

Materials linked from the November 20, 2015 Graduate Council agenda.

Graduate Program in Biochemistry and Biophysics

Action Plan in Response to the Decennial Review (February 2015)

**Developed by the Faculty
of the
Department of Biochemistry and Biophysics**

Final Version Prepared by

Michael Freitag, Graduate Program Director
(freitagm@onid.orst.edu)

and

P. Andrew Karplus, Department Head
(andy.karplus@oregonstate.edu)

October 2015

1. Introduction

On February 15-16, 2015, the Department of Biochemistry and Biophysics (DBB) hosted the decennial review of its Biochemistry and Biophysics Graduate Program (BBGP). The review team was lead by Dr. Bertrand García-Moreno (Chair; Professor, Biophysics, Johns Hopkins University) and consisted of one additional external reviewer, Dr. Larry McReynolds (Senior Scientist, New England Biolabs), and two internal reviewers, Dr. Lisa Ganio (Professor, Forest Ecosystems and Society, OSU), and Dr. Donald Jump (Professor, Nutrition, OSU). The committee submitted its review to Oregon State University and the DBB in early spring.

We would like to thank the committee for their hard work and the overall excellent review. Addressing the key recommendations developed by the review panel will undoubtedly strengthen our BBGP. This action plan describes in detail how the faculty and students of the BBGP will address specific recommendations and how we plan to work together with the College of Science (CoS) and the University to improve the quality of the BBGP.

The review panel made 14 key recommendations that are listed below (Table 1). Several of these were broken down into more specific recommendations. The recommendations were not grouped in order of importance but rather followed the outline of the BBGP self study document. We will maintain this organization in our action plan and list the topic areas as appropriate.

The overall recommendation of the review panel is that the quality of the BBGP is very high and the it should be maintained as a program, and even possibly expanded, something the DBB strives to do. The executive summary states that “*OSU is fortunate to have a Department of Biochemistry and Biophysics (DBB) with a national and international reputation for world-class and original research on molecular mechanisms of living processes. Undergraduate (majors and non-majors) and graduate student and postdoctoral fellows receive outstanding classroom and laboratory training in the DBB,*” that “*The BBGP offers a curriculum of very high quality that has a measurable impact in programs and departments beyond the DBB. ... reviewers found the curriculum to be very strong, state-of-the-art, comparable to that of the best graduate programs in this field in the country*” and that “*courses ... are taught by top-notch, research active faculty.*”

In this light, we consider all of the recommendations made as expert advice offered to help us maintain and even strengthen the BBGP, rather than requirements that must be carried out for the program to be acceptable. Consequently, we have received the recommendations as valuable input and have not rejected any but devised goals and actions to put them into practice.

The review panel also provided a “SWOT” analysis of the BBGP, which is summarized here:

1. Strengths:

- (1) DBB is very strong, very democratic, supportive of youngest faculty members, doing well.
- (2) BBGP appears in very good health, vibrant, with very positive atmosphere. Faculty/students describe it as close knit community; everybody gets along, is accessible, interactions are good.
- (3) BBGP is positioned to participate in initiatives at OSU (big data, marine bio., material sci.).
- (4) DBB has some outstanding faculty who are extraordinarily committed to success of BBGP.
- (5) Grad students are happy, get excellent, personalized training, emerge very well prepared.

2. Weaknesses:

- (1) DBB lacks a strategic plan to articulate how BBGP fits within the vision for the COS.
- (2) Size (strength/weakness). BBGP doesn't need to grow but is not protected from fluctuations.
- (3) The graduate program is underfunded.

- (4) Graduate students need more career planning.
- (5) Graduate students take too many courses.
- (6) Ethnic diversity is lacking.
- (7) The research in BBGP does not receive the recognition within OSU it deserves.
- (8) The program would benefit from more research grants in the Department.

3. Opportunities:

- (1) Life sciences are undergoing a revolution, OSU has a very strong program in a critical area. Changes in biosciences should be reflected in offerings of BBGP. Opportunities for growth into new research areas would have a healthy impact on the BBGP.
- (2) BBGP should grow. New resources have to be dedicated to this end.
- (3) There is room for increased collaborations between Departments.
- (4) With minor tweaking of the curriculum the graduate students would be better served.

4. Threats:

- (1) Current funding climate requires safety net to protect against fluctuations (students/funds). The BBGP does not have a safety net and this perilous situation should be remedied at once.
- (2) Research is not recognized at OSU as important for teaching mission; BBGP not recognized. If the balance between teaching and research duties is not managed correctly, the research mission will suffer and so will the Department's reputation and ranking.
- (3) A move to centralize funding and other resources used to support graduate students would remove much needed flexibility from the graduate program. The model for the financing of graduate students needs to be clarified and probably reconsidered.

Table 1: Key recommendations for the BBGP submitted by the decennial review panel.

- **A vision and a long-term plan are needed:** The vision and the long-term plan for the DBB and the BBGP should acknowledge other efforts within OSU.
- **Improve diversity:** Efforts should continue to increase ethnic diversity in BBGP and in the DBB.
- **Increase financial support for graduate students:** Without increased financial resources the continued vitality and success of the BBGP and the ability of faculty to secure funding is threatened.
- **Identify new sources of funding for graduate students:** Efforts should be made to identify private and industry sources of graduate student funding.
- **New funding model for graduate students:** The Department's fiscal autonomy appears to be eroding and that is not in the best interests of the DBB, the BBGP, the COS, or OSU.
- **Tweak the curriculum:** The curriculum is highly successful, yet students would benefit from a few minor changes. Consider increasing the emphasis on computation. Take advantage of the entire wealth of courses across OSU. Examine carefully the merits and role of slash courses. Shift the emphasis away from courses (lower course requirements) and towards research.
- **Size and stability of the faculty:** The faculty need not grow, but the COS should help minimize the deleterious consequences of fluctuations in faculty numbers and productivity.
- **High impact hires are needed:** The faculty need not grow but a couple of high impact hires would be beneficial. The high initial cost would be offset by visibility and long term benefits.
- **Increase collaborations within COS and beyond:** Practice selective excellence within the DBB and the BBGP, and achieve breadth through collaborations across campus.
- **Raise more research funds:** Incentivize the faculty to seek research funds aggressively.
- **Improve the balance between teaching and research:** If teaching loads are unreasonable, the research mission will suffer.
- **Develop research infrastructure:** Some of the financial burden of the research infrastructure should shift to the administration. State-of-the-art research requires state-of-the-art infrastructure and in the current funding climate individual investigators will be unable to develop the necessary infrastructure on their own.
- **Facilitate submission of grant proposals:** Administrative support is urgently needed to facilitate the preparation and submission of grant proposals.
- **Raise the profile of BBGP:** A regular symposium at OSU should be organized to raise the profile of the program nationally and within OSU.

2. Action plan to address review panel recommendations for the BBGP

While there is some overlap between recommendations we will address each in order of appearance in the review submitted by the panel.

2.1. Mission (recommendation 1)

Recommendation #1: A vision and a long-term plan are needed

The Department and the Program stand to play a central role in biological sciences at OSU, but the Department in particular needs to articulate a clearer vision for itself and this has to be reflected in the Program. They need to develop a long-term plan to describe where they want to be in ten years in terms of size of faculty, number of students, areas of expertise represented in the DBB and the BBGP.

Goal: The DBB will formulate a ten-year vision and strategic plan.

Actions: The DBB started discussions for a new Strategic Plan in 2013, met weekly informally during spring 2014, spent much of the 2014 faculty retreat with an outside expert and some of the 2015 faculty retreat with CoS Dean Pantula to discuss DBB and the developing CoS strategic plans. Some goals have crystallized based on these discussions. At our Fall 2015 faculty meeting we formed a Strategic Planning Committee (Perez, Mehl, Ahern, Johnson, Beckman, Barbar) that is charged with guiding the development of the plan.

Further actions include (a) to continue planning discussions during weekly brown-bag lunch meetings, (b) to seek additional input (from DBB faculty, CoS, OSU, externally), and (c) to use the faculty survey (2014), retreat notes, and the existing SWOT (“strength, weaknesses, opportunities, threats”) analysis to formulate a “white paper” by spring 2016.

Metrics: A “white paper” draft is ready by the 2016 spring faculty meeting, a second draft is ready by the 2016 fall faculty retreat, and the final Strategic Plan will be completed by January 2017.

Fall 2018 target for metric: A formal 10-year Strategic Plan for the DBB and the BBGP will be in hand to guide future program development.

2.2. Recruitment, enrollment, selectivity, quality of students (recommendation 2)

This section encompasses the bulk of any program self-study document. All topics received very positive reviews. The sole recommendation in this topic area is to address diversity issues.

Recommendation #2: Improve diversity

The program has worked hard and succeeded at maintaining a balance of male and female students. The Chair and Graduate Program Director noted the difficulties of identifying students from groups underrepresented in STEM, and agreed with the review panel that accepting students without adequate preparation for their program is problematic. We recommend continuing efforts to recruit from under-represented groups, but we also support the philosophy that the acceptance bar must be kept high for all. The BBGP should try to develop relationships with colleges or universities, perhaps in neighboring California that could be a source of talented graduate students from underrepresented groups.

Goal: The DBB will increase the diversity in the BBGP.

Actions: Increasing the diversity of the DBB as a whole and BBGP specifically has already been a concrete goal of the DBB, and diversity has increased both in the student body and among

faculty, where gender is now more balanced, and more diverse places of origin and education are represented.

Further actions that we will take to increase the diversity of the BBGP are (a) to seek to roughly maintain our number and diversity of international students, (b) to send recruiting representatives to Pacific Northwest undergraduate institutions with higher underrepresented minorities (URM) populations, (c) to send recruiting representatives to annual meetings for URM in STEM fields interested in graduate study (such as the Society for the Advancement of Chicanos and Native Americans in Science - SACNAS), (d) to continue to target research awards to OSU URM undergraduates and actively recruit strong candidates into the BBGP, and (e) to include URM and women seminar speakers in our departmental seminar series.

Metrics: One set of metrics will be the percentages of students entering the BBGP and awarded MS or PhDs that are women, URMs, and international students. Another metric will be the number of recruitment trips made by faculty or students dedicated to increasing URM diversity (SACNAS or similar). A third metric will be the number of URM and women speakers in our seminar series.

Fall 2018 target for metric(s): Targeted percentages of doctoral students in the BBGP are ~50% women, 10% URM, and 15% international, with the URM population rising to 15% (i.e., one of seven students in each incoming class) by Fall 2020.

3. Level of financial support (recommendations 3-5)

Several recommendations pertain to this topic but they are addressed here in combination because they are interconnected. The review panel found that the funding model for the BBGP as instituted by CoS is unclear - saving or maintenance of discretionary funds was discouraged, and that the BBGP relies too much on external (i.e. grant) research funding. A safety net to maintain reliable student and faculty numbers is needed. The panel strongly suggested that an updated funding model will “pay for itself”.

Recommendation #3: Increase support for graduate students

The continued vitality and success of the BBGP depends on increased financial support for its graduate students. The goal is to allow for a larger number of students to be recruited and to decrease the number of years that students need to be paid from research grants. Graduate students should be encouraged to seek support from NSF and NIH pre-doctoral fellowships. This should be done in an organized manner and with close faculty supervision to maximize chances of success.

Recommendation #4: Identify new sources of funding for research/graduate students

A task force should work to identify non-federal sources of funding (e.g. industry, private foundations) to fund graduate student fellowships and research projects. These interactions might require the presence of the COS to protect freedom to publish and a discussion of patent rights, etc. Alumni of the DBB should also be tapped, especially for targeted fund raising for graduate student fellowships, as suggested by A. Karplus.

Goal: Increase overall support for graduate education (stipends, research and equipment funds) by (1) improved success with investigator-initiated grant applications at professorial, post-doctoral and pre-doctoral levels, (2) targeting graduate support as a main fundraising priority and (3) stable CoS-derived GTA-support. This will address both recommendations.

Actions: In the past three years the BBGP has taken advantage of several new OSU fellowships

(e.g., Provost Fellow- and Scholarships, ARCS scholarships), and a new annual Chris and Kate Mathews Fellowship was awarded for the first time in Fall 2015. Development of long-term training grants within DBB alone is deemed exceedingly difficult because traditional programs at NIH and NSF (eg IGERTs) have been discontinued and no longer serve to support student research activities. This does not preclude development of opportunities with different departments or universities. DBB encourages these possibilities but we are reluctant to include them as action items. One major goal is to win more student-initiated predoctoral fellowships. Toward this end, we are starting this Fall (2015) to focus a first-year graduate student course on proposal-writing with the goal of having some students submit an NSF proposal during their first term and others to be ready to prepare and submit proposals shortly after they choose a lab to work in at the end of their first year. A website listing past and current fellowship opportunities in reverse chronological order will be set up. This site will be maintained by the “Fellowships Coordinator” from the BBGP Graduate Student Association and the Graduate Program Director.

Further actions that will be taken include: (a) improve communication with DBB alumni and friends through annual newsletters to help attract philanthropy in the form of unrestricted donations and graduate student support, (b) identify alumni that are engaged in research or industry that overlap clearly with research done in the BBGP with the goal of developing industry-sponsored fellowships, and (c) work with CoS to have stably funded GTA lines related to the teaching needs of the department.

Metrics: Two metrics will be the fraction of doctoral students submitting a predoctoral proposal by the start of their third year as well as the fraction of students winning student-initiated predoctoral fellowships. Other metrics will be departmental newsletters sent out, the numbers of conversations had with potential donors and industry partners about their philanthropic interests and goals, and the number of stably funded GTA lines.

Fall 2018 target for metric(s): More than 60% of BBGP doctoral students starting their third year will have submitted a pre-doctoral fellowship proposal and more than 5% of BBGP students in years 2-4 of the program will be supported by a student-initiated multi-year fellowship, raising to 10% by Fall 2020. Also, the webpage listing relevant fellowship opportunities will be present and maintained. Three annual newsletters will have been sent out and at least three contacts will have been made with a donor or industry partner with conversations about establishing a long-term graduate fellowship. There will be ≥ 8 stable CoS-funded GTA lines coming to the DBB. In the longer term, we further anticipate that our adding an undergraduate “Biochemistry and Molecular Biology” major will increase our needed GTAs by 2-3 annually.

Recommendation #5: Create a safety net with a new funding model

There is confusion as to how students in BBGP are funded. A centralized mechanism for funding of the BBGP should be avoided so Departments can retain as much financial autonomy as possible. This is necessary to protect BBGP from the vagaries of our current funding climate, and to allow the program to stay nimble and strong. Separate handling of budgets for graduate student support and for other expensive endeavors (e.g. start up packages) are recommended; otherwise the situation will lead into an unproductive zero sum game.

Goal: Develop and maintain a safety net for the BBGP research active faculty and graduate students.

Actions: We completely agree with the review panel regarding the need for a safety net for graduate education. However this is also a major challenge. Using the autonomy we have had in

the past and a variety of creative solutions, we are pleased that we have been able to provide funding for every graduate student in the program who has maintained satisfactory academic progress. Although the recommendation is to avoid a college-centric funding mechanism, this decision is beyond our control and is one that CoS has adopted, so that DBB-generated “income” flows to CoS and is re-distributed according to strategic priorities. Thus, some of the specific ideas of the panel will not be easily realized. However, as noted above the DBB has a demonstrated need for consistent GTA lines and we now expect to maintain a higher number of such *guaranteed* GTAs per year than in the previous decade. Although most GTA slots are given to first year students, in line with the recommendation to provide a safety net some of these GTA positions will be reserved for students beyond their first year in laboratories of DBB faculty that have a funding gap and are actively pursuing further funding. Also, we will work with the college to preserve salary savings based mechanisms for creating a safety net and to devise a more formal college-wide CoS centered mechanism to provide bridging funds to support faculty and students through funding gaps.

Metrics: Our metric will be the fraction of doctoral students in the program making satisfactory academic progress who are receiving full funding. A second metric will be whether a CoS centered mechanism exists for research active graduate faculty to receive bridging funds to maintain their programs through funding gaps.

Fall 2018 target for metrics: In terms of funding of students, the target we have achieved over the previous decades has not changed: we aim to fund 100% of doctoral students who show satisfactory academic progress. For the second metric, we will consider it a success if one formal mechanism exists at the college level for graduate faculty to obtain bridging funds.

4. Curriculum (recommendations 6-12)

The key recommendation in this section was to “*tweak the curriculum*”. This includes specific recommendations #6 to #12, all addressed separately here.

Recommendation #6: Standardize syllabi

A standard format based on the minimum syllabus requirements outlined by OSU’s Office of Academic Planning and Assessment should be used.

Goal: Standardize syllabi.

Actions: The standardization has already been achieved as of Fall 2015. Also, a new process will be put in place whereby a complete set of current syllabi will be posted on the DBB webpages.

Further actions are to maintain syllabi updated according to the changing guidelines posted at <http://oregonstate.edu/admin/aa/apaa/syllabus-minimum-requirements> or any other new URL that may appear within the coming years.

Metric: Syllabi meet standard criteria and most recent versions are available online.

Fall 2018 target for metrics: 100% of syllabi will meet minimum syllabus requirements

Recommendation #7: Program competencies

Program competencies should be listed on the BBGP website with web links to syllabi.

Goal: Program outcomes (or “competencies”) will be listed and linked to course syllabi page.

Action: This has been done. Program outcomes are available online from the DBB webpage at <http://biochem.science.oregonstate.edu/content/biochemistry-and-biophysics-graduate-degree-program-outcomes>. Further actions to be taken include a regular update of the program outcomes

(as part of the annual reviews required by the Graduate School).

Metric: Current program outcomes are accessible online.

Fall 2018 target for metrics: 100% BBGP outcomes will be accessible online.

Recommendation #8: Assessment

The committee recommends more formal evaluation mechanisms, including the delivery of written assessments and recommendations to the students on a yearly or a biyearly basis.

Goal: Formal assessments will be done on an annual basis.

Action: In current practice, students and their committee need only meet at the first program meeting, the preliminary exam, and the defense. We greatly appreciate the value of this recommendation and have in response already instituted a formal requirement for annual meetings, beginning in 2016. The detailed requirements to be worked out will be modeled on the current requirements of the MCB program and will involve having students develop a 1-2 page “progress report” with their accomplishments and the next year’s plans and a short presentation to go with it. After the meeting, this report with the agreed upon goals for the next year will be filed with the BBGP office. Meetings will be scheduled by the student and the Graduate Program Director will track compliance with the policy; also timely reminder emails will be given to the students.

Metric: One metric will be the existence of a formal policy with relevant forms available online; A second will be the fraction of students having documented annual meetings.

Fall 2018 target for metrics: 100% compliance students enrolled since Fall 2015.

Recommendation #9: Fix slash courses

The utility and success of the slash courses should be examined to make sure that they work as intended.

Goal: Assess success of the slash courses.

Action: For most BBGP students the only slash courses are three courses in Biochemistry (BB590/591/592) and Biophysics (BB581/582/583). These courses also serve the students enrolled in the BB undergraduate major. For the past five years, the Biochemistry series has become more rigorous since the courses no longer serve a large number of students bound for professional studies, especially Pre-Pharmacy. Nevertheless, we will assess how these courses are meeting their objectives by instituting anonymous pre- and post-tests into each course. We will also track grades in the six classes to correlate them with success in the program (i.e. graduation with either MS or PhD and time spent in program). For the graduate students in slash courses the material is the *minimum* knowledge that is required for satisfactory academic progress – two grades of B- result in dismissal from the program. It seems natural that some students feel they are more advanced but selected topics classes later in the program will build on a solid foundation acquired in the core courses.

Metric: The existence of and use of graduate course specific version of the pre- and post-tests for each course.

Fall 2018 target for metrics: 100% compliance of courses and full cycle assessment available for AY17 and AY18.

Recommendation #10: Greater emphasis on computing

The DBB is encouraged to develop courses in introduction to computing, to enhance the student’s comfort level with computational and quantitation. If done right, the utility of these

courses could expand beyond the boundaries of DBB and BBGP and become courses useful to students in other programs. This might provide a source of TAship revenue that would allow the BBGP to increase the number of graduate students in the program.

Goal: Deliver courses with biocomputational and bioinformatics content.

Actions: The recommendation stems from student responses to the survey we conducted. Already recognizing this need for solid bioinformatics training, two additional classes in BBGP have been added in the last couple years: one on programming and molecular modeling and the other on bioinformatics. Also, additional cross-listed graduate standalone and slash courses are being developed in other programs in CoS and at OSU in general. We will work to ensure coordination of these course offerings to avoid duplication, and will make BBGP students aware of relevant courses from other units by listing them on the BBGP curriculum web site.

Metrics: Number of computational/quantitative graduate level courses offered by our program or others.

Fall 2018 target for metrics: Graduate classes on biomolecular modeling and bioinformatics will be offered by DBB either on an annual or biannual basis. A complete list of relevant courses from other departments will be available on the BBGP web site.

*Recommendation #11: Minimize the number of courses required of graduate students
In a Ph. D. program the real learning takes place in the research laboratory. The number of required courses should be kept in check, and under no circumstances should the number of credit hours be used to give shape to programmatic requirements. This is not in the student's best interests.*

Goal: Limit the number of required non-blanket credits to 27.

Actions: Compared to other programs nationwide OSU requires what is considered an excessive number of courses from all graduate students. This reduces our ability to compete in recruiting students and also increases the residence time in the program. The BBGP will seek a variance through the appropriate channels similar to the solution that was found for the Graduate Program in Chemistry.

Metric: Number of credits required for completing a BB doctoral degree.

Fall 2018 target for metric: Only 27 non-blanket credits will be required for completing a doctoral degree in the BBGP

*Recommendation #12: Course-sharing across OSU
It was not obvious that the graduate students are taking full advantage of courses offered across OSU. This ought to be encouraged.*

Goal: Provide information about all courses relating to topics in the BBGP on the DBB webpage.

Actions: To ensure that students and faculty are aware of current course offerings at OSU that would be useful to graduate students in the BBGP, courses will be listed on the DBB webpages listing the BBGP curriculum and courses. Course numbers and titles will be clickable links to the appropriate course descriptions. This page will be updated annually under the direction of the Graduate Program Director.

Metrics: Web site listing of BBGP and other relevant course offerings at OSU.

Fall 2018 target for metric: The BBGP-relevant courses web page will be active and up-to-

date.

5. Personnel (recommendations 13-16)

Recommendation #13: Stability and Size

The size of the faculty in the DBB should be maintained or even allowed to grow modestly. Under no circumstances should it be allowed to become a smaller Department. Retirements should be handled with immediate replacement of the faculty. OSU needs to be very aggressive on this front. Even a one year hiatus on replacement can have a deleterious effect that lasts for years. Growth of the faculty cannot happen at the expense of an increase in the number of graduate students.

Recommendation #14: Impact hires

To improve national visibility and stability, the next set of hires should focus on high profile and high impact hiring. Scientists with a strong national reputation need to be hired. It is initially expensive but it pays off by improving research support for the Department, enhancing overhead for the university, and increasing national prestige. This high level hiring should be guided by the 10 year strategic plan for the Department.

Goal: The number of faculty will be maintained or increase slightly, especially considering the addition of a new undergraduate major.

Actions: Because of recent hires the DBB is currently at a reasonably healthy size. Over the next ten years we expect some retirements and we will aggressively lobby the college for immediate replacement of these positions. Developing our vision for hiring priorities within the Strategic Plan will help to define specifics, but we are prepared to take advantage of hiring excellent candidates when opportunities are made available, especially as coordinated with OSU Provost initiatives. Further, a realistic path to an “impact hire” is the Provost Tenured Faculty Diversity Initiative, and we will seek to identify suitable candidates for such a hire. We will also look out for opportunities to appoint excellent scientists as non-tenure track Assistant Professor (Research).

Metrics: Total FTE of research active graduate faculty.

Fall 2018 target for metric: Strategic Plan will be developed and hiring priorities spelled out. The DBB graduate faculty FTE will be the same or greater than it is today.

Recommendation #15: Growth and synergy: increase collaborations within OSU and beyond
An organizational model that brings departments and graduate programs closer together should be promoted, perhaps with seed funding from COS. These collaborative interactions could lead to new research grants. Collaborations should not be limited to within OSU. U of O and OHSU might be available for partnerships. This should be explored, especially for growth in areas that require expensive instrumentation.

Goal: Increase research and training collaborations.

Actions: Many faculty in the DBB have collaborative research programs and these have indeed often led to successful funded research collaborations and major instrumentation acquisition. The garnering of funds led by Elisar Barbar for a \$2.4 million biomolecular NMR resource is a recent example and involved faculty from OSU, UO, and OHSU; and a new \$2.8 million R01 interdisciplinary grant with Fritz Gomart as PI and involving nine faculty in the Colleges of Science, Pharmacy and Vetmed is another example. Such investigator-initiated collaborations are

already strongly encouraged and supported with matching funds whenever possible and we will continue to do so. In terms of graduate training, such cross-disciplinary collaborations could even provide paths to training grants (such as the IGERT in studies of aging won a few years ago, and the MCB NIH training grant from long ago). Related to this, our main priority is to promote synergy in research and graduate training through developing greater interactions at the level of the School of Life Sciences (SLS). The Heads of the three Departments (Microbiology, Integrative Biology, and BB) have four monthly meetings to explore mutually beneficial opportunities and to share best practices, and these meetings will continue and lead to joint initiatives that will be pursued.

Metrics: Number of SLS initiatives undertaken to promote inter-unit collaborations and synergy.

Fall 2018 target for metric: At least three documented SLS initiatives will have been undertaken to promote collaboration and synergy and effective graduate training.

Recommendation #16: More aggressive attempts to raise research funds

The faculty should be given incentives to be more aggressive in procuring research funds. 201 accounts are an example of the incentive that might be useful, but only so long as they are embraced by the administration as a saving device that is not held against the Department or individual. A reduction on the load on grants by graduate student stipends would be another type of incentive.

Goal: Increase research funding with the long-term goal of having on average one grant per faculty.

Actions: Many faculty members in the department have been aggressively looking for national funding. Since Fall 2015 these efforts are being tracked again by the Department Head and published as part of the quarterly DBB internal newsletter. Since 2014, younger faculty members have also been taking advantage of peer editing of proposals within the department, similar to efforts carried out in the Department of Chemistry. Manuals and example proposals available from the NIH have been distributed to faculty members to improve the likelihood of successful applications and funding. In combination these efforts have already borne fruit: since the review was conducted, four faculty members have been awarded long-term research grants from the NIH, NSF and DOD, totaling ~\$7 million, three junior faculty members have received top scores on 2-5 year NIH proposals that are very likely to be funded, and three more proposals by senior faculty members are still pending.

Regarding the specific recommendation, our main actions will be to work with the college to ensure that “201” funds generated by “salary savings” and other mechanisms continue to be a strategic resource available to faculty, and to help craft university policies on reduced tuition for senior graduate students. Further actions to be taken to encourage faculty to more aggressively and successfully seek funding include (a) maintaining department-wide communications so there is broad awareness of applications submitted and awarded by DBB faculty, (b) adding peer reviewing of proposals as a ‘service’ activity to the annual PROF reports (in both goals and accomplishments), (c) as part of strategic planning explore visions for possible large collaborative research consortia that could compete for NIH Program Project grants as well as NIH Centers for Excellence.

Metrics: Nature of policies regarding 201 account use, research proposals submitted and levels of research funding.

Fall 2018 target for metric: 201 accounts remain as a strategic resource for investigators. We

will have lists of proposals submitted and funded for FY16, 17 and 18. FY18 will have increased research expenditures (i.e. as measured by returned overhead) by 50% over FY15.

6. Infrastructure (recommendations 17-18)

Recommendation #17: Develop research infrastructure

The creation of research infrastructure centers can help protect faculty from fluctuating income from grants and ensure their productivity even during dry years. The visibility of the BBGP, the DBB and OSU depends on the success of its research mission. One cannot perform state-of-the-art research without state-of-the-art research infrastructure and increasingly the cost of supporting research infrastructure will have to fall on the administration.

Goal: Develop new research infrastructure by CoS- and OSU-wide collaborations.

Actions: Being competitive for large instrumentation grants requires buy-in by the College and the University, and ideally will involve creation of regional centers where part of the associated costs are recovered as user fees. Using this approach, we have recently been successful in replacing an outdated NMR with a new 800 MHz instrument dedicated to the study of biomolecules. Attracting additional funds for equipment and maintenance of research infrastructure will be key for success of the DBB.

Actions to be taken include (a) as part of our strategic planning developing a list of research infrastructure/instrumentation needs, (b) applying for large equipment grants to update the macromolecular crystallography facility, (c) using OSU Research Office competitive grant mechanisms to replace aging minor equipment (RT-PCR, spectrophotometer, CCD microscope camera, gel documentation system, (d) to pursue competitive OSU funding sources to update building and computational infrastructure.

Metrics: Existence of list of needed research instrumentation and infrastructure. Numbers of purchases or improvements that address infrastructure needs. Wireless and wired network speed on second floor of ALS.

Fall 2018 target for metric: A priority list of for new or replacement research instrumentation needs for the DBB research and teaching mission will exist. At least one substantial purchase or improvement in each of FY16, 17, 18 will have been made that addresses an infrastructure need. The second floor of the ALS building will be on the 1 Gb wired network.

Recommendation #18: Improve internet access

The internet in ALS does not work well in many locations. Fixing this relatively small problem should be made a priority.

Goal: Make sure that strong wireless access is available everywhere on the second floor of the ALS building.

Actions: The first steps to reach this goal were taken in FY15 as new wireless access points were added in the Karplus and Johnson labs. Actions are to have a current wireless coverage “heatmap” generated and have access points added in areas currently underserved such as the Mehl lab.

Metrics: Generate “heatmap” of ALS second floor wireless coverage and customer satisfaction.

Fall 2018 target for metric: All second floor ALS rooms will have satisfactory wireless service.

7. Support from organization (recommendations 19-20)

Recommendation #19: Improve administrative support

COS and BBGP need to work together to develop a strategic plan moving forward. This plan should focus on program quality and on a scientific vision and not numbers of students or number of faculty. But COS also needs to invest in administrative support. An office that focuses on grant writing and grant preparation, including preparation of budgets, is urgently needed. This is particularly valuable for large multi-investigator grants, but it is standard even for individual PI proposals at most universities. Dedicated administrative support to help submit proposals will increase the willingness of faculty to seek funding more aggressively.

Goals: Faculty to be aided in more mechanical aspects of proposal preparation by office staff. Mechanisms to screen for appropriate RFAs and calls for proposals will be found in collaboration with the School of Life Sciences and the CoS.

Actions: More support in proposal preparation used to exist, but was largely lost with the advent of the business centers and the decrease in office staff. Although budgets are tight and the DBB office is quite minimally staffed (a 0.5 FTE OM1, a 1.0 FTE OS2 and a 0.5 OS2 that is supposed to start soon), our plan is to provide budget preparation service to BB faculty either by training someone in the DBB office or training an office staff member serving at the level of the School of Life Sciences (SLS). This is one of the possible initiatives being discussed as part of the response to Recommendation #15 above. Some discussion is also taking place about how the college can provide support, but it is unclear how this will proceed. After effectively providing draft budgets, the next goal will be to provide a support for uploading the various PDF files needed for a proposal.

Metrics: The time it takes for a faculty member to get an accurate draft budget for a grant proposal.

Fall 2018 target for metric: Within 48 hours of a request, a faculty member will receive an accurate excel spreadsheet for the budget needed for proposal submission.

Recommendations 20 and 21 fall under the key recommendation to “*Improve the balance between teaching and research*”.

Recommendation #20: Acknowledge and increase the visibility of research

The standing, the ranking, and the perception about science programs, departments and research universities are determined primarily by the quality of the research activities and the success and visibility of its faculty. Training and teaching are essential components to success, but on their own they are not sufficient. CoS has to be more pro-active about protecting the faculty from the increase in workload that comes from decreasing university support for administrative matters so they can dedicate more quality time to their research. It also has to keep the balance between teaching and research at the right level. The CoS has to do everything it possibly can to ensure the success of its research-active faculty, and to encourage and support the faculty who are not funded but who are trying to stay active in hopes that they will become funded. The budgetary priorities suggest that many decisions are being made without acknowledging what it takes to support research at the highest level.

8. Productivity (recommendation 21)

Recommendation #21: Improve ranking through research

An increase in research productivity will increase visibility and ranking. More efforts should be dedicated towards acknowledging the role of research as an important component of education.

There is no other more effective or permanent way of effecting change in ranking. The teaching loads have to be reasonable else the research mission will suffer. It is especially important to protect young faculty who are having a difficult time getting funded. Weighing them with an unreasonable teaching or administrative load will minimize their chances of ever being funded.

Goals: DBB and CoS will work together to increase the visibility of research accomplishments of students and faculty in the BBGP, and to ensure that junior faculty can devote sufficient time to develop active and funded research programs (see recommendations #5 and #16).

Actions: The DBB has in the past taken steps to interact with the public via interviews, involvement in foundation events (e.g. of the American Cancer Society) and outreach activities. Newsworthy items are reported to the University Communications (David Stauth). Since 2014 we have a Facebook page. Also, a very positive development has been the hiring at the CoS level of a marketing expert, Debbie Farris, who has been developing web and newsletter content for promoting CoS accomplishments. One action item is to figure out how to make best use of our Facebook page (and possibly other social media sites) and also to pass on our accomplishments to Debbie in the CoS and David at OSU communications. Still, we agree with the reviewers that reputations among our peers relevant to rankings are made through high impact publications and seminars and talks at meetings and participation in societies. Thus, while we value teaching highly, it is crucial that research success not be smothered by other responsibilities. Teaching assignments in the past have been tailored to ensure that faculty active in research and graduate student training, especially for junior faculty members, do not have excessive teaching or service responsibilities, and this will continue. So our main action in response to this recommendation is to resist any pressures to increase the teaching loads of research-active faculty. Also, senior faculty with experience in publishing higher profile papers will mentor junior faculty in communicating their work in the most impactful manner.

Metrics: Teaching load of faculty active in research and graduate training; levels of returned overhead as noted in Recommendation 16

Fall 2018 target for metric: The teaching load will not be increased compared with AY15. As noted in recommendation 16, FY18 will have increased by returned overhead by 50% over FY15.

9. Student satisfaction (recommendations 22-23)

Recommendation #22: Be more proactive with career planning

Students need to be helped with career planning in a more organized manner. New directives from NIH requirements for Individual Development Plans should help the faculty figure out what type of guidance might help the students.

Goals: All graduate students and their mentors will develop Individual Development Plans as suggested by the OSU Graduate School and required by NIH for grant proposal applications. In cooperation with the new Graduate Student Association of the BBGP, the Graduate Program Director and Department Head will increase career planning activities.

Actions: The DBB has great success in placing graduates in post-doctoral research positions in academia and industry, as found and acknowledged in the panel review. Students increasingly envision alternative careers in biotechnology, teaching and science publishing. As a more general response to this and other recommendations, we have encouraged the BB graduate students to

create a BB Graduate Student Association through which they can gain professional experiences and advocate for themselves and pursue their own initiatives to enhance their professional development opportunities. They have eagerly pursued the opportunity and it is now formed and can develop further. We have provided them a \$500 annual budget for initiatives they would like to pursue.

Actions to be taken specifically related to this recommendation include (a) requiring Individual Development Plans by the newly required annual committee meeting following successful preliminary examination, (b) encouraging mentors to send students to at least one national and/or one international meeting during their time in the program, (c) making current job postings in academia and industry available to graduate students by providing them instructions for how to subscribe to a service used by many faculty, and (d) having at least one DBB seminar speaker per year be from industry.

Metrics: Percent of students with Individual Development Plans on file, numbers of students having attended at least one national or international meeting during their training, and numbers of seminar speakers from industry.

Fall 2018 target for metric: 100% of students starting F15 or later will have Individual Development Plans on file. We will also have a record of national and international meetings attended by students, which should show an increase over the three years. The instructions for subscribing to the job postings emails will be on the DBB website.

Recommendation #23: Encourage students to join professional societies

Professional societies need to be stronger than ever so they can be an effective voice in support of research and education. Students should be encouraged to play a bigger role in science beyond the confines of OSU and joining a society is a good starting point.

Goals: Graduate students will be encouraged to enter professional societies appropriate for their disciplines.

Actions: Some mentors have been proactive with this, but the BBGP can do more to support these efforts, especially if travel support for meetings is granted in cases of students joining societies. To address this we will, in cooperation with the BB Graduate Student Association, encourage students to join the AAAS and one or more societies more closely related to their research focus (e.g. Genetic Society of America, American Society for Microbiology, American Chemical Society, Protein Society, Biophysical Society, American Society for Biochemistry and Molecular Biology) and provide links on the DBB web site to each society.

Metrics: Percentage of students who are members of at least one professional society.

Fall 2018 target for metric: The number of BB doctoral candidates (i.e. students having passed their prelim) who are members of at least one professional society will increase over the three years and in Fall 2018 will encompass $\geq 75\%$ of students.

10. Outcomes and impact (recommendation 24)

Recommendation #24: Raise the profile of the DBB and the BBGP:

A regular symposium at OSU should be organized to raise the profile of the program nationally and within OSU. A two day symposium with high profile national speakers would bring immediate attention to the Department. It is worth emphasizing again that the Department has a very good reputation and it is recognizable owing to some of the past and current faculty. This can be taken to the next level with an annual symposium. Oregon is beautiful in the Spring, at a

time in which large swaths of the country are shrouded in winter. Capitalize on that. Bringing scientists to campus will have a very positive impact on students and will even help with student recruiting. This could be done in collaboration with the Pauling Center. Industrial funding would be ideal.

Goals: Hold at least one annual national or regional symposium sponsored by the DBB.

Actions: Two long-standing meetings BB faculty are involved with are the biannual Diet and Optimum Health Conference organized by the Linus Pauling Institute and the semi-annual CGRB Conferences. Also, in each of the past years two such meetings were organized by DBB faculty, one was the 2014 Northwest Protein Crystallography Meeting and the other a 2015 workshop on “Non-canonical amino acids” (ncAA) and their use in basic research. The crystallography meeting will not be hosted again in Corvallis for many years, but the ncAA topic is one we had during earlier strategic planning conversations discussed as making an annual event that our department becomes recognized for hosting, along with being recognized as the home of the Unnatural Protein Facility that promotes use of this technology. Already plans are being made for a 2016 summer workshop and a conference bringing together the world leaders in the field. We plan to continue these efforts and seek both internal and external funding to support them.

Metrics: The number of ncAA meetings and workshops we have held.

Fall 2018 target for metric: We will have hosted meetings in FY16 and FY18.