External Review of the Biology Graduate Program
Department of Biology
Texas Tech University


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Overview

The Biology Department at Texas Tech University is a vertically integrated department that investigates biological questions across multiple levels of inquiry. Research and graduate education are concentrated in six major areas: Animal Physiology and Biomedical Sciences, Ecology, Evolutionary Biology, Microbiology, Plant Biology and Quantitative Biology. There are currently 38 tenure-track faculty, 109 graduate students and more than 750 undergraduate majors. The Biology graduate program offers both MS and PhD degrees. Although many aspects of the graduate program are in relatively good shape, there are others that need improvement. I’ve outlined below my assessment of the Biology Graduate program and offer several recommendations that would improve the success and visibility of this program.

1. Faculty Research Activity

   An active and well funded research faculty is the foundation of a successful graduate program. Research active faculty provide the intellectual capital on which to train students, and competitive research support provides the necessary dollars to drive a program and fund student stipends. As of the 05/06 academic year, the Biology faculty reported 131 peer reviewed publications, representing 3.4 articles per FTE which is a solid level of productivity (I understand there is some question about where this number came from, which the administration should look into for further clarification). In addition to publication rate, one looks for additional evidence of scientific impact such as membership on editorial boards (16), grant panels (11), and invitations to speak (55). For each of these categories, the faculty appear to be well represented.

   In contrast to their publication record, their ability to compete for outside funding has significantly dropped in recent years. This is a major concern since research support is absolutely required for successful research programs and graduate training. Indeed, the faculty currently place too much emphasis on Teaching Assistships to fund their graduate students. This puts too great a burden on graduate students that lack the necessary time to focus on their research projects to complete their degrees in an acceptable time frame. Moreover, a quick survey of the grants currently coming into the department show many originate from foundations or in-state agencies they pay little to no over-head. This is also a problem since the department isn’t generating over-head return that can be used to support its research mission. Finally, limited research funding will have a negative effect on the faculty’s ability to generate and publish research results that have a significant impact on their disciplines.

Recommendation: The department must place greater emphasis on securing competitive research support. The department can not achieve national recognition for a strong and vigorous graduate program in the absence of substantially greater competitive funding.
During faculty interviews, several noted infrastructure support is dropping. Many items formerly maintained or covered by the university are falling on the department and faculty. These include building and equipment maintenance, and building renovation. The Biology department is located in a 40 year old building. The state of the art for many disciplines at the time of construction did not include significant wet lab activity. In contrast, almost every biological discipline today includes wet lab work and, moreover, expensive core facilities that support many faculty across campus (genomic and proteomic facilities, animal care, computational capacity and know-how).

Faculty also voiced a desire for the University to supply Research Assistantships for graduate students. This is probably an unrealistic expectation given funding climates across the country. However, strategic investment in 2 or 3 Research Assistantships that are used as tools to successfully recruit highly qualified graduate students could have a very positive impact on the graduate program (see below). Perhaps a combination of departmental and campus investments could make that a reality.

In closing, it is important to acknowledge the very positive esprit de corps expressed by the faculty. I detected a real sense of a shared vision and respect for one another. This is particularly important for such a diverse academic unit. Both the faculty and the Chair deserve great credit for maintaining such a positive atmosphere.

Recommendation: The university must partner with the department to provide essential services, maintenance, and renovation costs. The absence of a long-term investment program for maintaining and renovating the university’s infrastructure will lead to a catastrophic decline that limits research productivity, lowers recruiting success, and creates a retention problem with the most productive faculty.

II. Graduate Student Recruiting

The department relies its web page as its primary recruiting tool. While their web page is user friendly and complete, I think it is imperative that they take a more proactive approach in recruiting, especially of domestic graduate students. Today, more than 50% of the graduate population is international. The department’s ability to tap into the international market of bright and motivated students is good. However, a larger population of domesticated students would increase the possibility for graduate fellowships and pre-doctoral grant support from federal agencies. Such awards enhance the reputation of the graduate program, and those students are natural leaders that set high standards of achievement for their peers. Ultimately, graduate students are the engine that drive research success at any institution, and recruiting the very best students must be a constant focus for the graduate program.

Recommendations: The department must dedicate itself to enhancing the quality of its graduate students. I recommend several new approaches:
1) invite the most promising students to campus for interviews, 2) offer first year fellowships to the top 2 or 3 students, 3) increase departmental visibility by active recruiting while giving talks at other US universities.
III. Graduate Student Curriculum

The graduate curriculum is very individualized because of the vertical integration of the department's research areas. Thus, students are able to design courses of study, in consultation with their graduate committees, that best fit their needs. While this works well for each individual, it eliminates the shared experiences that often create a real bond (or esprit de corps) among departmental graduate students. Such interactions, outside the home lab, are essential components of most successful programs. While new graduate students do take a one semester course together that focuses on graduate learning and teaching strategies (BIOL 6202), additional materials could be presented, such as grant writing, ethics, and faculty chalk talks (5-8 minute talks by every faculty member so new students learn about the research done across the department. Both groups also put faces with names, also important in a large department). A year long class would link these students together throughout their tenure at TTU.

The majority of graduate courses offered by the department are “piggy-baked” on standard undergraduate courses in specific areas. Students attend the regular undergrad lectures and then have additional work that enhances their learning. The large percentage of graduate courses that operate this way is too high because the bulk of the information offered has been previously studied by their students as undergraduates. The department must increase the number of stand-alone graduate courses. While some stand-alone courses were mentioned by the faculty, these are offered on an irregular basis, and very difficult for students to plan their schedules around.

Recommendations: The department should expand the BIOL 6202 course to a year’s experience. They could add many new topics that are essential to all graduate students, including: 1) a grant writing exercise, 2) a series on ethics in science (required by NIH for all graduate programs), and 3) discussions of what it is to be a successful scientist. Many new students don’t understand graduate school is professional training, not a simple extension of their undergraduate experience. The department should de-emphasize piggy-baked graduate courses and increase (or at least enhance the coordination of) the number of stand-alone, highly focused graduate courses. The latter was a specific criticism leveled by the graduate students during our interview. Finally, the department needs to re-vamp its seminar series. A vital departmental seminar series engages all the faculty and students. It broadens their horizon lines for research by exposing them to key research questions across all the areas represented in the department. The graduate students noted current attendance is poor, where students and faculty alike only attend seminars in their own research areas. This is not healthy for the long-term operation of a multidisciplinary department. I suggest they have fewer seminars per semester. They can use the savings to bring in only the most cutting-edge speakers that give talks targeted to a broad audience. They must change the culture in the
department to one where everyone attends the departmental seminar and, of course, its is the faculty that must set the standard.

IV. Graduate Student Support

Graduate student stipends and health insurance costs were a major issue for the students. The low stipends are further limited because graduate students pay 50% of their tuition, fees, and health insurance from their incomes. Taken together, these costs are generally in excess of $3,000! The costs are so high, that many students stated they do not carry health insurance (at apx. $175 month). Quite simply, this will kill the program. New students will learn about these issues and choose to go elsewhere. Several students also noted summer support is often a problem. This is critical for international students and domestic students alike. One can not build a strong graduate program if the students are preoccupied worrying about their living costs.

Recommendations: The department and central campus must increase TA and RA stipends so that graduate students can cover all essential living costs, including health insurance. The central campus must view strategic investment in student stipends as an essential investment in maintaining successful graduate programs. The department must invest more to recruit and retain the very best students. This is another place over-head return could have a very positive, direct impact on the program. Finally, two graduate students that had prestigious Graduate Fellowships form NSF and EPA respectively bitterly reported how difficult it was to set these up at TTU (one waited 6 months without pay!!). This is an intolerable situation at a research I institution.

IV. Leadership

Both the faculty and graduate students alike had very positive comments about the Chair’s leadership. Each group feels the chair is a thoughtful and strong advocate for their needs. I sensed from the faculty that they view the chair as a fair and proactive leader. Moreover, in our interview with the chair, I was pleased to learn he was aware of a problem in his department concerning an unacceptably large group of “permanent” associate professors that have failed to advanced to full professor. The Chair has taken an active role in helping several of these individuals re-engage their research and start to move them toward fully productive faculty members. That is a challenging problem and I applaud the Chair for his success. On the other hand, I was concerned that the Chair gives average salary increases to many under-achieving faculty. That is the wrong message. Every faculty member must understand that the academic mission of the department is driven by research and teaching. Every member must strive to excell in both areas. If they fail to reach this goal, they should not be reward for performing below expectations.