Final Report of the Interdisciplinary Neuroscience PhD Program Review Committee

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Overview

The Interdisciplinary Graduate Program in Neuroscience is an umbrella PhD-granting program encompassing students conducting research and training in neuroscience in the laboratories of faculty appointed in multiple departments and units throughout the university. The program was formed in recognition of the benefit that would be obtained by creating a PhD program in which students working in neuroscience could share a unified curriculum with neuroscience taught as a distinct discipline, be exposed to and learn from each other's research, and share training experiences even though their thesis advisors are dispersed among different academic homes at the UW. The formal program has been in existence ~20 years, although the program was renamed the Interdisciplinary Graduate Program in Neuroscience in 2014. Originally founded by five departments, three from the School of Medicine and two from Arts and Sciences, faculty (~136) are now drawn from 27 different departments housed in multiple units. Thus, the program has seen enormous growth over the past 20 years, with the student number as high as 65 students matriculated ten years ago and 45 students presently in the program. The program is fully supported by the Graduate School, which provides financial support for all first year students, costs of student recruiting, salary supplements for the Program Co-Director's, salary support for two administrative staff and several other expenses associated with the program. While the mission of the program is to provide the highest level of training in neuroscience to graduate students, it is an important aspect of this program that there are many undergraduate students in the neurobiology major (http://depts.washington.edu/nbio/) that benefit from interactions with these graduate students and vice versa.

Executive summary

The Review Committee's impression is that this is a very healthy graduate program with a bright future. The major strengths are the excellence and breadth of the training faculty conducting outstanding research in neuroscience, and the dedication and success of the Co-Directors, participating faculty, and administrative staff in providing a highly collegial training environment for graduate students. On the whole, the students expressed a high level of satisfaction with their training. Despite a demanding curriculum (the required courses total 31 graded credits), the students appreciated the strong grounding they received in the broad field of neuroscience and the in-depth study of specific areas that are explored in the classes. The students in each entering class seemed well "bonded" and supportive of each other, and they also felt well supported by the faculty in pursuing their thesis research. Some of the weaknesses of the program are predictable given that the faculty are drawn from many departments. Not all departments give credit to their faculty for teaching and service to this program but instead focus on evaluating faculty based on meeting departmental needs. Thus, the workload is not as evenly distributed as it should be. Much of the responsibility for running the program falls to the Co-Directors, who are from different units and have no leverage to incentivize faculty. Physical space to "house" the program is insufficient as there is no common space for students to congregate and no conference room space dedicated to their use. Most importantly, the Review Committee perceives a missed opportunity to promote the growth, visibility and success of the neuroscience community at the University of Washington. Faculty engaged in neuroscience research do not appear to receive national and international recognition commensurate with the quality and scope of their scholarly work. A formal entity, such as a center, that unites these faculty by their discipline would increase visibility and recognition of neuroscience research at the UW. This would in turn enhance faculty recruitment opportunities to many departments, and increase success in grant funding. Importantly, formation of such an entity would strengthen the integration of graduate and undergraduate majors engaged in research and education in neuroscience, which would have an overall positive impact on the University of Washington. We describe below our specific assessment of different aspects of the program, and conclude with specific recommendations.

Governance

While there are numerous committees that administratively support this program, the Co-Directors play a pivotal role in its success. Drs. Jane Sullivan and David Perkel have been Co-Directors since September of 2012. They are clearly dedicated to the program and essentially make all decisions with input from the Program Committee. The Co-Directors are greatly admired by the students and the faculty, and their efforts result in the high degree of cohesion observed in the program. Committees with defined, specific functions include the Admissions Committee, Curriculum Committee, Diversity Committee, Graduate Training Committee, Public Engagement Committee and the Seminar Committee. As described below, these committees report to the Program Committee, which integrates the individual committee's input and provides global advice to the Co-Directors. The Admissions committee handles a large number of applications and, impressively, the Chair of this committee reads all of them. One concern arose regarding succession planning for the chairmanship of the Admissions Committee; this requires a dedicated faculty member that can devote time independent of commitments to their own department. Some of the faculty also expressed a concern that the Admissions Committee did not balance the scientific interests of the applicants across a broader range of research areas when making offers, and that their approach of selecting the top students sometimes resulted in a disproportionate number of students interested in one area. The Review Committee agrees that it is ideal to select students with a balance in interests and backgrounds to ensure that research programs of faculty focused on diverse topics may be attractive to incoming students; however, the Review Committee recognizes that it is difficult to predict the areas of research interests for incoming students. The students who matriculate appear to be of high quality and in the past year, the acceptance rate was 21% of those receiving offers, which is reasonable given that there is year-to-year fluctuation. Half of those in the 2015 entering class are URM applicants. Thus the Diversity Committee and Admissions Committee appear to function well. The Curriculum Committee also appears to function well as several recent changes have been made to the curriculum in response to student feedback and perceived "holes" in the earlier courses (discussed further under Curriculum). Given that neuroscience is a fast-moving field, it is important for the Curriculum Committee to be nimble, and this appears to be the case. We did not meet with the Public Engagement Committee; however, given the concern about lack of recognition of neuroscience research at the UW, this committee may need to become more active. The Graduate Training Committee has the critical role of overseeing student progress. It was difficult for the Review Committee to assess how well this committee functions. The program appears to rely heavily on the individual thesis committees to monitor progress and address student issues. Given the large number of training faculty, the composition of these committees is likely to be very diverse and may have some difficulty adhering to a common standard. The Review Committee felt that the program may benefit from having a faculty member serve as the Graduate Program Coordinator who monitors the progress of all students from a "30,000-foot" level, to ensure consistency on the degree of oversight for each student. Additionally, this faculty member could serve as an overall First-Year Advisor that would ensure that all rotation reports are reviewed from a common perspective, the process of securing rotations occurs smoothly, and be a resource for first-year students to consult as they navigate a challenging year. This would of course involve "buy-in" by the faculty member's department to credit the faculty member for the amount of time needed for this position. Implementation of IDPs will no doubt greatly enhance student oversight, and the Graduate Training Committee may be valuable in reviewing all of these documents. Nevertheless, a single point-person for advising first-year students, and overseeing the functioning of supervisory committees and larger problems would be seen as a positive addition. The Seminar Committee was also difficult to evaluate; we did not receive a schedule for this

past year's speakers. However, the students expressed appreciation for the diversity and quality of the speakers. The previous program review (2005) expressed the concern that this number of committees was excessive, and the dispersed style of governance impaired cohesion in the program. This Review committee did not reach this conclusion. Each of the committees described above reports to the Program Committee, which is charged with setting the Program's policies, addressing student issues and admitting new training faculty. Importantly, the Chairs of the individual committees are members of the Program Committee, ensuring cohesion among the governance units. The Co-Directors are the Co-Chairs of the Program Committee. Thus, it is important that this committee function somewhat democratically to avoid concentrating all decision-making in the hands of the Co-Directors. No problems stemming from this structure were noted in the review; however, the Co-Directors may wish to consider being *ex officio* members of the Program Committee rather than chairing it. Finally, the Steering Committee plays little role in governance of the program at this time. The Steering Committee expressed the view that governance of the program should be left in the hands of the Co-Directors without micromanagement from their end. We do not disagree with this view; however, we believe that the Steering Committee could play an active role as a liaison between the program and the Graduate School regarding actions that UW leadership could take to better support the program. In particular, the Steering Committee could facilitate formation of a discipline-focused Center described above by articulating the needs and benefits to the UW of this type of support. In addition, it would be helpful for the advisory role of the Steering Committee in the selection of replacement Co-Directors to be explicitly stated.

Students

The Review Committee met with small groups of students at all different stages in the program. The number of students that met with us is small compared to the number in the program; therefore we can only reflect on the input from this small fraction. A quantitative assessment of the views of the larger student body is found in the GPSS survey of all students in the program. Overall, we were impressed with these students. The students were thoughtful, articulate and very engaged in their research and training. It was evident that they identified with each other despite the geographic dispersion of their laboratories. From the more senior students, we could gain a more seasoned perspective on the program; from the first-year students, we learned of the most recent changes in curriculum. In sum, the students felt an organic connection to the program; they recognized the effort put into a program that attempts a broad knowledge base in a discipline but also attempts to instill knowledge in depth. We believe that their input is valuable to the program.

Strengths of the program from the student's perspective were:

- The students felt "respected"; their feedback on a variety of issues was genuinely solicited and seemed to influence programmatic decisions. To the Review Committee, this was excellent training in leadership: the students connected empowerment with responsibility.
- The students also appreciated their courses and seemed very willing to undertake a heavy course load in exchange for preparation that they believed would be valuable to them. They believed that the demands of the first year courses helped them learn how to teach each other, and they valued this experience. The students enter the program with diverse backgrounds; therefore, some are comfortable in some classes while others are not. A culture has developed wherein they "tutor" each other in their classes. The Review Committee felt support for this culture was a true credit to the program.
- The students also valued their TA experience with students in the undergraduate major, and teaching was an area that many students wanted to explore, although not to the exclusion of research.

- The students felt positively about the format of the general exam that includes both public and private presentations. More junior students felt that they benefited from observing the public portion of the exam, and students who had passed the exam felt that defending themselves in the public exam portion was excellent training.

Suggestions for improvement by the students included:

- There were some concerns about how TA assignments were given to individual students; they would like better coordination in this process.
- The students responded positively to the idea of a faculty member serving as a Graduate Program Coordinator as they felt this would ensure some equity in issues like selection of TA assignments.
- The students felt that finding a lab for rotation could be difficult and was becoming a growing problem. They did not think that the program was very helpful in facilitating identification of labs in which to rotate, and they faced competition from students in departmental programs of the training faculty. Several students thought that it would be helpful to have some advance notice in the summer that they should be planning ahead for rotations.
- Collectively, the students felt that they would benefit from more opportunities for public speaking. They appreciated the student-run symposium, but felt that it should be better attended by faculty. They recognized that speaking is a critical skill and they would like to have access to more opportunities to practice their skill.
- All students expressed a desire for greater faculty attendance at seminars, the retreat and student symposium.
- The students did not think there were clear guidelines regarding the expectations for completing their thesis research; they were unclear about the expectations of the program for earning a PhD. They understood the difficulty in defining a metric based on number of publications as publications in some areas take much longer than in others, however, they would be more comfortable with a better idea of what is expected as they near the end of their training.
- Senior students expressed a desire for more opportunities for professional development. They recognized that there were not abundant opportunities for faculty positions (although many indicated that exploring opportunities in academia was their first priority). The students wanted more exposure to alternative careers and more training that would prepare them for these careers. Nevertheless, the students recognized that their training environment was in academia and gaining exposure to other paths was challenging.
- All students expressed a desire for a “meeting place”, or lounge area where they could gather informally. Given the collegiality among this group of students, the Review Committee felt this was a valuable investment in an interactive group of young scientists.

The Review Committee felt that the senior students were giving an appropriate level of thought to the next step in their career. Despite this, we felt that the students did not have the appropriate motivation to finish their studies in a time frame that was under 6 years. The Co-Director’s shared this concern; it is hoped that appropriate implementation of IDPs will influence the motivation of the students. This is a key issue that should be addressed; a long time-to-degree was deemed the most significant problem for the program. The committee felt that the level of cohesion among the students was quite high, and this was a very significant, positive factor in broadening student exposure to different areas of neuroscience research. Several programmatic functions had a very positive benefit for the students and should be continued. These include the “Monday Lunches” for first year students in which faculty describe their own career paths and how they got to where they are (this series is particularly well received), as

well as the “First Friday” dinners, in which all students meet on their own in a social setting. On the student’s initiative, informal scientific talks were introduced by the students into the First Friday dinners, reflecting the student’s desire to learn more about research conducted by their peers. These are all signs of a healthy program. The committee did not have cumulative data on student outcomes; however, the success of the students in this program seems at least anecdotally to meet or exceed that of other programs.

Faculty

The program lists about 135 participating faculty who represent a full range of Neuroscience disciplines from Computational Neuroscience and Brain-Computer Interfaces to Membrane Biophysics and Sensorimotor Integration. In addition, the faculty use a variety of experimental systems, so students have opportunities to rotate and train in labs that offer different approaches to neuroscience research. This is appropriate for a broad program in neuroscience. The majority of faculty are highly productive, and many are recognized nationally and internationally as experts in their field. In several research areas, UW has a critical mass of expert synergistic faculty, so the group has much more to offer than the individual members. Several new members from the Allen Brain Institute have also joined the program as adjunct faculty members, and it is likely that they will add dimension to the scientific and professional training available to the students. Among these diverse faculty in the graduate program, only a core group of ~30 faculty, however, are active participants. Given the strength in neuroscience at the UW, more involvement of faculty should be encouraged. The Review Committee met with small groups of both junior and senior training faculty in the program. A common concern among the faculty was the difficulty in balancing responsibilities to their own departments versus dedicating time to the interdisciplinary program. Many faculty felt that they do not receive credit for the time that they devote to the program versus time devoted to needs of their primary departments. Another obstacle is the difficulty in securing funding for graduate students after the first year, leading some to decline rotation students. This issue affects all graduate programs at the UW, as the cost of graduate students now exceeds the cost of a post-doctoral fellow. The students in this program are extremely successful in securing NSF fellowships, which helps address the funding problem. The junior faculty interviewed by the committee felt that the program was supportive of them in creating ample opportunities to interact with and recruit new students. They also felt that the interdisciplinary training program catalyzed interactions among laboratories that would not happen otherwise and this was very valuable to them. However, some expressed the view that the governance of the program was weakened by not having the formal structure that departments have. Senior faculty expressed strong views that the neuroscience community at UW lacked visibility and were disappointed that there has not been more support from the UW for forming an overarching Neuroscience Center. They felt that having a defined identity and central focus would greatly benefit the training program, neurobiology undergraduates, the neuroscience community and the UW as a whole. They advocated having an assigned member of Advancement to help with fund raising. The senior faculty also felt that there should be more financial support from the Graduate School as the support has not increased over the years while expenses for students have risen. The Review Committee did not have data to assess whether there were training faculty who had the desire and resources to take a student from the program but did not have a student because the class sizes are too small. It is recommended that this question be addressed in order to determine the ideal size of the program. The senior faculty also felt that the Steering Committee should be more involved in the graduate training program as the same individuals form the Steering Committee for the undergraduate program and more effort is spent on undergraduate issues. The Review Committee sensed that there was a lack of communication between the Steering Committee and senior faculty in the training program. Finally, the senior faculty echoed comments of others that there is a need for space dedicated to neuroscience students, both

graduate and undergraduate, where administrators that serve in the program would be readily available, a conference room would be available for events and a welcoming space for students that would greatly enhance interactions and camaraderie. They also echoed the concern that faculty in different departments are not given sufficient credit for teaching in the graduate program and this impaired participation by many faculty. A significant strength identified by the senior faculty was that the interdisciplinary nature of the graduate training program resulted in "porous boundaries" between laboratories and students in the program helped make connections and collaborations between different labs.

Curriculum

The class requirements for this program are intense due to the need to teach a broad discipline and very diverse array of concepts and techniques. Despite the large number of credits, both students and faculty felt the course load was appropriate given the scope of material to be covered. The 501 course received the most criticism. Students recognized that this course has the challenging goal of teaching a wide range of material to students with very diverse backgrounds. However, the students felt that the class lacked cohesion, lecturers did not consult with each other or attend classes taught by other instructors; therefore, there was too much redundancy between lectures. While some of the lectures were too detailed and not sufficiently broad in scope, lack of coordination between lectures resulted in many topics being treated superficially. Students were also critical of the 559 course. They liked the idea of learning about diseases that involve neurobiology but they felt that there was not enough basic science and emphasis on the mechanisms underlying different diseases. They also felt that the class assignment of writing a NIH-style grant was not well connected to the lectures and not well mentored. The students understood that the seminars in this class were meant to inspire an interest in thinking about how to investigate a disease process in more depth, but they did not feel well prepared to generate a grant proposal. In contrast, 504 received universal praise; students felt this class should be the model for others as it is well organized and cohesive. They also very much enjoyed 526, the Current Topics class. The format of modules in which classic papers are read first, then more current work followed by truly cutting edge work resonated well with students as they could see the progression in a field and how specific challenges were overcome. In general, the students felt the other core courses were valuable and had no complaints. Although the program is moving towards having the students take all of the elective courses in the second year, the students felt there was merit in relaxing this requirement so that at least some electives could be taken at later time when the relevance to their particular research topic could provide a meaningful context.

Recommendations

Based on the broad impressions described in the executive summary and the detailed comments above, the Review Committee makes the following recommendations:

- The program should appoint a faculty member to function as a Graduate Program Coordinator. This person could review the newly implemented IDPs and ensure that thoughtful conversations are taking place with regard to progress toward the degree and concrete plans are discussed. Hopefully, this will help shorten the time to degree. This individual could also help coordinate placement in labs for rotations and TA assignments, and serve as a resource and safety net for the students as a whole. Consideration could be given to having this person replace the assigned first-year mentors, which are currently underutilized.
- Better guidelines should be developed to define criteria that should be met to receive a PhD from the program. Some flexibility is needed, but expectations that may vary

depending on the nature of the research should be articulated. Consideration should be given to requiring one publication (not necessarily first author) to receive a PhD degree.

- Attention should be paid to the 501 course such that the faculty coordinate lecture content and work to 1) eliminate redundancies and 2) ensure all essential areas are covered in sufficient depth.
- The committee recognizes that the Co-Directors devote significant effort to the Program, and that the training grant also requires significant effort. These responsibilities should be distributed among different faculty. If the recently re-submitted training grant application is unsuccessful, a faculty member should be identified from the program with current funding and a solid record of student mentorship to serve as PI on a new submission. The Co-Directors should be actively involved in administering the training grant, perhaps by being members of the training grant steering committee.
- Faculty conducting neuroscience research should be integrated into a separate entity, potentially a center that would provide greater cohesion to the training environment for the graduate students and allow better integration with undergraduates majoring in neurobiology. Formation of this entity would also improve the visibility of the outstanding neuroscience research to funding agencies, donors, colleagues and students, thereby improving resources available for training and faculty and student morale.
- Space should be dedicated to the program that would include administrative space, meeting room space, and a student study/lounge space to be utilized by graduate students in the program as well as neurobiology undergraduates.
- The Steering Committee should actively engage leadership at the UW in an effort to obtain resources needed for the program. This committee should also work with department chairs to allow credit to be given to faculty who teach in the program.
- The Co-Directors should ascertain whether there is unmet need on the part of faculty for access to students in this program in order to determine if growth is needed.
- A specific person in Advancement should be identified who can help with philanthropic efforts to support the program and the neuroscience community.

Given the overall strength of the program, we recommend the next review occur in ten years.