Five-Year Academic Program Review

Biochemistry and Molecular Biology

Reviewed by: Paul Gorman, Joanne Noone, Margaret Scharf

Reviewed on: May 29, 2014

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October 28, 2014

David Farrens, Ph.D., Director
Biochemistry and Molecular Biology
School of Medicine

Dear Dr. Farrens and Faculty:

The primary goal of the Academic Program Review is to maintain and strengthen the quality of OHSU’s undergraduate and graduate degree programs. Reviews are intended to be helpful and supportive in (i) recognizing strengths and achievements of academic programs; (ii) promoting program planning and goal setting aligned with OHSU’s strategic plan (Vision 2020), the requirements of the Northwest Commission on Colleges and Universities, and specialized accreditation agencies; and (iii) identifying areas unique to and/or common among academic programs that require attention. In carrying out these aims, each program will be reviewed at least once every five years. In preparing for this review, each unit scheduled for review conducts a self-review that focuses on its current situation and expectations for the next three to five years.

Completing the five-year Academic Program Review indicates the Biochemistry and Molecular Biology (BMB) program’s commitment to ongoing programmatic improvements and excellence. As this self-review process is new to OHSU, the Academic Program Review Committee values your contribution as we contemplate the most effective and efficient way to carry out this work.

Your self-review report was discussed and evaluated by a Review Team of three members of the Academic Program Review Committee in May 2014. The subcommittee’s recommendations were approved by the full APR Committee and the Faculty Senate. The following commendations and recommendations summarize the Review Team’s findings.

Commendations: The Review Team commends the BMB program in three areas: (1) strong evidence that the program is dedicated to rigor and producing graduates that are ‘strong thinkers’; (2) number of publications per student; and (3) strong graduate outcomes and professional post-program placements.

Recommendation: The Review Team recommends the following: (1) utilize faculty in the development of the report; (2) review a model of a well-written APR report to better understand the spirit of the process; (3) develop specific Student Learning Outcomes (SLO) modifying uniform SLOs and more clearly link learning to those SLO’s; and (4) articulate the vision of the program’s future.

The Review Team’s comprehensive evaluation including ratings, commendations and recommendations specific to each section of the report follows.
Part 1. Introduction
Rating: Early Development. Process is incomplete, omitted dates of meetings or voting record; self-study compiled primarily by program head or senior faculty member; little faculty and staff input; no input from students or other stakeholders.
Commendation: Evidence of monthly faculty meetings.
Recommendation: Demonstrate more stakeholder engagement. After cancellation of student lunch sessions, it is not clear how student feedback will be collected.

Part 2. Overview
Rating: Developing. Program has established its own set of Mission, Purpose, Goals (MPGs) unique to the program, but MPGs are not aligned with university MPGs.
Commendation: Strong evidence that the program is dedicated to rigor and producing ‘thinking graduates’; program outcomes match well to core competencies.
Recommendation: Provide purpose statement; goals need to be more explicit for the degree.
Comment: The committee is aware of the Graduate Studies endeavor to create and adopt uniform SLOs across all PhD programs, is there a way within those uniform SLOs to illustrate more program-specific outcomes?

Part 3. Faculty and Staff Resources
Rating: Early Development. No discussion of faculty trends that affect program development and faculty diversity; no succession planning (recruitment, retention, retirement, needs) is evident. Temporary/adjunct faculty teach majority of the courses in the curriculum. Program does not avail itself of academic and student services.
Commendation: Narrative indicates a highly qualified faculty.
Recommendation: Complete faculty tables (3.1 and 3.3) to provide more detailed information about faculty qualifications and duties; identify issues and/or resource constraints faculty are facing, if any, and if not, indicate as such.

Part 4. Enrollment/Degree Production
Rating: Developing. Curriculum appears to reflect current practice in the discipline. Uses some rudimentary analysis of trends in enrollment and degree production in the context of program quality and sustainability. No discussion of employment projections or prospects for program graduates. There was some discussion about student diversity and planning for recruitment.
Commendation: Graduate outcomes and professional post-program placements are strong.
Recommendation: Work on creating a more articulate plan for recruitment participation within the PMCB structure; provide more data and analysis in this section.

Part 5. Other Resources
Rating: Developing. Preliminary discussion of the adequacy of resources; no resource planning for or identification of potential new revenue streams for the next 5 years. Identifies needs or sets priorities, but not linked to data. Limited discussion of context and extenuating circumstances affecting resource planning.
Commendation: Critical insight into program’s reliance on sophisticated instrumentation.
Recommendation: Create a 5 year plan for resources, identifying revenue sources and diversification, and where resources are likely to become scarce.

Part 6. Student Learning Outcomes and Assessment
Rating: Early Development. Program-level student learning outcomes are vague and not measurable; courses or experiences required for the degree/certificate are listed but not linked to the SLOs; assessment methods are not identified; no evidence of faculty engagement in the discussion of assessment results to improve curriculum, academic support services, faculty development and the like.
Commendation: Publication rate per student is consistent.
Recommendation: Include the whole assessment plan to demonstrate how outcomes are measured and/or map student activities to outcomes; consider linking mandatory authorship to an SLO, to criteria for program completion; provide examples of intermediate level evaluation.

Part 7. Other Information (Optional for Programs)
Rating: N/A

Part 8. Analysis and Conclusions
Rating: Early Development. Discussion of strengths, accomplishments and improvements needed are superficial and not likely to lead to needed improvements over the next 5 years. Neither selected indicators for improvement, nor set targets; plan does not address curricular or program challenges ahead.
Commendation: Identification of six targets to address over the next five years.
Recommendation: Create a five year plan and identify specific ways to address target areas.

Part 9. Response to Previous Program Reviews
N/A

Part 10. Overall Recommendations
Overall, the committee was impressed by the number of publications per student and the clear commitment to ensuring graduates are strong thinkers. The committee noted a general lack of analysis in the report and a sense of ‘apathy’.

The Academic Program Review Committee determined that the BMB program meets the academic standards of Oregon Health & Science University. Based on these findings, your next review is scheduled for 2019-20 by the Faculty Senate APR Committee, with your self-review and school-level processes beginning and concluding no later than 2018-19.

Sincerely,

Charles Allen, Ph.D., Committee Chair

CC: Jeanette Mladenovic, M.D., M.B.A., M.A.C.P., Provost
Mark Richardson, M.D., M.Sc.B., M.B.A., Dean
Allison Fryer, Ph.D., Associate Dean
Five Year Academic Program Review

1. Introduction

Program Name: Biochemistry and Molecular Biology (BMB)

1.1 Identify the participants in the self-evaluation process. Please select all that apply.

- X Faculty
- X Students
- Staff
- Alumni
- Employers
- Others, please specify

1.2 When were meetings held to complete this self-evaluation process? Add date fields as needed.

During our monthly faculty meetings, we discuss pertinent issues regarding our graduate program when they arise. Such discussions include student involvement in our monthly Seminar series, future courses, faculty involvement in the teaching process, stipends, etc.

Until recently, we also elicited feedback weekly from BMB students during lunch meetings held after our weekly Seminars. Unfortunately, these had to be cancelled due to recent OHSU policy changes forbidding departmental expenditures on these sorts of activities.

1.3 Who prepared the document?

David Farrens, Director, Graduate Program in Biochemistry and Molecular Biology.

1.4 Who reviewed the report?

Graduate Program Steering Committee and Graduate Program Faculty.
1.5 Provide the faculty vote on the final draft of the report.

Number of faculty eligible to vote: 13
Number Agreed: 13
Number Provisionally Agreed: 0
Number Disagreed: 0
Number Abstained: 0

2. Overview

2.1 Describe the program mission and goals.

General Description of the Discipline of Biochemistry and Molecular Biology. [Note – the description below was implemented prior to the adoption of the Student Learning Outcome statements (SLO’s). Many fields of biomedical research focus on whole organisms. Biochemistry and Molecular Biology (BMB) often focuses intensely at the other end of the spectrum – the molecular level. BMB researchers feel that knowing, at the physical level, how different components of our cells (proteins, DNA and RNA, lipids) work is a requirement for truly understanding how cells function and how they communicate with each other, for example, to transmit signals or fight disease.

Mission. The mission of the Department of Biochemistry and Molecular Biology (BMB) at OHSU is to promote outstanding fundamental research on mechanisms of disease at atomic and molecular levels of resolution.

Rationale. Since Biochemistry is the study of life at the molecular level, it provides the foundations of a wide range of other scientific disciplines, including virology, genetics, immunology, cell biology, microbiology, pharmacology and medicine. We aim to ensure students obtaining a degree in BMB have a strong foundation in the logic and application of the molecular and physical sciences, thus empowering them to later specialize in a wide range of subjects of their choice.

Goals. The goal of the BMB Graduate Program is to provide its graduate students with a rigorous and complete education in the underlying principles and practice of modern biochemistry and molecular biology. This will not only enable them to participate actively in the processes described above, but also empower them to successfully participate in whatever endeavors their future holds post graduate training, thus broadening their career opportunities.

Expectations. We expect a BMB student to be able to understand and critically evaluate existing knowledge about his or her research project, as well as synthesize, create and publish new knowledge. Specifically, we expect BMB students to excel at the following skills:
Thinking:
- Critically evaluate existing knowledge relevant to his/her field of research
- Identify significant and original scientific problems
- Understand current policies regarding ethical behavior expected of a research scientist

Doing:
- Design and conduct independent, innovative research and employ analytical skills
- Collect, store, and evaluate data using best lab practices
- Conduct oneself in a professional and respectful manner with all faculty, students and staff

Communicating:
- Clearly and accurately communicate findings using a minimum of jargon
- Produce written documents appropriate for publication
- Continue self-education and connect with others by attending seminars, meetings, symposiums or conferences
- Maintain a safe workspace, adhere to all safety regulations and display responsible conduct in research

Another way to re-phrase these expectations is through use of the recently approved OHSU Shared Learning Outcome (SLO) Statements for the PhD:

A BMB PhD graduate will be able to:

1. Demonstrate a basic knowledge of central concepts in the relevant scientific field;
2. Demonstrate advanced knowledge in one specialized area;
3. Advance knowledge in selected area of concentration;
4. Formulate hypothesis based on current concepts in the field;
5. Design, conduct, and interpret their own research;
6. Demonstrate doctoral-level competence in written and verbal communication;
7. Interpret and critique scientific literature;
8. Apply fundamental knowledge of ethics in research; and
9. Develop ancillary skills, where necessary, to obtain positions outside scientific research.

2.2 How do these align with, and contribute to, the fulfillment of OHSU's mission, strategic goals and core themes?

The BMB Graduate Program is fully in line with the OHSU's mission statement: (http://www.ohsu.edu/xd/about/facts/missions.cfm). As outlined in this document, we specifically:
Strive for excellence in education, research and scholarship, as evidenced by high quality publications, formal and informal research presentations, and in many case, external grant support.

Have a dynamic interdisciplinary environment that stimulates the spirit of inquiry, initiative, and cooperation among students, faculty and staff, as evidenced by regular formal and informal scientific discussions of research, and co-authored publications involving several students and faculty.

Educate tomorrow’s scientists to prepare them for a lifetime of learning, leadership and contribution.

Explore new basic and applied research frontiers in biomedical sciences.

Documented examples of these activities can be seen in the titles of various faculty and students papers (see Appendix 2 - Students), and in our monthly seminar series, which are open to the public.

It is important to note that the above SLOs map to the OHSU Core Competencies in the following manner:

- Professional Knowledge and Skills (SLO 1, 2 & 3)
- Reasoning and Judgment (SLO 4, 5, & 8)
- Evidence-based Practice and Research (SLO 7)
- Lifelong Learning (SLO 3, 4, & 7)
- Communication (SLO 6 & 9)
- Professionalism & Ethics (SLO 8 & 9)
- Interprofessional Teamwork (SLO 8 & 9)
- Safety & Quality Improvement (SLO 1, 4 & 5)
- Systems (SLO 8 & 9)

2.3 Describe the curriculum, and if more than one award is given, highlight the progression in difficulty. Use the "Attach File" button below to upload the curriculum.

Overview: The BMB Graduate Program is a member of the Program in Molecular and Cellular Biosciences (PMCB) at OHSU. Thus, in the 1st year, BMB students take required conjoint PMCB. These are: CONJ650: Practice and Ethics of Science, CONJ661: Structure and Function of Biological Molecules, CONJ 662: Genetic Mechanisms, CONJ 663: Bioregulation, and CONJ 664: Cell Structure and Function.

BMB Requirements: Along with the above required courses, BMB students are required to take the CONJ elective CON668: Molecular Biophysics and Experimental Bioinformatics, in order to familiarize themselves with the tools and analyses used to study the structure, biophysics and chemistry of macromolecules. Students are also required to take BCMB619: Mol. and Biochem. Basis of Disease, in order to learn presentation skills.

Finally, starting in the year 2 through the end of the program all BMB students are required to enroll in a Journal Club, BCMB 605. They are also required to register for, attend and present their thesis work annually in the Departmental Seminar Series, BCMB 607,

BMB Electives: BMB requires a total of 9 credit hours of elective courses to be eligible for the Biochemistry & Molecular Biology Ph.D. degree. Students are strongly encouraged to start taking at least one elective course relevant to their field of study no later than winter term of their second year. Some of these classes include:
Appendix 1 is a copy of the Biochemistry and Molecular Biology Academic Guideline. We make this document available to all interested parties online, here: (http://www.ohsu.edu/xd/education/schools/school-of-medicine/departments/basic-science-departments/biochemistry-molecular-biology/graduate-program/upload/BIOCHEMISTRY-AND-MOLECULAR-BIOLOGY-Academic-Guidelines-2.pdf#page=1&zoom=auto,0,792).

3. Faculty and Staff Resources (Use the State of the Program Reports from the last five years to address these questions.)

3.1 Describe the major research thrusts of faculty, areas in which the research is particularly strong, areas that need to be strengthened and current research support.

BMB Research Activities and Strengths. BMB faculty use a range of scientific approaches to assess protein structure and function, to evaluate the interactions of receptors with their ligands and transporters with their cargo within biological membranes, to dissect the biochemical properties of signal transduction networks and transcriptional pathways that influence cell fate and function, and to investigate the essential properties of disease-causing viruses and protozoan pathogens.

A key tenet of biochemistry is that the 3-dimensional structure of a molecule drives its function. Thus, biochemical research often involves obtaining structural knowledge about biomolecules, and defining the chemical mechanism involved in their particular function. Such knowledge makes it possible to not only understand how molecules function, but also predict how they will interact with each other in both known and unknown situations.

For these reasons, Biochemistry departments in Universities are typically the home of structural biologists. OHSU is no exception. Of the 33 primary and associate faculty, ~ 50% are fully or at least partially involved in structural biology pursuits. Among these faculty, 4 are x-ray crystallographers, by far the highest density of such research on campus.

How BMB Leverages their Research Activities and Strengths to benefit their Graduate Student Training. Along with the coursework described above and the hands-on training BMB graduate students obtain working in their respective laboratories, BMB students are exposed to cutting edge BMB research through mandatory participation in our two seminar programs.

One Seminar series includes scientists from throughout the country who discuss their research to BMB faculty and students (note these seminars are open to and well-attended by the entire OHSU community). The other (discussed above) involves all of our graduate students and post-doctoral fellows, who have the opportunity to discuss their work on a regular basis in front of a
friendly but critical audience of their peers, and thereby gain valuable experience in presentation skills.

**BMB Participates Heavily in Education at OHSU in Roles Outside its Own Program.** As the BMB faculty are committed to teaching and mentoring the next generation of biomedical scientists through involvement in graduate and post-graduate education, BMB faculty participate enthusiastically in teaching missions across OHSU, not only in its own program. These activities include a heavy teaching presence in the campus-wide Program in Molecular and Cellular Biosciences (discussed above) conjoint courses.

In fact, BMB not only teach heavily in the PMCB, but BMB faculty are directors or co-directors in three of the offered CONJ courses. These include CON661: Structure and Function of Biological Molecules (director and co-director, Ujwal Shinde and David Farrens); CONJ 664: Cell Structure and Function (director, Linda Musil), and CONJ 668: Molecular Biophysics and Experimental Bioinformatics (director and co-director, Ujwal Shinde and David Farrens). A BMB faculty member is also presently acting as the Chair of the Conjoint Curriculum Committee (Michael Chapman).

The BMB faculty also enthusiastically participate in teaching in the Neuroscience Graduate Program, and the OHSU MD-PhD Program.

The BMB faculty also play a prominent role in the didactic education of our first year medical students. Cell Structure and Function (CSF) course, one of four basic science courses in the first year medical school curriculum, has been directed by BMB faculty member Dr. Buddy Ullman for years, and BMB faculty serve as lecturers for the biochemistry component of CSF and as facilitators for the many small group workshops in the course. In addition, Dr. Ullman is an active participant in the Biochemical Basis of Disease course at the end of the first year medical school curriculum and also lectures in a second year medical school course. Dr. Ullman has won 48 teaching awards and honors for his teaching efforts.

**Future Endeavors.** BMB is taking a major role in developing a new graduate level track in Quantitative Biosciences, which is designed to provide opportunities for students seeking to learn more physical and quantitative approaches, activities that are increasingly becoming necessary to solve fundamental biomedical research problems.

**3.2 Describe how OHSU has maintained adequate qualified faculty members and staff members in relation to the program's growth over the last five years.**

A total of 33 BMB faculty participate in graduate training. Among these, 13 have a primary appointment in BMB, and 20 are associated faculty members. Associated faculty include members with appointments in the Vollum Institute (6), the Shriners Research Center (3), Portland State University (2), Physiology and Pharmacology (1), Reed College (1), the SOM-Pediatrics Department (1), Molecular Microbiology & Immunology (1), Ophthalmology (1), Pulmonary and Critical Care Medicine (1), Jungers Center for Neurosciences Research (1), the School of Dentistry (1), and the Knight Cancer Center (1).

Since 2008, BMB has lost 3 faculty, due to retirement (2) or leaving OHSU (1). Four faculty have been added to our program. One, with a primary appointment in Biochemistry and Molecular Biology, was recently recruited from MIT following a national search.
3.3 How successful has the program been in attracting and retaining faculty and leadership from demographically diverse backgrounds?

BMB is committed to recruiting and retaining the best scientists, regardless of race, sex, or ethnicity. Currently we have 3 women among our 12 primary faculty. Among all BMB faculty, 8 were born outside the U.S.

3.4 If recruitment and retention efforts have not produced desired diversity, what are your plans to recruit diverse faculty? What resources will be used or are needed to achieve these results?

Our ability to recruit new faculty depends on funds from the Dean, and no such funds are currently available. However, we did actively pursue diversity in our above mentioned recruitment of a junior faculty member, interviewing two women and two men for the position (all but one of whom were non-US born).

3.5 What services has the program utilized to increase program effectiveness and further the academic mission? Please choose all that apply.

- Teaching and Learning Center
- Provost's Office
- Library
- Center for Diversity and Inclusion
- Student Health
- Registrar
- Financial Aid
- ITG
- Campus Planning and Development
- None
- Other, please specify
- Research Funding and Development Services

4. Enrollment/Degree Production (Use the State of the Program Reports from the last five years to address these questions. Each question has an "Attach File" option where charts or tables can be uploaded to demonstrate or emphasize your analysis.)

4.1 Is the five-year enrollment trend appropriate to the program’s resources and capacity?
BMB was integrated into the Program in Molecular and Cellular Biosciences (PMCB) over a decade ago, and since then recruitment of students into the laboratories of BMB graduate faculty has steadily declined. We have matriculated ~2 students/year, with 10 students graduating with PhDs in the last 5 years (2008-12). This number is approximately half the number of graduates per year compared to when the Biochemistry and Molecular Biology Program was separate and independent, which graduated 18 students in the five years prior (2003 and 2007).

Please see Appendix 2-Students. The BMB faculty ideally would like to enroll ~ 3- 4 students/year.

Information on current 8 BMB Graduate students is also provided in Appendix 3 – Current Students, and is made publicly available online at: http://www.ohsu.edu/xd/education/schools/school-of-medicine/departments/basic-science-departments/biochemistry-molecular-biology/graduate-program/students.cfm

4.2 Has the number and/or quality of matriculates changed in the last five years? If so, how? What is the impact?

The number and/or quality of matriculates have not changed significantly in the last five years.

4.3 Is the five-year trend in awarding degrees and certificates appropriate to the program’s resources and capacity?

Please see above.

4.4 How successful has the program been in attracting students from demographically diverse backgrounds?

BMB is committed to training the best students possible, regardless of race, sex, sexual orientation, or ethnicity. During the review period, we have admitted 11 women and 15 men. Of these, one was a URM, one LGBT, and 5 from an international background.

4.5 If you have not achieved desired results, what are your plans to recruit diverse students that add value to the learning environment? What resources will be used or are needed to achieve these results?

BMB does not directly control admission into its program; students must first be admitted into the Program in Molecular and Cellular Biosciences (PMCB). However, BMB does have representativeness on the PMCB admissions committee, and BMB faculty participate actively during the recruitment interview process.

Since 2012 OHSU School of Medicine offers five $1,000 Promising Scholar Awards to outstanding students, that have been admitted to any PhD or Master’s program in the SOM and who will enhance student diversity.
4.6 What is the evidence of regional, national or international need for additional qualified individuals such as the program is producing? Please specify.

Over the past 5 years, all but one BMB graduates have obtained positions as post-docs in academia, residents in medical schools, or positions in government and industrial laboratories.

4.7 Program availability (please select all that apply):

- X Full-time
- Part-time
- Evening
- Weekend
- Place-bound
- On-line

5. Other Resources

5.1 What is the current budget (present year) for this program?

Students are currently funded off of various training grants, as well as individual PI’s grants. The BMB Department also holds in reserve funds to ensure students stipends will be paid in case of gaps in a given PI’s funding. Each student is an estimated ~ $40,000/year cost obligation to the department if not covered by external funding sources such as grants.

We have previously submitted one Training Grant to obtain more funding for students, and have plans to do so again in the near future, after we have completed the implementation of the reviewers’ suggestions. These include increasing joint PSU/OHSU educational collaborations, which we are doing with BCMB 630: Intro to Biophysics (PSU/OHSU joint course), and BCMB 631: Adv. Biophysics (PSU/OHSU joint course).

5.2 What revenue sources does the program have access to? Choose all that apply:

- Tuition
- State Appropriations
- Clinical/Patient Care
- X Grants/Contracts
- Philanthropy
- X Indirect Cost Return
- Other, please list

5.3 How does tuition (or graduate stipends) compare to similar programs at other institutions (ideally, compare against programs on the institutional peer list)?
Graduate stipends are not set by BMB, but rather, are set by OHSU School of Medicine Graduate Studies. A comparison with similar programs at other institutions suggests that our stipends are comparable, when adjusted for Portland's cost of living.

5.4 Evaluate the adequacy of other resources necessary to support this program (e.g. library, computer equipment, facilities, research labs, clinical placements).

BMB has excellent laboratory resources. BMB is also arguably the most instrumentation-heavy department on campus. BMB facilities include advanced computational and X-ray crystallographic capabilities, as well as state of the art biophysical instrumentation, including fluorescence and proteomic. Together, these give BMB students exposure to and training on advanced, modern instruments.

5.5 Has anything happened since the last review that has influenced expenditures?

N/A

6. Student Learning Outcomes and Assessment (Use assessment reports from the past five years.)

6.1 Summarize how faculty members engage in ongoing systematic collection and analysis of meaningful, accessible and verifiable data that are appropriate indicators of student and graduate achievement of student learning outcomes.

All of the BMB required and elective courses are graded, and an online grade-book is kept with DegreeWorks (SunGard Higher Education).

The research progress of the individual BMB students is evaluated in a number of ways, both formal and informal.

Formal assessments include the student meeting at least once a year with his/her Thesis Advisory Committee (TAC), which is made up of composed of 4-5 faculty. Near completion of the course of studies, the students TAC typically meets more frequently. After each meeting, the Chair of the TAC is asked to briefly summarize the students' progress, and this information is kept on file. These reports are collated for review by the Program's Steering Committee.

Another formal assessment involves the student presenting his/her research activity to the entire department in the BMB weekly seminar series, followed by a period for questions and answers. These yearly formal presentations are open to the public and are mandatory for each year except the last, when in its place, the student presents and then defends his or her Thesis work, again, in a formal presentation that is open to the public.

In addition to the above formal requirements, students periodically meet informally with the Program Director to discuss matters related to their training.

6.2 Summarize how the results are used to improve the program curriculum, learning experiences, instruction, student recruitment and/or academic and learning support.

The faculty discusses the students' performance in the above activities with each other, and with the students involved and these deliberations are to improve the program when possible.

6.3 Describe briefly any other evidence considered in evaluating your program's effectiveness (student time-to-degree, retention and graduation rates, advisor/advisee relationships, mentoring).
It is our understanding that the average time from matriculation at OHSU to PhD degree is 5.1 years. For BMB students, the average over the past five years was 6.06 years, and all but two who passed the Qualifying Exam went on to graduate with a PhD or are still in the program, or transferred with the mentors to another University.

All the students met the mandatory BMB requirement to be an author on at least one manuscript, and almost all made the strongly suggested goal of having at least one first author publication. BMB students were listed on 67 total publications. The average for the 23 BMB students who completed the program over the time of assessment was 2.9 publications per PhD graduate.

6.4 What evidence does the program have about employment and/or further professional or graduate-level activities of program completers? What and how are alumni doing (e.g., industry or self-employment, geographic location, job, success indicators)?

All BMB graduates have been able to obtain postdoctoral positions in academia or government, or positions in industry, including institutions such as Duke, UCLA, the ETH-Zurich, the NIH and OHSU.

7. Other Information (optional)

N/A

8. Analysis and Conclusions

8.1 What are the strengths and achievements of the program’s faculty, students and graduates?

The goal for the BMB program is to train students who can think independently, produce scientific research and actively analyze it, and then describe their findings to the public. We feel our students’ excellent time-to-degree, publications, and capabilities to rapidly find positions after graduation demonstrate the quality of our training program.

Examples of this success include the fact that BMB students were first-authors on 19 publications, including manuscripts published in prestigious journals such as Science, Nature, EMBO, Virology, JBC and Biochemistry.

8.2 How will the self-study be used for improvement against goals and targets? How will it inform planning, decision making and allocation of resources and capacity for the next five years?

On the one hand, this self-study has confirmed to us that we are doing a good job training graduate students, especially given the decrease in direct resources into our program by the institution.

However, there is always room for improvement. Based on this self-study, we have identified a number of action items we will focus on to improve several areas in the future. These include:

Part 1. Introduction. Develop more specific mechanisms for collecting and utilizing student feedback.
Part 3. Faculty and Staff Resources. Work on ways to increase diversity outreach to underprivileged and URM communities. Best practices for doing so are currently under discussion.

Part 4. Enrollment/Degree Production. Continue our efforts to attract students to the BMB Graduate Program, for example, by continuing to give lectures at institutions with high undergraduate populations. We are also exploring opportunities to increase potential funding for more slots by maximizing revenue stream capture from external funding sources.

One of our concerns is that the decline in matriculation following integration of the BMB program into PMCB is a reflection of a biomedical mission highlighted by the umbrella program. The Quantitative Bioscience and Biomedical Engineering initiative will, it is hoped, allow us to better address the needs of the larger number of students applying to biochemistry graduate programs who are technically-oriented and will consider field of application later in career.

Part 5. Other Resources. Continue pursuing other options for external funding options, such as Training Grants.


8.3 What new resources and/or support do you need to achieve these goals and improvement targets?

More institutional financial support would be the most direct and effective way to achieve these goals.

9. Response to Previous Program Reviews

N/A.

10. Signature and Submission

The preparer's email address below acts as a signature verifying the report is complete and ready for submission.

Preparer's email address:

farrensd@ohsu.edu

Date Submitted:

11/12/13.

Date of Final Amendment:

1/16/14
BIOCHEMISTRY AND MOLECULAR BIOLOGY
GUIDELINES AND EXPECTATIONS FOR Ph.D. STUDENTS
(Years 2+)

These rules pertain to all students in the Department of Biochemistry and Molecular Biology (BMB). They are in partnership with the guidelines and requirements set forth by the Program in Molecular and Cellular Biosciences (PMCB), and the Graduate Council of the Oregon Health & Sciences University (OHSU) School of Medicine. All BMB students are responsible for reading this document.

The Ph.D. program is organized as follows:
Year 1: Complete PMCB requirements

Year 2
Complete the PMCB Qualifying Examination
Undertake the research leading to the Ph.D. thesis
Complete required and elective courses
Attend and participate in Departmental seminars and a journal club

Years 3 +
Create a Research Advisory Committee (RAC)
Advance to PhD candidacy
Continue research leading to the Ph.D. thesis
Attend and present research at Departmental Seminars and a journal club of choice closest to thesis work

REQUIRED BMB GRADUATE COURSES YEAR 2

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall/Winter/Spring</td>
<td>BCMB 605</td>
<td>Journal Club 3 courses</td>
</tr>
<tr>
<td></td>
<td>BCMB XXX</td>
<td>Elective credits 1 course</td>
</tr>
<tr>
<td></td>
<td>BCMB 607</td>
<td>Departmental Seminar Series 3 courses</td>
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<td></td>
<td>CON 665, 667 &amp; 668</td>
<td>Two of these courses must be taken in Year 2 if it was not selected during Year 1 as part of the PMCB required courses 3 credits</td>
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<tr>
<td></td>
<td>BCMB 619</td>
<td>Mol. &amp; Biochem. Basis of Disease 1 credit*</td>
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<td>BCMB 601</td>
<td>Research 11 - 14 credits/term</td>
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REQUIRED BMB GRADUATE COURSES YEAR 3

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<th>Term</th>
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<tr>
<td>Fall/Winter/Spring</td>
<td>BCMB 605</td>
<td>Journal Club 3 courses</td>
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<tr>
<td></td>
<td>BCMB XXX</td>
<td>Elective credits 2 courses</td>
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<td></td>
<td>BCMB 607</td>
<td>Departmental Seminar Series 3 courses</td>
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<td></td>
<td>BCMB 619</td>
<td>Mol. &amp; Biochem. Basis of Disease 1 credit</td>
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<tr>
<td></td>
<td>BCMB 601</td>
<td>Research 11 - 14 credits/term</td>
</tr>
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</table>

Summer Terms
BCMB 601 Research 16 credits

*If course not offered substitute one elective course
BMB SPECIFIC COURSE REQUIREMENTS

Students are required to register for, attend and present their thesis work annually in the Departmental Seminar Series, BCMB 607, held Tuesdays at noon as well as attend a Journal Club, BCMB 605 (Years 2 through end of program).

If a student wishes to be excused from taking a required course, the student and advisor should jointly petition the Graduate Curriculum Committee stating their reasons for wishing to be excused from the requirement. The curriculum committee will decide the issue by a majority vote.

Only course work (required and elective), and not research, journal club or seminar credits, will contribute to the GPA. Students must receive a grade of A or B in the required courses specified in this document. If a student does not receive an A or B, the student must repeat the course the following year. The course can be repeated one time only. Failure to receive an A or B the second time will result in dismissal from the program. The required courses for which this rule applies are CON 650, 661, 662, 663, 664, 665, 667 and 668. The grade of Incomplete is reserved for circumstances in which a student is unable to complete the course requirements the end of the term in which the course is offered due to circumstances beyond their control (i.e. illness) AND it is possible to fulfill the remaining requirements within the subsequent term to earn a grade.

If a graduate student fails a semester of research credits (i.e. receives No Pass (NP) on research), the student is put on immediate academic probation. The student is required to obtain a passing grade on the next term (and subsequent terms) of research credits or the student may be dismissed from the BMB graduate program.

A pre-qualifying graduate student is required to notify and meet with his/her mentor, Graduate Program Director (GDP) and Graduate Program Coordinator (GDC) immediately upon receiving a failing grade on the research credits in any one term. The GDP will suggest a course of action that the student must follow in correcting his/her academic performance.

A post-qualifying graduate student (in consultation with his/her mentor, GDP and GPC) is required to schedule a Research Advisory Committee (RAC) meeting immediately upon receiving a failing grade on his/her research credits in any one term. This RAC meeting must take place within two weeks of receipt of the failing grade on the research credits. The mentor and RAC will suggest a course of action that the student must follow in correcting his/her research programs.

The courses BCMB 605 Journal Club and BCMB 607 Seminar require documentation of attendance in order to be considered for the grade of ‘Pass.’ A total of 3 absences are allowed per term. A graduate student missing more than 3 will receive a grade of ‘No Pass’ and will be placed on immediate academic probation. The student must receive a ‘Pass’ the subsequent term and every term thereafter. Following the receipt of the first ‘No Pass,’ a pre-qualifying exam student must immediately meet with their mentor, GDP and GDC. A plan for insuring the attendance goal for the next term should be designed. Two grades of ‘No Pass’ in either of these activities disqualifies a student from taking their qualifying exams, resulting in dismissal from the BMB graduate program. If a student who has advanced to candidacy receives two grades of ‘No Pass’ in either activity they may be dismissed from the BMB Graduate Program.

Elective Courses: A total of 3 elective courses are required to be eligible for the Biochemistry & Molecular Biology Ph.D. degree. Students are strongly encouraged to start taking at least one elective course no later than winter term of their second year. The following are only a few of the popular electives taken by the graduate students in BMB. Other courses available are listed in the course catalogue and graduate students are encouraged to speak to their mentor and/or GDP when considering taking other courses. Some of the elective courses are offered every other year, relative dates are noted below:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits/Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCMB 620</td>
<td>Biochemical &amp; Biophysical Properties of Membranes</td>
<td>2 credits/Winter Term</td>
</tr>
<tr>
<td>BCMB 628</td>
<td>Protein Crystallography</td>
<td>2 credits/Winter Term</td>
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PH.D QUALIFYING EXAMINATION
The purpose of the Qualifying examination in BMB is two-fold. First the examination will determine if the student has acquired sufficient knowledge and skills to pursue his or her Ph.D. thesis work. Second, the exam will provide the student with the opportunity to practice the preparation of a research proposal. Before taking the candidacy examination, the student must have completed the BMB course requirements. In the event that a course is not offered before the end of the second year, and the student is otherwise prepared to take the candidacy examination, the examination may proceed without completion of the course and with approval from the Graduate Education Committee. However, the required course must be taken prior to the thesis defense.

Format of the Examination:
Note: BMB guidelines are in accordance with PMCB written guidelines with minor differences that are outlined and bolded.

Oral examination: The oral examination will probe the breadth of the student’s knowledge and also the depth of the student’s understanding of his/her research proposal. The student is expected to begin the oral examination by giving a short (20-30 minute) formal presentation summarizing the written proposal. Audio-visual aids may be used. Questions from the Qualifying Examination Committee should focus primarily on issues pertaining to the proposal; however, the student is responsible for all areas of cellular and molecular biology that have been covered during the first two years of graduate study. Therefore, students also should expect questions on general knowledge in addition to questions relating to the scientific background pertinent to their areas of specialization, as well as more general issues related to the proposed experiments. Student should be prepared to discuss the rationale for the proposed study, the strengths and limitations of the proposed experimental strategies and the potential pitfalls and alternative.

Written examination: The qualifying examination will consist of written research proposal prepared by the student within his or her general area of research, but not directly on the student’s research project, followed by an oral examination. The proposal should use the general format of the "Research Plan" section of an NIH RO1 (http://grants.nih.gov/grants/funding/phs398/phs398.html). The research plan should have the substance and content, including original thinking, appropriate for such an application. That is, it shall have the following sections:

1. Specific Aims
2. Background and Significance
3. Experimental Design and Methods
4. Literature Cited

The significance, feasibility and the relationship of the proposal to current literature will be important criteria for evaluation. The reference listings must include citations of original papers from the literature. Website addresses may be included as a supplement. The total length of the proposal is limited to 10 single-spaced pages using a 12-point font and/or no more than 15 characters per inch and ½ inch margins. Proposals submitted in an inappropriate format will be returned to the student for reformatting, which will delay the qualifying examination.

Before embarking on preparation of a research proposal, the student will submit two abstracts of approximately 300 words each to the Graduate Student Coordinator (GSC). The abstracts should describe specific research problems which have been designed by the student and which may be related to but not directly on the student's thesis research project. Abstracts will be reviewed and the Qualifying Examination

Committee (QEC) will select one topic for development. If the QEC deems none of the proposals suitable, the student will present additional proposals in a time frame designated by the QEC.

During the preparation of the proposal, the student is encouraged to seek constructive criticism by others, however excluding the thesis advisor. During the oral examination, the student will be expected to make a 20-30 minute presentation of the research proposal, which will be followed by questioning that may cover all areas of biochemistry and molecular biology relating to the proposal.

**Defined Categories:**
- Pass (unconditional)
- Pass (conditional)
- Fail (Retry)
- Fail (Final)

Students who pass the examination conditionally will be required to complete additional work (e.g. rewriting of the proposal, re-examination by the Examination Committee on basic knowledge). The additional work, and date by which it must be completed, will be specified in writing by the chair of the Examination Committee. Upon the recommendation of the Examination Committee, a student who fails the candidacy examination may be given the option of taking a second examination. The second Examination Committee will either pass the student or recommend that the student not be admitted to candidacy for the Ph.D. degree.

**Timing of the Examination**
Each student is expected to complete the qualifying examination by no later than the end of the summer term (this is not true for a re-examination) of their second year in the program, in compliance with the PMCB requirements.

On or before **July 13** of their second year, students must submit two abstracts to the Graduate Student Coordinator.

**July 19:** the Graduate Program Director will select a Qualifying Examination Committee (QEC) responsible for conducting the student’s qualifying examination. A chair of the QEC will be designated. The student is notified of the names of the panel members.

**July 26:** The QEC notifies the student in writing of selection of the examination topic and the acceptance or of any weaknesses or specific suggests for improvement to their proposal.

**August 6:** students must have their examination dates scheduled. Examinations must be completed at least ten days before the beginning of the Fall term.

Students submit their final written proposal to the QEC and their thesis advisor at least one week prior to the Examination date. Students must submit a letter to the QEC from their thesis advisor describing the advisor’s role during preparation of the proposal (see “Role of Thesis Advisor and Other Faculty” in the PMCB guidelines).

A student who is asked to repeat the candidacy examination will be expected to do so within 2 months of the initial examination.

**Examination committee**
The Graduate Program Director will appoint a 5-member examination committee for each student based on the topic to be presented by the student and, as they see fit, the nominations of the student involved. **Names of the examiners nominated by the student should be submitted to the Graduate Program Director together**
with the abstracts of his or her proposals. The student's thesis advisor may not serve on the examining committee, but may attend the examination as an observer.

RESEARCH ADVISORY COMMITTEE
Purpose: The purpose of the Research Advisory Committee (RAC) is to advise and oversee the progress of the student’s entire graduate education and training. The Committee should be composed of two or more primary faculty members of the Department of Biochemistry and Molecular Biology, and faculty members with primary appointments outside of BMB with appropriate research expertise, to total four members. The Chairperson of the committee cannot be the Student’s Research Advisor (mentor). If the focus of the student’s research changes, then appropriate changes of personnel in the RAC can be made. The RAC should advise the student in matters of curriculum requirements and research objectives. The RAC will determine whether the required coursework has been taken and may recommend additional coursework pertinent to the specific research goals. Members of this committee may also serve subsequently on the Thesis Examination Committee. In this way, these faculty members will be familiar with research, and will have the opportunity to communicate possible concerns they may have about your work early to allow time to address these concerns. RAC meetings usually involve an oral presentation by the student of thesis research goals and progress.

Forming the Committee: Immediately following passing the qualifying exam, students in consultation with their mentor should construct a Research Advisory Committee. Students must meet with their RAC within 6 months of passing the Qualifying Examination and every 9 months to one year following the first meeting. It is the responsibility of the student to organize and schedule these meetings.

The First Meeting: Students are encouraged to form their RAC as early as possible, but the first formal meeting must be held by the end of Winter Term in the student’s third year. At least one week prior to the first meeting, the student will be expected to send the Committee Members an updated half-page description of his/her immediate research goals, a copy should also be sent to the Graduate Program Coordinator (GPC) along with a list of the RAC members and the RAC meeting date. At the first meeting, the student will present a 5-minute introduction to the research problem and one member of the committee will be selected to serve as chair of the committee. It is the responsibility of the student to schedule this meeting.

Subsequent Meetings: The RAC will meet every 9 months to one year, or more frequently if deemed necessary. The student will update the committee on the progress made toward the research objectives and the completion of required coursework. At least one week prior to the meeting, the student will be expected to send the RAC members and the GPC an updated summary that should be no more than three pages. The meeting will begin with the student giving a 15-minute overview of his/her more recent results and future directions. Following each committee meeting, the chair should prepare a brief memo evaluating the student’s progress and send it to the GPC.

Final Meeting: Three to four months prior to anticipated thesis defenses the student would have a RAC meeting to obtain approval for the beginning of thesis writing.

Advancement to PhD Candidacy: Students will advance to PhD candidacy once they have passed their qualifying examination and have formed their RAC.

Stipends: Students in BMB receive a monthly stipend for living expenses. Students will receive an increase in their stipend payment only after they have passed their qualifying exam, formed their RAC and submitted the Adv. to Candidacy form to the GPC. The increase will begin the month following submission of the form.

Non-compliance: Non-compliance can and will result in the revocation of certain Departmental privileges (e.g. Student’s Departmental e-mail account), academic probation and possible dismissal from the graduate program.
BMB Preparation and Submission of Thesis: All instructions and guidelines adopted by the Graduate Council By-Laws shall be carefully followed.
### OHSU BMB Graduate Program, student report September 2003–February 2013

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<tr>
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<th>URM</th>
<th>Date matri (PMC B)</th>
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### Appendix 2

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<td>A denuded anterior segment model for transplantation of differentiated iPSCs as a therapeutic strategy for glaucoma</td>
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<td>201101</td>
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<td>1. Substrate inhibition of Ura61 Phosphoribosyltransferase by Ura61 Can Account for the Ura61 Growth Sensitivity of Leishmania donovani Pyrimidine Auxotrophs.</td>
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<td>201200</td>
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<td>1. Dynamics of Arrestin-Rhodopsin Interactions: Identification of Two Distinct, Separate Sites on Arrestin that Interact with TM6 on Rhodopsin. Sinha A., Jones, A., Fay, J., Schafer, C. and Farrens D.I. Biochemistry. (In press.)</td>
<td><a href="mailto:schaferc@ohsu.edu">schaferc@ohsu.edu</a></td>
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The mechanism by which a propeptide-encoded pH sensor regulates spatiotemporal activation of furin.


2. Propeptides of eukaryotic proteases encode histidines to exploit organelle pH for regulation.


Hadd, Andrew C 2


Hadd@ohsu.edu

Rauch, Benjamin J 2

1. Transfer from CDB to BMB
2. Transfer student from outside OHSU

Martin, Gregory M

1. Transfer from CDB to BMB
2. Transfer student from outside OHSU

1 total (3 transferred out, one got MS) total (3 transferred out, one got MS)

Average 6.06 67 total, 19 first author 2.9
Appendix 3. BMB Graduate Students (current)

Johannes Elferich, BS- U. Munich. 
Shinde Lab

Andrew Hadd
BS – U. Colorado, Boulder. 
Perona Lab

Amber Jones-Hackathorne
BS - Evergreen State College 
Farrens Lab

Jessica Martin
BS - Washington State University 
Ullman Lab

Nathan Montgomery
BS - University of Oregon 
Bachinger Lab

Ben Rauch
BS - Skidmore College 
Perona Lab

Chris Schafer
Michigan Tech. 
Farrens Lab

Danielle Williamson
BS - Whitman College 
Shinde Lab
Academic Program Review Rubric

Program Name: Biochemistry and Molecular Biology

Review Date: 5/29/2014

APR Committee Reviewers: Paul Gorman, Joanne Noone, Margaret Scharf

1. INTRODUCTION

☑ 1. Early Development:
Process is incomplete, omitted dates of meetings or voting record; self-study compiled primarily by program head or a senior faculty member; little faculty and staff input; no input from students or other stakeholders.

☐ 2. Developing:
Process is complete, with dates of meetings and record of faculty vote; but engagement of stakeholders is narrow.

☐ 3. Highly Developed:
Process is complete, with dates of meetings and voting record; engagement of faculty, staff, students and other stakeholders is broad and collaborative.

Reviewer’s Comments:

Commendation: Evidence of monthly faculty meetings.

Recommendation: Demonstrate more stakeholder engagement. Once student lunch sessions were canceled, what method were implemented to insure student feedback is being collected.

2. OVERVIEW

☐ 1. Early Development:
Overview is incomplete; program has not created MPGs or MPGs are not aligned with university MPGs.

☑ 2. Developing:
Program has established its own set of MPGs unique to the program, but MPGs are not aligned with university MPGs.

☐ 3. Highly Developed:
Program has established its own set of MPGs unique to the program, AND are aligned with university MPGs and stated clearly and concisely.

Reviewer’s Comments:

Commendation: Strong evidence that the program is dedicated to rigor and producing ‘thinking’ graduates; program outcomes match well to core competencies.

Recommendation: Provide a purpose statement; goals need to be more explicit for the degree.

Comment: The committee is aware of the Graduate Studies endeavor to create and adopt uniform SLO’s across all PhD programs, is there a way within those uniform SLO’s to illustrate more program-specific outcomes?

3. FACULTY AND STAFF RESOURCES
1. Early Development:
No discussion of faculty trends that affect program development and faculty diversity; no succession planning (recruitment, retention, retirement, needs) is evident. Temporary/adjunct faculty teach majority of the courses in the curriculum. Program does not avail itself of academic and student services.

2. Developing:
Discussion of faculty trends; preliminary planning for program development, faculty diversity recruitment and retention. All courses are taught by highly qualified faculty. Program uses academic program services to a limited extent.

3. Highly Developed:
Explicit planning for program development based on faculty diversity and recruitment/retention needs. Supporting data used in planning. All courses taught by high quality faculty current in the field. Program draws upon relevant academic and student services to increase program effectiveness.

Reviewer's Comments:
Commendation: Narrative indicates a highly qualified faculty
Recommendation: Complete the faculty tables (3.1 and 3.3) to provide more detail information about faculty qualifications and duties; identify issues and/or resource constraints faculty are facing, if any, and if not, state that.

4. ENROLLMENT/DEGREE PRODUCTION

1. Early Development:
No analysis of program enrollment and degree production in the context of program development, capacity and sustainability. No discussion of student diversity and plans to increase student diversity to achieve core theme objectives. Static curriculum unreflective of changes in the field. Courses are not integrated into a coherent whole and do not reflect student needs. No discussion of curriculum to reflect current practice in the field, changing student needs or changing employment conditions.

2. Developing:
Curriculum appears to reflect current practice in the discipline. Uses some rudimentary analysis of trends in enrollment and degree production in the context of program quality and sustainability. No discussion of employment projections or prospects for program graduates. Some discussion about student diversity and planning for recruitment.

3. Highly Developed:
Innovative, dynamic curriculum; program development based on data about student performance and developmental needs. Well-developed and successful plans for student diversity recruitment, retention and success. Data analysis reflects trends and understanding of both internal and external forces. Informed by comparison to peer universities.

Reviewer's Comments:
Commendation: Graduate outcomes and professional post-program placements are strong.
Recommendation: Work on creating a more articulate plan for recruitment participation within the PMCB structure; provide more data and analysis in this section.

5. OTHER RESOURCES

1. Early Development:
No discussion about resource adequacy. No 5-year planning for resources. Does not identify needs or priorities. Does not identify important contextual factors or extenuating circumstances related to resource planning.

2. Developing:
Preliminary discussion of the adequacy of resources; no resource planning for or identification of potential new revenue streams for the next 5 years. Identifies needs or sets priorities, but not linked to data. Limited discussion of context and
extenuating circumstances affecting resource planning.

3. Highly Developed:
Detailed analysis of resource adequacy for the 5-year period; uses data to identify program needs and priorities. Developed understanding of unique program circumstances affecting resource needs. Informed by comparison to peer universities.

Reviewer's Comments:

Commendation: Critical insight into program’s reliance on sophisticated instrumentation.

Recommendation: Create a 5-year plan for resources identifying revenue sources and diversification, and where resources are likely to become scarce.

6. STUDENT LEARNING OUTCOMES AND ASSESSMENT

1. Early Development: Program-level student learning outcomes vague and not measureable; courses or experiences required for the degree/certificate are listed but not linked to the SLOs; assessment methods are not identified; no evidence of faculty engagement in the discussion of assessment results to improve curriculum, academic support services, faculty development and the like.

2. Developing:
Program-level student learning outcomes clear and measureable, reflecting three learning domains (Bloom’s taxonomy) indirect and direct measures of learning are used; faculty committee discusses assessment results and uses results to improve curriculum and results; evidence of administrative support for assessment and resources for regular data collection. Some students are aware of the findings.

3. Highly Developed:
Program-level student learning outcomes are clear and measureable; uses direct measures of learning; courses listed and linked to SLOs (curriculum mapping); defined levels of learning; assessment results regularly discussed by faculty committee; evidence of administrative support, use of technology and regular data collection to support assessment. Most students are aware of the findings.

Reviewer's Comments:

Commendation: Publication rate per student is consistent.

Recommendation: Include the whole assessment plan to demonstrate how outcomes are measured and/or map student activities to outcomes; consider linking mandatory authorship to an SLO, to criteria for program completion; provide examples of intermediate level evaluation.

7. OTHER INFORMATION (OPTIONAL FOR PROGRAMS)

1. Early Development:
Additional information provided about the program did not contribute to the reviewers’ understanding of the program and its effectiveness.

2. Developing:
Additional information was relevant, but did not contribute significantly to the reviewers’ evaluation of program effectiveness.

3. Highly Developed:
Additional information enhanced the discussion of specific actions or changes to be taken in the next 5 years.

Reviewer's Comments:

N/A
8. ANALYSIS AND CONCLUSIONS

- **1. Early Development:**
  Discussion of strengths, accomplishments and improvements needed are superficial and not likely to lead to needed improvements over the next 5 years. Neither selected indicators for improvement, nor set targets; plan does not address curricular or program challenges ahead.

- **2. Developing:**
  Reflects spirit of continuous improvement; directions for next 5 years are reasonably developed; selected one indicator for improvement and set a realistic target; Core Themes considered.

- **3. Highly Developed:**
  Reflects spirit of continuous improvement and self-reflection; selected more than one indicator for improvement, but no more than three. Set reasonable 5-year targets for each; specific program/curricular changes are discussed and based on evidence and trends; Core Themes are directly addressed.

**Reviewer’s Comments:**

- **Commendation:** Identification of six targets to address over the next five years.
- **Recommendation:** Create a five year plan and identify specific ways to address target areas.

9. RESPONSE TO PREVIOUS PROGRAM REVIEWS

- **1. Early Development:**
  Program did not address or implement recommendations, nor give an explanation for not doing so.

- **2. Developing:**
  Program implemented some recommendations. Provides explanation for not addressing all.

- **3. Highly Developed:**
  Program effectively addressed most, if not all, recommendations or incorporated them into its current 5-year plan.

**Reviewer’s Comments:**

- N/A

10. OVERALL RECOMMENDATIONS

**Total Score (the sum of each section, totaling 9 - 27):**

| 10 |

**Does the sub-committee believe the program meets OHSU academic standards?**

- Yes  
- No

**Additional comments for Faculty Senate consideration.**

Overall the committee was impressed by the number of publications per student and the clear commitment to ensuring graduates are strong thinkers. The committee noted a general lack of analysis in the report and a sense of ‘apathy’.

Below are some specific recommendations for the program to consider moving forward:

- Utilize faculty in the report development
- Review a well-written APR report to better understand the spirit of process;
- Consider developing specific SLO’s MODIFYING uniform SLO’s and more clearly link learning to those SLO’s
- Articulate the vision for the program’s future
• Illustrate that the program is paying attention to the changing research environment