Program Review: Masters of Science, Department of Biological Science, Sam Houston State University

Dr. Jake Schaefer, Professor, Department of Biological Sciences, University of Southern Mississippi

Overview – The Department of Biological Sciences at Sam Houston State University has been offering graduate degrees in Biological Sciences since 1951. The department currently offers MS and MA options with the majority of students graduating with a MS. There are currently 17 faculty and, on average, 30 active graduate students in the program. The faculty of the department have strengths in the areas of ecology, evolutionary biology, and cell and microbiology. There are a number of research active faculty that are prominent nationally in their respective fields. It is clear that the faculty are well qualified and students receive good training in the program. This is evidenced by the majority of graduates remaining in the field after graduation and entering professional school, Ph.D. programs or the job market.

In the last seven years, 52 students have received MS degrees from the department. The program averages 30 graduate students, less than two students per faculty member. Some faculty maintain larger laboratories and the number of graduate students mentored by individual faculty since 2007 ranges from 0 to 9. The variation likely reflects a variety of constraints including individual faculty time and discipline specific infrastructure. Most of the students in the program are supported on teaching assistantships (22 lines currently available) that require teaching of 3 or 4 laboratory sections and full time enrollment status. A small number of students are supported on research assistantships for faculty that have received extramural funding. Students must select a faculty mentor and develop a research prospectus that is presented to an advisory committee within the first year. Each year, advisors submit a progress report for each student to the graduate committee. The average time to complete the MS degree is 3-4 years (8-12 terms) which is something the department may want to consider trying to reduce (see comments below on graduate student time constraints). Faster time to degree completion will increase the number of graduates without additional resources. Student retention and success rates are good, the department self-study

report indicates students not finding advisors and poor grades are the most common reason for students leaving.

There was a clear desire from faculty and administrators to grow the program (increase the number of graduate students enrolled). A larger program will increase research productivity and allow for a more diverse offering of graduate courses. The limitations to growing the program seem to be faculty time to mentor students, infrastructure to support more faculty and student research, and financial (stipends and more competitive packages for graduate student recruitment).

Listed below are some observations and recommendations based on literature (current graduate student handbook), reports (Department of Biological Sciences Self-Study Report for the Graduate Program), and my discussions with students, faculty and administrators in April 2015. Most of my recommendations are focused around ways for the faculty to better define their vision of the program and what they want students to get out of it. Discussion of the program mission should also address how much the department and administration want to prioritize and support research productivity. There are recommendations for recruiting students which will allow the program to grow (if that is desired), increase diversity, and bring more high quality students into the program. While there are a variety of means to these ends, I firmly believe there is potential for a larger and more active graduate program supported by greater research productivity from faculty.

1. **Develop a mission statement for the graduate program –** There is currently a single mission statement for the Department of Biological Sciences (undergraduate and graduate). It would be beneficial for the faculty to embrace the diverse faculty research expertise and student professional goals in defining program mission and objectives. One result of the current less-specific mission is that the department has a single MS track (the MA track is currently not used, see below) that all students follow. A well-structured and inclusive mission statement will facilitate program changes that will be beneficial to faculty and students in a variety of subdisciplines.

2. **Consider emphasis areas within the MS degree** – Biology is a discipline with disparate subdisciplines (e.g. behavior, genomics, endocrinology and ecology). As a department of 17 faculty charged with undergraduate instruction of "biology", it is not at all surprising that the faculty have diverse research interests. There are clear core areas of strength in the department that should be recognized. The department may want to consider these core areas as formal emphases or tracks for graduate education. Emphasis areas allow faculty in specific disciplines to design admission requirements, curriculum and program requirements to better serve students. Additionally, formal emphases will help the department identify areas of strength or areas where the department and administration want to see future growth. The department should consider ways to ensure new emphases align with broader university initiatives (e.g. health sciences) to maximize available resources.
3. **Consider utilizing the existing MA track or add a non-thesis option** – While some of the graduate students in the department are destined for a career in research, some view the MS degree as terminal. The department should carefully consider the needs of these students and how they will be best served. For some students, a graduate degree based on formal classroom instruction and laboratory and field techniques is most appropriate. For these students, the department may want to consider a non-thesis option. For students interested in a career in research, laboratory experience and training in the science enterprise is more important. Currently, both groups of students are in a single degree plan that creates clear conflicts between curriculum requirements and research productivity (see below). A non-thesis option may serve existing students well, and if combined with appropriate emphasis areas could prove to be an effective recruitment tool.

    Graduate students in non-thesis tracks will be focused on classroom learning and may grow the program without additional strain on existing research infrastructure. In addition to generating revenue, this would allow for a wider variety of graduate course offerings. If the

broader mission of the program is research, the department can direct resources to reflect this. For example, assistantships can be prioritized for students in the research tracks.

4. **Review graduate student time constraints** - Graduate students in the Department of Biological Sciences have demands on their time that reduce time allocated to research. This not only reduces student research productivity but increases the time to project completion, delaying graduation and reducing the number of graduates the department produces. Students that are supported on assistantships typically teach 3 or 4 laboratory sections and take two formal classes. In speaking with students, these two activities can take well over 40 hours a week. Assistantships in comparable programs are for 0.5 FTE, usually translating to 20 hours a week. If additional resources can be identified for assistantships, the department should consider not only more lines but also reducing the instructional loads of existing lines.

   Graduate student research productivity can also be increased for students by having them enroll in research hours. Research hours can take the form of a techniques course, prospectus development course, or simply fulfilling research objectives related to a thesis project. At most institutions that have similar research hours, the faculty mentor serves as the instructor of record. This could have two direct benefits for research productivity at Sam Houston. First, students would get course credit for research productivity towards their project. Second, faculty would get instructional credit for mentoring graduate students. This could culminate in a course release for faculty mentoring a large number of students. Ultimately, the department and administration has to define how much it values and wants to incentivize research productivity of faculty and graduate students.

5. **Recruiting initiatives -** The Department of Biological Sciences recruits heavily from the resident undergraduate student population. While the program has been successful, growth of the program or increased productivity could be achieved through successful recruitment initiatives. Larger applicant pools to the department will allow for selection of higher quality students or students that are more focused on specific career goals (i.e. well suited to defined emphases). One positive

trend is the decline in the percentage of applicants accepted (data in department self study report). Acceptance rates were 80-100% in 2008-2010 and dropped to 55% in 2013. The department may want to consider setting a goal for the number of applicants to the program. As the number of applicants increases, the acceptance rate will decline as the quality of accepted students increases.

Once faculty decide on a mission statement, I would suggest a "rebranding" of the department that would include development of recruitment and promotional materials. The website should be updated to highlight the mission statement, the strengths of faculty research programs, and the careers pursued by some of the most successful graduates. Similar material can be used to develop recruiting brochures for direct mail to potential students. These promotional materials should make it clear what a graduate degree in Biological Sciences from Sam Houston will do for students professionally. The implementation of specific emphases within the program will aid in recruitment alone. For example, students who want a career in a biomedical field are more likely to apply to a program with an appropriate emphasis.

Many undergraduate students learn about graduate programs from visiting seminar speakers. The department should encourage willing faculty to give research seminars at universities in the region. A list of research active faculty could be disseminated to appropriate universities. Because many seminar programs have restricted travel budgets, the department could consider paying faculty travel expenses in exchange for the faculty member advertising the program at the end of the seminar.

The department should consider direct mailing and e-mailing potential students with high standardized test scores. Databases with contact information can be purchased from testing agencies, usually for $0.30-0.40 per contact. The department can design a query to target quality students (including additional students from underrepresented groups) in the region and mail promotional material to them directly.

6. **Graduate student support -** While graduate students in the Department of Biological Sciences are excited about the program, there are some areas (mostly financial) where they feel

underappreciated. Changes in this area may increase student retention, productivity and recruitment.

a. Students are not currently offered a tuition waiver. The department might consider studying the level of student support (stipends and potential tuition scholarships together) at competing institutions in the region. Given that tuition payments are substantial for graduate students with no other support, the department might consider options for automatic enrollment in tuition payment plans or shifting the typical academic year payment schedule for graduate students. A number of students commented on the financial hardships encountered when their tuition bill is received before their first stipend payment.

b. Sam Houston State University has a strong tradition of supporting undergraduate research. As the university has moved to encourage more graduate research, some of the internal funding mechanisms remain focused on undergraduate research. In some cases this may simply be due to poor communication and graduate students do not know they are eligible for awards that are advertised to undergraduates. The department may want to review the availability of research and travel awards at both the undergraduate and graduate level. More broadly, the department and administration should discuss how much they value graduate student research and then ask if the support for it is appropriate.

7. **Time to graduation and student mentoring -** The most common complaint from graduate students was that there is sometimes a delay in getting feedback from advisors. Students have clear deadlines (with consequences) for meeting certain degree deadlines and timely feedback from advisors is important for students to make progress. The faculty teaching loads at Sam Houston are high meaning faculty time is often a limiting factor. The obvious solution is to implement a mechanisms to get faculty credit for mentoring graduate students. As discussed earlier, research hours or a formal “prospectus development” course under the direction of the

advisor would formalize student time to completing degree milestones and faculty credit for mentoring graduate students. Here again, the department and university need to decide how much they want to incentivize faculty and graduate student research productivity.

8. **Graduate course offerings -** With a faculty and student body of this size, there are a limited number of graduate courses that can be offered. While students appreciate the instruction they receive, they expressed a desire to focus coursework on their areas of interest. Students often enroll in courses outside of their area of expertise simply to fulfill the required course load for assistantships. The department should consider whether these students would be better served working with advisors on research goals. Additionally, the department should consider whether a student interested in a career in research is best served enrolling in two formal (in class) courses each semester. Many students noted that teaching duties and their own required coursework took all of their time. The message sent was that research was a low priority, often delayed until later in the program.
9. **Faculty vision of the program –** My discussion with faculty revolved around two issues: 1) curricular requirements for the program, and 2) size of the program. The faculty do not all agree on what the requirements should be for admission and completion of the degree. I think this issue will resolve itself with honest discussion of the program mission and the formation of emphasis areas. It is not surprising that faculty with disparate expertise and interests have different views of what constitutes graduate education. This diversity of ideas should be made into a strength of the department. Some faculty commented that they would like to see the program grow, but that they did not feel they had the infrastructure or time to mentor more students. Growing the program to broaden course offerings could be accomplished, in part, through populating a non-thesis option. Growing the research intensive (thesis) portion of the program may require additional resources (assistantship lines), faculty lines and infrastructure (depending on the nature of the research). Some gains might be made in this area by giving faculty instructional credit for mentoring

graduate students - some faculty might be willing to mentor more students if this meant reduction of teaching load.

Summary – The faculty in the Department of Biological Sciences are to be commended for the quality of the graduate program at Sam Houston State University. There is a clear commitment to providing quality instruction at the graduate level. Some faculty have developed research that is programmatic with tightly integrated student involvement. A common theme in talking with various stakeholders is that time is the largest limiting factor. Faculty are limited in the amount of time they can allocate to mentoring graduate students and graduate students are limited in how much time they can spend on their research. The faculty should discuss how much graduate education in the program should be based on formal course work vs. developing and implementing independent research. It may be that the answer here differs for different groups of students, leading to greater use of the MA (or a non-thesis MS) degree option. In my opinion, the program as currently implemented relies too heavily on formal coursework. Students that do want to do engage in active research may take longer to graduate or be forced to scale back their research due to time constraints. Limited course offerings also result in students being enrolled in courses outside of their area interest. While some might argue that there a molecular biology student enrolling in a graduate course in ecology will gain new insights, the reality is that student may benefit more from experience or training in a laboratory setting under the direction of their mentor. Given the breadth of subdisciplines within biology, students must specialize in their graduate years if they are to compete as professionals.