Review of Graduate Programs
Department of Biological Sciences
Texas Tech University
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Introduction
On Feb 19, 2007, Dr. Fedler, Associate Dean of the Graduate School, and Marlene Kenady, met with Drs. Naz Karim (Chemical Engineering), Loren Smith (Natural Resources Management), and Cary Green (Plant and Soil Science) and gave the charge to conduct a review of the graduate programs in the Department of Biological Sciences. External committee members include Dr. Daniel Bush, Chair of Biological Sciences at Colorado State University and Dr. Dave Rintoul, Associate Director, Division of Biology, Kansas State University.

The internal committee met Feb 28th and identified several additional data needs from the Graduate School and Department of Biological Sciences to supplement the report provided to us. The committee then met with Dr. Zak, Chair of Biological Sciences, on March 6th. At this meeting with Dr. Zak, many clarifications were made and additional data were subsequently provided by Biological Sciences.

On March 23rd, the entire committee (internal and external committee) met with the faculty of Biological Sciences as a group of about 20-25 individuals. We then met with graduate students (about 50-60). Following these meetings, we met with Dr. Jeter, Graduate Advisor, Dr. Densmore, Professor and Associate Chair, and Dr. Holaday, Professor and Associate Chair. The committee had a closing meeting with Dr. Zak and then toured facilities. Finally, the committee met to discuss the department. Each external reviewer provided a separate report. The internal committee prepared the current report, which only briefly alludes to comments and recommendations made by the external reviewers.

Program Overview and Vision
In the material provided by the Department of Biological Sciences, it is stated that, “From a platform of innovative approaches that integrate undergraduate and graduate education with collaborative research efforts, the Department of Biological Sciences strives to achieve national and international leadership in research, scholarship, and education in Biological Sciences and to provide leadership in the teaching of life sciences at Texas Tech University.”

The Department of Biological Sciences is diverse in its academic offerings and programs. The realization of the vision is attainable. As will be detailed below and in the reports of the external reviewers, many aspects of the department are very good while some areas could be strengthened.

Grade: Good
Recommendation: Give due diligence to the recommendations of the committee.
Faculty Productivity

It should be noted at the outset, that some of the comparative material provided by the Graduate School was inadequate. Therefore, it was not possible to compare the productivity of the Biology Department faculty with the information provided on peer institutions, since it was not on an FTE basis and it was not clear as to why certain peer institutions were, or were not, included in that material. The committee relied on their knowledge of program productivity at other familiar peer institutions, experience of the outside reviewers, and their personal research into different aspects of the program. The Biology Department did graciously provide data on an FTE basis.

The Biology faculty are to be commended as number of refereed papers per FTE has increased since 2000/01. (In the outside reviewer reports, it was noted that Biology data differ from data obtained form the Web of Science. This could be due to papers inadvertently being counted more than once in Biology due to multiple departmental authors, or publishing in outlets that are not covered by the Web of Science.) The faculty service on grant panels and editorial boards also is commendable.

One of the keys to a productive graduate program in the Sciences is successful competition for federal grants. These grants bring visibility to a graduate program which, in turn, attracts high quality graduate students. High visibility competitive grants further promote peer-reviewed publications in high impact journals. Competitive grants also allow a higher percentage of RAs relative to TAs, and flexibility to allow TAs to be put on RAs from indirect cost return or the funded project itself. Graduate students then finish in a timely manner and attain visible positions. All of this builds upon itself, elevating the stature of a department. All measures of grant productivity (grant award amounts, number of funded grants, grants submitted, and number of RAs) per FTE, have declined over the period covered by this report. The Biology faculty should work on this aspect of their program to achieve the next level of national stature.

The number of classes taught per faculty is 2-3, which is average for the peer institutions. Several faculty members are dedicated primarily to the teaching mission of the department, a strategy which should allow increased productivity of the remaining research oriented faculty. The amount of internal TTU support to Biology has also increased, which should allow further increased research and graduate program productivity.

Grade: Satisfactory

Recommendations: The Biology Department should increase emphasis on attaining competitive grants. Efforts on foundation or internal grants should receive less emphasis. Attaining federal grants will increase overhead return, allowing greater flexibility in the graduate research program. It will also bring some balance to the RA/TA ratio. Graduate students should only be accepted when a research project exists for them to promote their timely completion. Resulting articles can then be targeted to top tier scientific journals.
Quality and Quantity of Graduate Students and Graduates

This portion of the report is based on the documents provided by the Graduate School and the Department Chair, and as well as one hour “town-hall” meeting with the graduate students. There were no comparative materials specifically for this section provided by the Graduate School. Therefore, it was not possible to compare the graduate student productivity and other relevant facts with peer institutions. The committee relied on their knowledge of the graduate student issues and productivity at other familiar peer institutions, experience of the outside reviewers, and their personal research into different aspects of the program. The Biology Department graciously provided relevant graduate student data on an FTE basis.

The quality of the graduate students in the Biology Department is very good. The quantitative indicators (e.g. GRE and GPA scores) are reasonable. It would be beneficial to obtain separate GRE data for the MS and the PhD applicants. Many students joined the graduate program with prestigious research fellowships such as the EPA GRO Fellowship. However, during the town-hall meeting it was apparent that these students had to go through significant bureaucratic hurdles (not specific to Biological Sciences) in order for them to get paid properly through TTU system. This must be corrected at the institutional level if competitive recruitment of fellowship awardees is to be successful at TTU. Lack of any new graduate student applications in Microbiology (2001, 2004) and Zoology (2000, and 2001) was surprising; no reason was given for this. Why is there a Graduate Program in Bioinformatics, if no student has ever enrolled in it?

The number of PhDs enrolled in the Department (per FTE) has increased in general. The same is true for the PhDs granted per FTE. The MS enrollment per FTE has remained somewhat constant at ~1.15. However, the number of MS degree offered has decreased from 0.56 (2000/2001) to 0.34 (2005/2006). The reason is not clear. The comparative demographic data are not available; however, it seems that the ratio of male to female students is healthy. The minority graduate student population (Black and Hispanic) is not very high; however, this may be an institutional problem. The graduate students have been involved in refereed journal publications and presentations at conferences. This is commendable but some noted difficulties from their advisors who held potential manuscript submissions up for more than 12 months. The PhD students have been placed in post-doctoral and as well faculty positions. The number of people who were recruited as assistant professors from the program has decreased somewhat from 2000/2001, when three PhDs were hired from the TTU Biology Department.

The Department must have a decent balance between the TA/RA. The TAs are funded for the 9-month period and thus they do not always have 12 paychecks. The Department Chair tries very hard to get additional funds for these TAs for the summer, but dissatisfaction among students was clearly visible at the town-hall meeting. Number of RAs per FTE has decreased from ~ 1 to 0.6, from 2002/2003 to 2005/2006. As noted above, more research funding from external sources with full overhead should help alleviate this issue.

Grade: Good

Recommendations: Provide infrastructure at the university level that allows students to seamlessly accept prestigious research fellowships need to be established. Eliminate the Bioinformatics graduate program since it is not being used by graduate
students. Increase the number of externally funded RAs to improve program stature and graduate student morale.

Curriculum and Programs of Study

The Department of Biological Sciences and Natural Resources offers six graduate programs including MS degrees in Biology, Biological Informatics, Microbiology, and Zoology. The department offers Ph.D. degrees in Biology and Zoology.

The department offers 46 courses, 30 of which are taught as “piggyback” concurrently with undergraduate sections. Additional work is required of the graduate students to justify the graduate credit of these courses. The usage of this course format, however, is not unique to Biological Sciences but is an issue for many departments at Texas Tech University. Comments from faculty and students were mixed on these courses. This format was deemed beneficial for graduate students who could obtain graduate credit for leveling courses. The format was deemed deleterious for graduate students who had already taken similar undergraduate courses at other institutions prior to enrolling in the graduate program in Biology.

Some students felt that courses were not offered frequently enough. It was stated that “umbrella courses” are offered. These courses fall under a generic course listing and the actual course material varies between offerings. This approach is beneficial in that it allows a wider variety of specialized courses to be taught than would otherwise be feasible. However, it was mentioned that these classes are not always publicized enough to ensure that all interested students learn about the course topics in time to register.

Grade: Good

Recommendation: Consideration should be given to reducing the number of piggyback courses. The use of the umbrella course seems appropriate, but the particular topic of the courses should be advertised widely enough and early enough to allow interested students to enroll.

Facilities and Resources

The Biological Sciences building is 40 years old. More important than the age of the building is the fact that space is available for 38 faculty, but Dr. Zak feels that 45 faculty are needed to cover the high teaching load of the department.

It was stated that resources available for start up packages are not competitive with those of peer institutions. The faculty stated that in some disciplines (molecular biology, for example), the top candidate may not choose to come to Texas Tech University. It was also stated that in some cases, resources are shifted to start-up packages at the expense of the current faculty/facilities.

It was stated that infrastructure costs were being moved from the university to the department. For example, the Imaging Center housed in the Experimental Sciences Building serves the university as a whole, but apparently no university resources are allocated to support the faculty.

Resources needs were identified as additional faculty and competitive start-up packages for these faculty. These faculty would include those with research and teaching appointments as well as dedicated instructors to teach large undergraduate lecture courses. Additional resources needs include microscopes for lab classes and renovations to the greenhouse facility. It was stated that there are growth chambers in the