases in student enrollment in the M.S. and Ph.D. program were viewed as potentially problematic by committee members. Members feel that lower enrollment rates (particularly for M.S. students) with higher stipends would lead to increased quality of admitted students. Furthermore, increased stipends would reduce the need for students to engage in grant writing (for grants to support their own studies) from the outset of their program experiences.
- **Parking.** Students expressed to the committee members that they frequently have difficulty accessing resources on the main Texas Tech campus because of parking issues. The distance between the ENTX facilities and the main campus leads to a sense of isolation.
- **Publishing and Grant writing.** Committee members viewed that grant writing within the department seemed to be focused on quantity over quality, leading to lower success rates. Members recommended spending more time and effort applying for fewer (but more beneficial) sources of funding. Similarly, the committee recommended that faculty members strive for publications in higher tier journals.

Program Overview and Vision Rating: Good

Charge to Reviewers

“Reviewers should examine the mission and organization of the academic unit, paying special attention to program planning, vision, and program size and compare this to their current strategic plan.”

Program Overview and Vision as Stated in the Department Self-Study

“The Department of Environmental Toxicology represents the academic home of the core faculty of The Institute of Environmental and Human Health (TIEHH). TIEHH began in 1997 and the Department of Environmental Toxicology was formed 3 years later.”

“TIEHH integrates the efforts of Texas Tech University, the School of Law, and the Health Sciences Center in a joint venture to assess toxic chemical impacts on the environment. Attracting graduate students at both the master’s and doctoral level, TIEHH also includes adjunct faculty from biological sciences, medicine, epidemiology, biostatistics, engineering, chemistry, computer science, law, mathematics, pharmacology, physiology, and range, wildlife, and fisheries management.”

“The vision of the Department (as outlined in its Strategic Plan) is to ‘stimulate and develop environmental and health sciences research and education at Texas Tech University/Texas Tech Health Sciences Center within an atmosphere of superior scholarship and collegiality so as to position Texas Tech to be premier in the state, nation, and the world in the integration of environmental impact assessment of toxic chemicals and other anthropogenic stressors with human health and ecological consequences, framed in the context of science-based risk assessment to support sound environmental policy and law.’

Comments of Review Team

The review team found that the Department of ENTX is working towards promoting a culture that stimulates increased scholarship among its faculty and graduate students through education and research. In doing so, the members of the department have engaged in the development of collaborative proposals and publications in collaboration with Texas Tech Health Sciences Center (TTUHSC). During the 2005-2010 period there has been an increase in the number of collaborative proposal activities of the department. In general, faculty scholarly productivity is in accordance with the lower workload that the department has in comparison with the College of Arts & Sciences (home of the department) and the university in general as established in the self-study.

Students are intimately involved in research activities at TTUHSC and actively participating in conferences showcasing research in the subject set in the department’s vision. In support of student participation in these activities the chair indicated that the department supports 30-50% of their travel.

In the area of research expenditures, during the 2005-2010 period the Environmental Toxicology Department (ENTX) has had pronounced levels of variation fluctuating between \$1.6M and \$3.2M, which may be indicative of the trend the department has had of having faculty getting recruited by other institutions. Therefore, during the 2005-2010 period ENTEX research expenditures were consistently lower than its peer institutions North Carolina State University (except for year 2007-2008) and University of Saskatchewan (except for year 2010-2011). With regards to degrees awarded, ENTEX has seen a slight decline in the number of doctoral students it graduates per year, but an increase in the number of master’s students it graduates per year. Regardless, ENTEX numbers of conferred doctoral degrees compares to peer institutions (Clemson University, Iowa State University, North Carolina State University, and University of Saskatchewan) and in particular years (2005-2008) exceeded peer institutions. In terms of faculty reputation, they have accomplished on average to triplicate their publications per year from 2005-2010. Such productivity provides an opportunity to disseminate the research accomplishments of ENTEX to the broad Environmental Toxicology community thus positively raising the visibility of the program.

Based on the interviews carried out with the faculty, the review team perceived that there was no communication between the Graduate Admissions Committee and the faculty in general about graduate program curriculum, graduate student recruitment, admission, and funding awards decisions. More importantly, there was a general sentiment to improve transparency

and discussion of these subjects with the faculty in general. In addition, in the view of the faculty the university's pressure of increasing graduate admissions hampers the program in general.

Lastly, the unique relationship of the Department of Environmental Toxicology with TIEHH as perceived from the self-study questionnaires and the review team interviews muddles the graduate academic goals of excellence of the department. Therefore, a recommendation is for these two units to be separated.

Recommendations:

- Since in the previous graduate program review limited participation of faculty and students on graduate programs matters were noted it is necessary to change the structure in which participation and decisions are taken. Therefore, a recommendation is for instituting a maximum of three-years of continuous service to the committee. Such rotational structure provides the opportunity for all members of the faculty to participate in the committee and have input on decisions concerning the graduate program.
- Graduate committee must present a summary of their activities periodically and carried out balloting on matters concerning curricula, admissions, and funding. Such interactions must occur a minimum of two times a year.

Curriculum and Program of Study Rating: Very Good

Charge to Reviewers:

"Factors that should be considered are: degree requirements, course offerings and frequency, areas of specialization, nature and type of qualifying exams. Reviewers should determine if the program is compatible with similar programs in peer institutions."

Comments of Review Team

The foundation of the curriculum consists of a two course sequence, ENTX 6325 and 6326: Principles of Toxicology I & II, which is taken by essentially all M.S. and Ph.D. students in the department. While there is general consensus that these two courses satisfactorily satisfy their foundational role, some concern was expressed that not all entering students have mastered the prerequisite content knowledge in biology (basic, cell, and molecular), biochemistry, genetics, and physiology, and consequently some graduate level content in these courses is not covered as time is given to the undergraduate content.

Beyond the core courses, the self-study lists sixteen 3 or 4-SCH graduate courses in the ENTX curriculum. Compared to peer-institution departments, this is a very large number of courses, but looking only at the total number of listed courses may be misleading. Six-year enrollment data in the self-study indicates that over this time period four of these courses (6345, 6361, 6366, and 6431) were not offered, three courses (6314, 6331, and 6332) were offered once, and two courses (6327 and 6391) were offered twice. Further, comparing the six-year course list in the self-study to the current course offerings shows that five of these courses are no

longer in the curriculum. It may make more sense to utilize the topics course (ENTX 6300) more often, even multiple times in the same semester, than to have named courses created, offered sparsely, and then be deleted from the course inventory.

The 2005-2006 review recommended formally establishing a graduate advisor position. Although Dr. Salice appears to function in this role, he does not carry the formal title, and, more importantly, his role in this regard cannot be identified on the department website. Having a clear faculty contact for graduate affairs is important for retaining continuing students and recruiting new students.

Recommendations:

- Variation, sometimes wide variation, in the content knowledge of new graduate students is an issue faced by graduate departments throughout the university; however, this problem is exacerbated in the Department of Environmental Toxicology by two special circumstances: (1) no independent undergraduate courses in the department that could be used for leveling, and (2) long travel time to, and parking issues at, the TTU main campus which inhibits using undergraduate courses in other departments for leveling. Unfortunately, there appears to be no straightforward, easily implemented remedy for this problem.
- It may make more sense to utilize the topics course (ENTX 6300) more often, even multiple times in the same semester, than to have named courses created, offered sparsely, and then be deleted from the course inventory.
- The recommendation in this regard of the previous review committee is as pertinent today as it was six years ago. A clearly assigned graduate advisor could address student concerns related to policy communication, TA/RA decision process, and initial guidance upon entering the program.

Faculty Productivity Rating: Excellent

Charge to Reviewers

“Factors that should be considered are: faculty profile, faculty scholarship and teaching awards, faculty teaching load, total faculty workload, and faculty service.”

Comments of Review Team

ENTX has 14 tenured/tenure track faculty as of the time of the issuance of the self-study document. Of these tenure track faculty, there are three Full Professors, four Associate Professors, and seven Assistant Professors. They generated approximately \$13.8M of extramural funding during the period assessed by the self-study document, fluctuating funding level per year between \$1.6M and \$3.2M. For the 2005-2011 term the ENTX faculty generated 248 refereed articles/abstracts (the self-study does not identify from this total number how many were articles and how many were abstracts), 42 books/book chapters (the self-study

does not identify from this total number how many were books and how many were book chapters), and two patents.

The ENTX department offers 20 formal classes and three variable-credit courses. In comparison with the university's teaching workload ENTX faculty teaching workload is low, averaging one course per year per faculty occasionally team taught, as explained to the review team during interviews. Faculty members mentor between 1 to 3 Master's students and between 1 and 6 Doctoral students (with the exception of three faculty members who each mentors 16, 10, and 8 Master's students, while another faculty member mentors 8 Doctoral students). There are two undergraduate classes (ENTX 4325 and ENTX 4326) cross listed with graduate level (ENTX 6325 and ENTX 6326) classes. These two service classes are for undergraduates who wish class work in Toxicology.

The ENTX faculty is active in external professional societies. It is difficult to determine based on the self-study report the level of involvement that the faculty has with committees in the College of Arts & Sciences and/or the university in general. Based on the interviews conducted by the review team there seem to be a level of disconnect between the ENTX faculty and activities that take place in central campus (i.e. committee responsibilities). However, the self-study document does reveal that the faculty in general is well-involved on graduate student committees at both the department and university level.

Recommendations:

- Interviews with students revealed that there are courses not in the curricula that are of research interest to the students. More importantly, courses in these particular areas are offered in peer institutions. Given the light teaching load that the department has it is recommended that these courses are added with two purposes in mind. First, to satisfy the research interests of the students which will aid the department on recruitment of a diverse population (research-wise) of students. Secondly, the department's performance seems to be steady (and overall lower) in comparison with peer institutions. Therefore, adjusting the academic curricula of the department can bring about a competitive edge to the department to continue to grow and exceed the performance of its peer institutions.

Quality and Quantity of Graduate Students and Graduates Rating: Good

Charge to the Reviewers:

"Factors that should be considered are: student profile, student recruitment, student retention, program applicant pool, placement of graduates, career success of former students, student productivity, teaching/research assistant preparation, and support, and whether the program is at capacity and if so, why."

Comments of Review Team:

Faculty commented that the quality of graduate students has been improving over time; however, this impression is not strongly supported by average GRE scores and GPA of incoming

students which show no clear trends over time. A positive in this regard is that the department has become somewhat more selective admitting only 57% of applicants during 2008-10 which is down from about 66% of applicants admitted during 2005-07. There is a sense from the faculty with respect to having sufficient extramurally funded research projects, and from the graduate students with respect to having sufficient laboratory space and access to instruments, that the department is very near the limit with respect to the number of graduate students it can productively manage.

The department would likely be beyond the limit if it has not received 10 institutionally funded TA positions in 2010 which added to the 10 institutionally funded RA positions it received around 2006. The department now finds itself in the unfamiliar circumstance of having nearly 50% of the graduate students supported by departmental TAs or RAs, and this seems to have led to resource allocation issues. Remarkably, students and faculty express near complete ignorance of the process with several students with RAs expressing a stronger interest in teaching and several students with TAs expressing a stronger interest in research. This is another area an active graduate advisor could have a positive impact. Going forward, the department would be wise to use these 20 positions as seed corn to bootstrap themselves to higher levels of extramural funding.

From the very beginning of their graduate studies, the need for external support is strongly conveyed with students minimally expected to obtain their own travel support and in some cases, their own stipend. On the positive side, this emphasis has produced a graduate population demonstrating unusual maturity and professionalism. On the negative side, the policy may be too strongly encouraging students to “follow the money” rather than to follow their interests and inclinations as they choose research; an attitude which might explain why very few graduates pursue academic careers (although placement of graduates is generally very good). A questionable extension of this approach is the “wall of shame” which highlights graduate students thought to have been too long on department support.

Throughout the 2006/07 to the 2008/09 academic years, the number of Ph.D. degrees earned in the department fell by about 50% with little recovery occurring in the subsequent two academic years. Concurrently, throughout the 08/09 to 10/11 academic years, there was a three-fold increase in M.S. degrees to where M.S. graduates are about double the Ph.D. graduates in 09/10. Coupled with the increase of M.S. degrees and the decrease of Ph.D. degrees is an increase in the time required to complete the M.S. degree from 2.0 years in 07/08 to 3.5 years in 09/10 (only 1 year less than that required for a Ph.D.).

Department guidelines indicate that an M.S. (Ph.D.) student is expected to serve as the primary author of one (two) refereed manuscript on their research. In fact, the publication records of the students are substantially larger than this due, at least in part, to the large number of collaborative projects in the department. While such a collaborative environment can run the risk of students losing a sense of ownership for any particular project, this seems not to have happened. In general, the students express a high level of satisfaction with the working and research environment which is a tribute to the faculty and departmental leadership.

Recommendations:

- Going forward, the department would be wise to use these 20 TA/RA positions as seed corn to bootstrap themselves to higher levels of extramural funding.
- Consider additional methods for providing funding for students beyond just student sought external support.
- If these trends continue, difficulties may arise, and it would be good to work toward shifting the balance in favor of Ph.D. seeking students and decreasing the time required to complete an M.S. to about 2.5 years.

Facilities and Resources Rating: Very Good

Charge to the Reviewers:

“Factors that should be considered are: determining if existing space, library resources, information technology, and support staff are adequate to support the program.”

Comments from Review Team:

Texas Tech University has provided excellent laboratory space in a converted complex of buildings at the Reese Technology Center. The retrofitting of the existing space to create a BSL3 lab will be another positive addition. ENTX will need to continue to grow its lab space as the department and Institute expands.

The research/teaching assistantships have provided excellent support to the program as well although increases in fees have led to a reduction in positions this year. Additionally, support staff was reported as excellent by both faculty and students, and library resources have greatly improved from the last review.

The issue of instrumentation used for both instruction and research was identified by many as an area of concern. While the available equipment is adequate some repairs, upgrades, and replacement are necessary and more will be required in the near future. Additionally, the common-use of instruments creates some scheduling problems that delay both research and thesis and dissertation outcomes. Space and instrumentation dedicated to teaching only is described by both students and faculty.

The need to increase graduate enrollment has presented some problems in research funding to support graduate students. This results in some students having to write for external funding for support. While the students were not particularly negative about this experience it could become a problem.

Recommendations:

- Continue to explore ways to expand laboratory space for both research and instruction.
- Create a plan for repair, upgrading, and replacing instruments.
- Plan for increases in graduate student support