Evaluation of the Department of Environmental and Molecular Toxicology
Oregon State University

1. Overall Recommendations

The overall recommendation of the Review Panel is to maintain the research and Ph.D. graduate programs at their current level. As the certainty of extramural funding is dependent on outside forces such as the overall economy and federal allocations to NIH and NSF, the Department will need to make decisions on expansion and contraction of these programs based on their ability to support the educational and research missions of the department, as well as the overall mission of the School of Agriculture.

The Department may wish to consider expansion of their Masters’ program offerings to include the development of instructional materials for online teaching through e-campus. This may better align the goals of the department with the teaching mission of the School of Agriculture.

2. Summary of Findings and Recommendations

The primary mission of the Department of Environmental and Molecular Toxicology (EMT) is to conduct high quality research in environmental toxicology and to train graduate students for careers in toxicology. The Department has 17 tenure/tenure track faculty, 9 adjunct, 3 research faculty, 21 Ph.D. Toxicology graduate students and 3 Masters’ degree students. The goals of the department are well aligned with the mission of the College of Agricultural Sciences, providing strong training of graduate students, and carrying out nationally and internationally recognized research.

The Department has an extremely strong graduate program. The credentials of the student applicant pool are excellent, and the department is able to select the strongest of those students for acceptance. The Department has a policy of trying to provide tuition remission and stipends for all of their graduate students. This is made possible by the presence of an NIEHS training grant, an NIEHS-sponsored Superfund grant, and research assistantships funded by the numerous individual extramural grants of the faculty. Although this is a strong program, the faculty and staff are aware that this program relies on extramural funding. Consequently, the program must be constantly monitored to ensure that funding will remain available for these students. The review committee recommends that additional support for graduate training be provided using State resources to provide additional stability to this excellent program.

Overall, the Graduate curriculum for the department is strong, based on discussions with the students, and their ability to obtain positions post-graduation. There is sufficient flexibility in the curriculum to train students with interests in environmental toxicology as well as those interested in molecular toxicology.

The faculty are an essential asset to the EMT, and this critical mass of research expertise is necessary for the continuation of the effectiveness of the department. Faculty expressed a concern over the difficulty in replacement of faculty who have left the institution based on a new formula for hiring at the School level. The review panel recommends that the personnel needs of this department be seriously considered, particularly in the need to replace critical faculty. The result could be weakening of the department to the point where the core program grants (NIEHS Center grant, NIEHS training grant and Superfund grant) cannot be maintained.

Two main issues were brought out by the self-study and program review, including 1) physical separation of faculty and graduate students due to office and lab locations, and 2) limitations on overall square footage of space. The EMT faculty and their offices and research laboratories are located in 4 separate buildings on the OSU main campus and 2 research facilities east of...
Corvallis. The physical separation of buildings has the potential to inhibit regular communication and collaboration among faculty and graduate students. Additionally, the self study provides evidence that laboratory and office space is limited, about 20% below the standard OSU space allotment. The space issue is most problematic for graduate students and to a lesser extent, faculty office space. Relocation of faculty to fewer buildings, to the extent possible, and providing additional research and office space, would further strengthen both research collaborations and the educational programs.

EMT receives support for its research, extension and training program from four main sources. The majority of the funds for EMT/Toxicology come from the State of Oregon, through the budget provided to the OSU College of Agricultural Sciences (CAS). Although the CAS has been highly supportive of EMT and the Toxicology Program, even during the current difficult times for the CAS statewide budget, EMT does not receive any base funding to support graduate education activities (fellowships, teaching assistantships, etc.) in excess of the faculty and support staff salaries.

The students receive excellent training in toxicology through the EMT graduate program with most students receiving their degrees within 5 years. The student applicant pool is extremely competitive, and the students who are accepted into the program have shown an ability to excel. Their performance can be seen not only in the awards and fellowships that they have received, but also their ability to obtain positions after graduation.

As mentioned above, the EMT faculty are an essential element in the success of the department. Most of the Faculty are nationally recognized research scientists and several have stellar international reputations. The EMT Faculty has an impressive record of publication productivity, with a high average H index, including several over 30. A primary attraction for toxicology students to study at OSU is the quality of the Faculty, particularly in the area of environmental chemistry. Studying with a world class faculty member, as well as the opportunity to interact with others at the same level of scholarship is a privilege that is recognized and appreciated by the students.

Generally speaking, the students exhibited a high degree of satisfaction with their training programs. In particular, they noted that quality and diversity of their research options as a strength. Additionally, they enjoyed their access to the faculty, the high quality of most of the facilities, library resources, and office space as positive aspects of their training environment. The students did have several recommendations to improve their educational experience including: (a) improving mentoring of 1st year students, particularly prior to their selection of a research mentor, (b) development of a substitute for the 400/500 level Biochemistry curriculum to one that is more focused on graduate level training, (c) formalizing student seminars on their research and improving faculty attendance at these seminar to provide feedback to the students, and (d) providing additional opportunities for graduate students to teach.

In conclusion, the Review Panel determined that the EMT possesses an excellent research and educational environment. Research excellence can be seen in the reputations of the faculty, their ability to publish, and their success in obtaining extramural funding. The Department also provides a strong educational experience for graduate students. The graduate student applicant pool is strong, and acceptance is selective. The students excel in this environment and graduate with the training necessary for their future success.

3. Detailed Findings

Introduction

- Objectives of the review

Evaluate the Research Programs, including the quality of independent investigator – initiated research programs, as well as the larger program grants.

Evaluate the educational opportunities in Environmental and Molecular Toxicology, the strength of the curriculum and the competitiveness of the matriculating students.
• **Participants**

Brenda McComb, Ph.D.
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Anne Fairbrother, D.V.M., Ph.D.
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Eco Sciences
Exponent

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Associate Dean for Research
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• **Order of Events**

The review panel met on the evening of March 20\textsuperscript{th}, 2013 to discuss the goals and order of the review. The review panel met throughout the day of March 21\textsuperscript{st}, 2013 and brief descriptions on various aspects of the department were presented. The meetings included:

Meeting with Craig Marcus (Department Head) and Andrew Buermeyer (Chair, Graduate Program Committee) – 1 hr

Department Support Staff, Susan Atkisson (EMT Office Manager) and Mary Mucia, (EMT Graduate Program Administrator) – 30 min

College Environment and Program Support – Larry Curtis (Associate Dean of the College of Agricultural Sciences and Associate Director of the Agricultural Experiment Station) – 30 min

Graduate Program Committee: Andrew Buermeyer (chair); Admissions: Robert Tanguay, Jennifer Field, Rod Dashwood; and Curriculum Committee: Kim Anderson, Nancy Kerkvliet, and Dave Stone – 45 min

Meeting with Graduate Students – 90 min

Meeting with Graduate Program Faculty – 45 min

Facilities Tour:
ALS – Kolluri Lab, Anderson Lab, EHSC Biomolecular Mass Spectrometry Core, EHSC Cell Imaging and Analysis Core – 45 min

SARL – Sinnhuber Aquatic Research Laboratory, Tanguay & Johnson – 30 min

Meeting with Craig Marcus and Andrew Buermeyer for final questions and exit interview – 30 min

Executive Session – 1 hr

• **Organization of the Report**

The report is organized according to the recommended outline and generally follows the same format as seen in the EMT Department self-study.

**Inputs**

• **Background**
Within the Department of Environmental and Molecular Toxicology (EMT), there are 17 tenure/tenure track faculty (16 FTE) and 4 fixed-term research professional faculty (3 FTE). The Department identifies nine adjunct, affiliate and courtesy faculty who regularly contribute to the graduate program (0 FTE). The Department receives 1.07 FTE through E/G funds from the college, with an additional 9.23 FTE through the experiment station and 1.61 through extension services. The remaining FTE are funded through extramural grant and contract funding.

The degree programs within EMT include a PhD in Toxicology (21 students), a Thesis Masters in Toxicology, a non-thesis MAg in Toxicology (3 students), and an undergraduate minor in Toxicology. Thus, the majority of the FTE are devoted to graduate education and research.

- The fit of the mission of the program and its relationship to the mission of the academic college and University mission

The self-study of this graduate program provides clear evidence of alignment to the mission of the College of Agricultural Sciences (CAS) and to the three Signature Areas of Distinction in Phase II of the Strategic Plan for the University: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress. The EMT faculty are nationally and internationally recognized for their outstanding research contributions and graduate programs, and as such, enhance the reputation of CAS and OSU.

One of the initiatives in Phase II of the OSU Strategic Plan is to “Raise the profile of graduate education at OSU by repositioning existing programs and introducing targeted new programs to support OSU’s three signature areas, and increasing professional and graduate programs to 25 percent of all enrollments” (http://oregonstate.edu/leadership/strategicplan/). There is an initiative within the Department to create a new 4+1 Masters in Risk Analysis offered jointly with the Department of Agricultural Resources and Economics. This new program is supported by the Provost Initiative and will fund the addition of one FTE tenure-track faculty position. This appears to be a good strategy for the department to support the university initiative and increase the number of students within their graduate programs. The review committee did get the sense that this initiative was not fully supported by the entire faculty.

- Quality of students and Admission selectivity

As indicated in the Self Study, the quality of students is generally high with an average GPA typically above a 3.5. Average GRE scores were 521.5 for verbal and 647.7 for quantitative. The review committee did not have comparative data on GRE scores for other programs so cannot comment on whether these are representative of toxicology programs in general. On average, 16.5 percent of the applicants are admitted, and slightly over 15 percent of the applicants matriculate to these graduate programs.

The Department has a well-defined recruitment strategy to increase diversity in their trainees and devotes specific efforts to recruit students from under-represented groups.

- Level of financial support of students

All Toxicology graduate students are funded. The NIEHS Training Grant is used as a recruiting tool to allow students to perform laboratory rotations before choosing a thesis mentor and laboratory home. Departmental funds and Provosts Distinguished Fellowships have also been used to fund students. Providing support for all graduate students is a definite strength of this program although the source of funding (dependence on statewide
funding and NIEHS training grant) appears to be somewhat problematic for the future of the program as a whole.

The desire to only admit funded students does create variation in the student advising loads for the faculty. Over the past 10 years, 4 of the full professor faculty have advised an average of 15.25 students each. The remaining 10 faculty have advised an average of 2.8 students each (note that 3 relatively new Assistant Professors were excluded from this count). This variation in advisees appears to be related to the ability of the faculty to earn research grants that can be used to support the students. Those faculty without stable grant funding advise fewer students.

Recommendation: There appears to be an opportunity for faculty without stable grant funding to take a more active role in teaching. As the department develops the 4+1 Masters program, these faculty could be available to supervise self-funded and externally-funded students.

The Department does realize that dependence on grant and Statewide funding for both the faculty and PhD students is problematic. There are two opportunities that could be available to the Department to supplement the current university/college budget allocations:

1) On-line course offerings through eCampus (where 80 percent of the tuition flows back to the unit). The Department should consider the feasibility of creating on-line (or hybrid format with some face-to-face meetings) courses to support the undergraduate minor. Another consideration would be to offer the TOX 360 course in an on-line format, especially given that it satisfies a baccalaureate core requirement for undergraduate majors. Once these courses are developed, they could be facilitated by either adjunct faculty or with GTA positions (thus providing additional sources of graduate student support as well as generating revenue for the department).

2) Consider creating an INTO OSU Graduate Pathways program that would feed international students into the 4+1 Masters program. The revenue model for this program would return approximately 64 percent of the tuition dollars paid by the students after admission to the Masters program to the department. The pathway coursework would provide language instruction, and could also include undergraduate coursework typically completed by 4th year undergraduate students who are candidates for the Masters program.

Recommendation: The Department should be thoughtful in considering new instructional opportunities that would generate revenue to the department.

- Curriculum strength

The goal of the EMT curriculum is to provide detailed expertise in Environmental Sciences, including (a) garnering substantive knowledge of toxicology and environmental chemistry, (b) how to analyze the scientific literature, (c) acquiring both verbal and written communication skills, (d) demonstrating ethical conduct in science, and (e) learning how to design experiments, analyze data, and prepare the results for publication. There are three graduate degrees currently being offered a non-thesis M.S. (or M. Ag.), a thesis M.S. (or M. Ag.), and a Ph.D. in Toxicology.

In the Masters Programs, students are required to take a minimum of 45 graduate credits. In the non-thesis Masters, students are required to take 3-6 hours of research (in-lieu-of-thesis). In the thesis Masters, students must 6-12 hours of thesis research. For the Ph.D. program the students are expected to take 3 years of full-time graduate work.

In each program, students are required to take 30 hrs of didactic courses (27 in the M.S. programs). Students are required to enroll in a seminar course each term, which is taught
Socratically. As described in the self-study, the course requirements are delineated and given to the students when entering the program.

This represents a strong educational program with sufficient flexibility to prepare students for careers in toxicology and environmental chemistry, which are by nature a trans-disciplinary programs.

Some EMT faculty also participate in graduate programs with other departments or colleges within OSU. These students are bound by the degree requirements of their home departments.

- **Quality of personnel and adequacy to achieve mission and goals**

According to the self-study, the faculty of the Toxicology Graduate Program currently consists of 17 tenured or tenure-track faculty. Supporting these tenure-track faculty and also contributing to Toxicology graduate training are 3 fixed-term Research-track (non-tenure track) faculty and 9 regularly contributing adjunct, affiliate and courtesy faculty (who receive no compensation from EMT). The Toxicology Graduate Program faculty has been relatively stable over the past 10 years at a steady-state of approximately 17 FTE. The few departures of faculty over the past 10 years have been replaced with new hires. Despite the relative stability of 17 FTE, faculty voiced concern about the difficulty in protecting positions and wanting to continue to have a critical mass of faculty without the fear of losing positions at the university or college level. The current faculty are a diverse group with many strong research programs that align well with the two main focus areas of 1) Molecular and Mechanistic Toxicology and 2) Environmental Chemistry and Ecotoxicology. The faculty members within this department appear to be sufficient to achieve the departmental mission and goals. There is currently a large proportion of full professors within the faculty; in the future, replacement of retiring faculty may become an issue.

The department currently employs 2 administrative support staff members which have decreased from 6 staff members 5 years ago. This is due in part to restructuring at the university level with the advent of the Business Centers. However, one administrative position was lost due to declining college and departmental funds. This reduction in support has burdened the current staff with many extra duties, resulting in a negative impact on departmental support. The Business Centers do not appear to be working in the intended fashion and many of the financial duties are being transferred back to the unit for logistical reasons. There is concern that this is impacting faculty productivity by placing increased burdens of grant and fiscal management on them.

Recommendation: More administrative support was deemed necessary to ensure adequate support of the department.

- **Level and quality of infrastructure**

Two main issues were brought out by the self-study and program review, including 1) physical separation of faculty and graduate students due to office and lab locations, and 2) limitations on overall square footage of space. The EMT faculty and their offices and research laboratories are located in 4 separate buildings on the OSU main campus and 2 research facilities east of Corvallis. The physical separation of buildings has the potential to inhibit regular communication and collaboration among faculty and graduate students. The department has a goal of one day housing all the EMT faculty and graduate students in one building, although this may be difficult to achieve in the current economic climate and limited space availability on campus. The self study provides evidence that laboratory and office space is limited, about 20% below the standard OSU space allotment. The space issue is most problematic for graduate students and to a lesser extent, faculty office space. Every graduate student is provided with an assigned desk and about 5 feet of workspace. Lack of
adequate research space may also be problematic, leading to crowding in the research lab, difficulties in acquiring new research instrumentation, and bringing more graduate trainees into the program. Significant investments have been made by the college (and an NIH G20 construction and renovation grant) in laboratory improvements during the past 10 years. The quality of research laboratories appears to be high, although there are exceptions that were brought up by faculty and self-study.

Recommendation: If possible in the future, decreasing the number of separate buildings housing faculty and graduate students is recommended. It is recognized that space is at a premium on campus and that capital improvements have been performed in off-site locations, as well as current financial constraints, may preclude the goal of having all EMT faculty and students in one building.

- **Quality of organizational support**

  EMT receives support for its research, extension and training program from four main sources. The majority of the funds for EMT/Toxicology come from the State of Oregon, through the budget provided to the OSU College of Agricultural Sciences (CAS). The self-study makes it evident that CAS has been highly supportive of EMT and the Toxicology Program, even during the current difficult times for the CAS statewide budget. EMT does not receive any base funding to support graduate education activities (fellowships, teaching assistantships, etc.) in excess of the faculty and support staff salaries. EMT has been highly successful in competing for extramural grant awards, and has generated increased amounts of returned overhead funds. These funds have been utilized over the past 5 years in large part to replace declining State support, and as ‘discretionary funds’ devoted to support graduate instructional activities, Team Tox, and provide infrastructure support for instruction and research.

  The organizational structure follows a Department Head and Vice Head leadership, with jurisdiction over faculty, departmental committees, administrative support staff, and the graduate program chair. There are several standing committees, including P&T, Graduate, Awards, Safety, and Space committees. The Safety and Space committees have yet to be assigned, according to the self-study. There has been a recent change in the structure of the Graduate committee, including the development of an executive committee and 42 subcommittees. This change was brought about due to a recognized weakness that the Graduate committee structure had fallen away in recent years and faculty had requested Graduate committee involvement to be more formalized. Also, there was some concern that the current Graduate chair may not be responsive enough to student inquiries. A suggestion was made that a senior grad student mentor might be helpful for first year grad students, in addition to the current system. Alternatively, having an advisor for each track (Environmental Chemistry and Ecotoxicology, Molecular and Mechanistic Toxicology) might provide better guidance for specific requirements, especially before a major professor was identified.

  Recommendation: More formalized graduate committee involvement and first year graduate student mentoring is encouraged.

- **Productivity**

  - **Level and quality of student performance**

    It is evident that the students in the EMT program receive excellent training. The large majority of Ph.D. students received their degrees within 4-5 years. Evidence of their performance can be found in their publication records and awards received. All of the Ph.D. students have obtained peer-reviewed publications with an average number per student of 3.4. This is an extremely important metric for the students’ future, in that the quantity and quality of the publications is generally used as a major criterion in recruitment and hiring. Over 50% of Masters’ degree students have at least one publication.
The quality of the students can also be seen by the number of awards. The graduate students have received numerous awards for their research, including scholarships, Graduate Fellowships, invitations for oral presentations at meetings, travel awards, as well as awards for oral and poster presentations at national and international meetings. This reflects not only on the students, but also their mentors and the strength of the program.

The graduation rate is 84%, which reflects both the high-quality pool of students entering the program and the commitment of the faculty to their training. However, there is evidence that the department adheres to high standards. About 8% of the students did not pass their qualifying exams necessary to obtain a Ph.D. Each of these students received Masters’ degrees.

- **Level and quality of faculty performance**

The EMT Faculty has an impressive record of publication productivity, with a high average H index, including several over 30 (Table 3.5 Self Assessment report). Most of the Faculty are nationally recognized research scientists and several have stellar international reputations. The Faculty has a diverse mix of grants and contracts, although the historical dependence upon NIH is obvious and continuing (Table 3.6). Given the percentage of grant applications that are fully funded by NIH, this continued success rate is very commendable. There is evidence of continued scholarship by most of the Faculty and the Review Panel encourages the Department to continue to support them in the manner that has led to this success. However, the Review Panel noted that the majority of the graduate studies appear to be associated with five-four of the faculty, while some Faculty have few to none. Understanding that not all Faculty are currently at high research productivity levels, the Review Panel suggests considering assigning a larger proportion of teaching duties to these Faculty members. In particular, the Department could consider a larger number of “4+1” Masters students that are mentored by Faculty with less research pressure. This would have the advantage of increasing the graduate program in alignment with University goals as well as generating additional revenue for the Department through student fees. The Review Panel cautions against instituting such a program without specific Faculty assignments as research output of highly productive faculty could be impaired if too high a teaching/mentoring load were added.

- **Viability of scholarly community within which students can interact**

The primary attraction for toxicology students to study at OSU is the quality of the Faculty, particularly in the area of environmental chemistry. Studying with a world class faculty member, as well as the opportunity to interact with others at the same level of scholarship is a privilege that is recognized and appreciated by the students. Secondarily, the breadth of equipment available for training (e.g., GCs, HPLC, mass spec, flow cytometer) provides students with a high level training opportunity that qualifies them for multiple career options. Although Dr. Stubblefield’s laboratory is more oriented toward contract research and less towards hypothesis-driven studies, the Review Panel encourages the department to rotate students through his laboratory to learn techniques and experience regulatory-driven studies. Similarly, Dr. Tanguay’s laboratory provides unique experiences in toxicity testing for chemical screening and extrapolation of animal data to human health concerns. The blend of traditional scientific research with regulatory-driven studies is attractive to students and also provides a platform for dynamic discourse among the faculty.

Recommendation: Encourage participation of all the laboratories in the student rotation program.

A unique attraction that brings graduate students to the EMT Department at OSU is the NIH training grant that provides the ability for students to rotate through multiple laboratories during their first two years in the program. This broadens the base of their education and allows them to find the most suitable professor-student match. Participation in a rotation
prior to selection of a Focus Area for graduate studies undoubtedly contributes to the very low drop-out rate among EMT graduate students. Therefore, the Review Panel is alarmed by the prospect of the Training Grant moving towards funding postdoctoral positions and away from funding Ph.D. candidates. The Review Panel urges the department to search for alternative mechanisms to continue to support at least first year graduate students (preferentially, first and second year students) in a broad-based, multi-laboratory rotational program of study.

Recommendation: The Department should be looking towards alternative funding sources to replace the student support on the NIH Training Grant.

The Review Panel acknowledges and supports the students’ high level of enthusiasm for continuing the departmental seminars in a manner similar to that which was trialed this year. Namely, an integrated seminar in Fall Quarter focused on a controversial relevant topic with students required and challenged to support any position and viewpoint. For Winter Quarter seminar, a focus on manuscript review skills, curriculum vitae presentation, and grant writing will provide the students additional competitive advantage. Finally, Spring Quarter can provide in-depth topical discussions in each focus area. The Review Panel encourages the students to continue to invite a broad diversity of professionals to their monthly seminar series, to experience a variety of potential job opportunities many of which may be outside the traditional realm for toxicologists but provide satisfying and challenging career options.

The Review Panel recognizes the strong role that TEAMTox plays in the departmental graduate student community. This provides a forum for interactive learning among the students and the opportunity to develop grant-writing skills and community service/teaching. TEAMTox is an idea that may be unique to OSU.

Recommendation: The Department is encouraged to continue to support the students in the TEAMTox initiative.

Outcomes

- Professional viability of graduates

The Review Panel is impressed with the diversity of placements of graduates from the EMT program (Table 4.2 in Self Study report), noting that all potential sectors (academia, industry, government) are represented. The broad background that all students acquire, covering both chemistry and toxicology regardless of the student's focus track, makes the EMT students highly competitive in the marketplace. The Review Panel encourages the continued integration of the student learning, with shared core courses and seminar classes. The experience gained by participation in TEAMTox is particularly noteworthy as the unique experience with outreach and teaching at the K-12 level enhances students' capabilities and attractiveness to potential employers. It was obvious to the Review Panel that the students gain a great deal of self-confidence during their tenure with the EMT department. The number of professional society awards (e.g., Best Student Paper), also indicates Faculty awareness of the necessity of introducing their students to a professional setting where they can begin networking and meeting other professionals. The Review Panel recognizes the importance of teaching experience for graduate students, particularly for those interested in an academic career, and encourages the Faculty to continue providing teaching opportunities to their students, through lectures in courses taught by their major Professors, leading seminars, or TA opportunities through other departments.

- Satisfaction of students and graduates

Students – Satisfaction of students was assessed through a survey sponsored by the graduate school and the meeting of our review committee with the students. The survey had only a 35% response rate; however, the same themes were borne out during our meeting with the graduate students where we received input from virtually every student.
Overall, the students described their training as exemplary. They mentioned that there were many opportunities that positioned them for their future careers, including, being able to write for NRSA grant support, and opportunities to present and National meetings. The students recognized that, once they received their degrees, they were extremely competitive for jobs. Interestingly, the majority of current students, when asked, favored careers in industry or government – not in academia. Additionally, the students noted very positive interactions with their mentors and other faculty, the quality of the research facilities, libraries, and office space.

Despite the overall positive impression that we received from the students regarding their training, the students expressed concerns and made recommendations for improvement.

(a) Despite the well-described curriculum in the self-study and the graduate student handbook, many of the students were confused as to the courses that they should be taking over the first year, and felt that student advising could improved. Part of this confusion may be related to the many different mechanisms that are being used to support the students. About 50% are supported by an NIEHS training grant, others by a Superfund grant, and others by individual R01s. There was also a lack of clarity regarding when waivers of courses were granted.

Recommendation: Each of these problems can be ameliorated with additional attention being paid to first year advising – until the students have selected a mentor.

(b) Many of the students took issue with the requirement for the 400 level (slash) courses in Biochemistry. They believed that the rigor of the course was not sufficiently geared toward graduate training. Comments on the MCB 553-555 series were much more positive.

Recommendation: The department may wish to consider improvement of the didactic course offerings by developing a graduate level course using the expertise of the faculty.

(c) There were a few concerns regarding the inconsistent offering of required graduate courses – particularly the toxicology series. In some cases the students were unable to take the course prior to their preliminary examinations. The department may wish to consider offering this course more regularly – even if there are only a few students who register.

(d) The students liked the seminar course, which was quite interactive; however, the students requested more opportunities to present their research on a regular basis (annually?) not only to their peers but also to the EMT faculty. They commented that faculty members generally do not attend student research presentations.

Recommendation: Student research presentations should be more formalized and attended by faculty.

(e) Finally, the students requested that they be given more opportunities to teach. They were not requesting Teaching Assistantship types of positions, but actually giving a lecture or two, and writing examination questions.

Recommendation: Students should be given the opportunity to gain teaching experience, through course lectures, leading seminars, or TA opportunities through other departments.

Alumni – Although data on alumni satisfaction are rather sketchy, the responses were extremely positive. The department did send out a survey; however, only 7 alumni responded. It is unclear how many surveys were distributed. Ultimately, satisfaction with the program depends, in large part, to acquiring a rewarding full-time position. Of the respondents, the majority are employed in fields related to their degrees.
• **Rankings/ratings**

Student metrics are strong, and the average GPA and GRE scores of applicants appear to have increased in the past few years (Table 2.1). This provides the department the opportunity to select the best students into the graduate program. Graduate student quality is reflected in the high number of prestigious awards received by the students (Table 3.2), indicating a high ranking of both students and faculty. Overall, the students appear highly satisfied with their experience (page 108), expressing some dissatisfaction only with the new student orientation process and perceived paucity of teaching opportunities.

The Faculty appears to be moving towards gender balance, with 5/14 female, and is encouraged to continue to actively recruit female professors (Page 53 of Self Study). Faculty diversity is still under represented, with only one self-identified minority member. While the faculty currently is well-balanced by age class, the Review Panel is concerned that the department is top-heavy with more than 50% of the faculty at the Full Professor level. This will lead to aging of the faculty if new hires of younger professionals are curtailed in the future.

Recommendation: The Review Panel encourages the department to work with the College and Graduate School to continue to grow the faculty base.

The Department continues to rank high on competitive grants, including NIH and Superfund awards, with increasing graduate student support (page 83 of Self Study).

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**Conclusion**

The Review Panel determined that the EMT possesses an excellent research and educational environment. Research excellence can be seen in the reputations of the faculty, their ability to publish, and their success in obtaining extramural funding. The Department also provides a strong educational experience for graduate students. The graduate student applicant pool is strong, and acceptance is selective. The students excel in this environment and graduate with the training necessary for their future success.

**Recommendations**

- The review committee recommends that additional support for graduate training be provided from State resources to provide additional stability to the exemplary program graduate program.
- There appears to be an opportunity for faculty without stable grant funding to take a more active role in teaching. As the department develops the 4+1 Masters program, these faculty could be available to supervise self-funded and externally-funded students.
- The Department should be thoughtful in considering new instructional opportunities that would generate revenue to the department.
- The recruitment needs of this department (particularly in terms of faculty) need to be seriously considered in order to maintain the critical mass necessary to maintain grant productivity.
- More administrative support was deemed necessary to ensure adequate support of the department.
- If possible in the future, decreasing the number of separate buildings housing faculty and graduate students is recommended. It is recognized that space is at a premium on campus and that capital improvements have been performed in off-site locations, as well as current financial constraints, may preclude the goal of having all EMT faculty and students in one building.
- More formalized graduate committee involvement and first year graduate student mentoring is encouraged.
- Encourage participation of all the laboratories in the student rotation program.
• The Department should be looking towards alternative funding sources to replace the student support on the NIH Training Grant.
• The Faculty should continue to support the TEAMTox initiative.
• Improving mentoring of 1st year students
• The department may wish to consider improvement of the didactic course offerings by developing a graduate level course using the expertise of the faculty.
• Student research presentations should be more formalized and attended by faculty.
• Students should be provided a wider range of opportunities to gain teaching experience.