

Year 2 – 4 Evaluation Interdepartmental Neuroscience Program

The 2-4 Project has provided us with a timely opportunity to thoughtfully evaluate our graduate program and its effectiveness in training and mentoring our Neuroscience graduate students. Our Program has consistently ranked among the very best neuroscience graduate training programs in the country, a record of which we are proud. We are always interested in improvements that can be made in all areas of our program. Over the last several years, we have implemented several changes that have strengthened the training environment for our students. These additions to our program include: 1) a required *Bioethics in Neuroscience* course for first year students; 2) mandatory fellowship application preparation for first year students under the guidance of the rotation advisor and other selected faculty mentors; 3) creation of additional special sessions in the first year *Structural and Functional Organization of the Human Nervous System* course to specifically address non-human brain structures in response to graduate student requests; 4) a monthly student/faculty luncheon with specific discussion topic; 5) an increase in the required terms of teaching from one to two; 6) the addition of a student representative to the Interdepartmental Neuroscience Graduate Program Executive Committee that provides the overall supervision and structure of the program.

This academic year other improvements have been effected, in part out of discussion of the Engleman Report recommendations. These include: 1) a written rotation evaluation for each completed rotation; 2) additional first year student advising sessions; 3) and a revised annual departmental thesis committee report. Additional useful suggestions that further refine guidelines or practices already in place within the INP came out of the DGS meeting with INP students. These include: 1) posting to the INP website descriptions of the Qualifying Exam and the Prospectus; and 2) a short (one page) Program description that could easily be printed by a student and given to a new committee member. Placing these documents on the INP website, independent of the Handbook, was suggested. Finally, new this year, our students took the responsibility to generate an INP Student Guidebook which covers everything from recommendations on how to select committee members to how to avoid lab fatigue.

Areas of Concern in the Sciences

Areas of concern noted in the sciences in the Dean's Year 2-4 Project assessment guidelines include the topics of Program Structure and Evaluation. Specifically, we were asked to address the question of whether the current configuration of research rotations is sufficient for students and faculty to make informed thesis laboratory selections and whether the rotations are formally evaluated and communicated to students in writing.

Requirements for our Laboratory Rotations are described in our Faculty and Student Handbook as below.

Laboratory rotations are considered an essential component to interdisciplinary training and each student is required to complete a minimum of two rotations by the end of second semester. The rotations should be in different laboratories and, preferably, in different areas of Neuroscience from at least two departments. At least one of these must be in the lab of an INP faculty member. The minimum duration of a rotation is one semester or a full summer. Each rotation should be long enough to allow the student to gain technical expertise and an appreciation of the practical aspects of an area of Neuroscience. The laboratory rotations can serve the dual functions of broadening a student's background and helping in the choice of a future thesis advisor. Should a particular laboratory not meet the needs of a student, he/she is encouraged to consider moving to another lab. At the end of the rotation, the P.I. will complete the

Rotation Evaluation form evaluating the participation of that student in the laboratory and they will submit this to the Neuroscience office.

Any student who is not ready to make a thesis lab selection at the end of two rotations is urged to complete a third rotation, in consultation with the INP DGS. Rarely, a student has needed to complete a fourth rotation. This is done again with DGS consultation and approval and has resulted in successful lab placement. The length of our rotations allows for both the student and the faculty member to determine if the match is a good one.

Formal evaluation of the research experience is completed by the rotation advisor at the end of the rotation and submitted to the INP Office for review by the DGS. A summary of the rotation evaluations and current academic standing is provided to the first year students during academic advising. If a student is in academic jeopardy, they must meet with the DGS and at that time a written letter from the DGS is provided to them informing them of their academic status, possibly placement on academic probation, what requirements must be met to improve their academic status or to be removed from probation, and the consequences of not meeting those requirements.

Other evaluations

INP students complete their Qualifying Examination in Year Two. Our QE is evaluated in three areas: 1) performance of directed readings and meetings with faculty; 2) a written qualifying examination; and 3) an oral examination. All three areas of the student's performance are evaluated by the student's committee. Each QE committee is chaired by Professor Charles Greer, thus providing continuity of standards and regularity of proceedings. The student is given a comprehensive evaluation of their performance in all areas of the examination and is immediately given the results of the examination after the committee makes its decision. When appropriate a written evaluation of their performance will also be provided to the student, though this is expected to occur predominately in situations in which the student fails one or more parts of the QE. Examples of QE failure are fortunately rare, but when they do occur the student is counseled by Professor Greer and subsequently provided with a letter from Professor Greer on behalf of the committee, clearly stating what the committee and the Program requires in order for the student to complete the exam satisfactorily and be promoted to the next stage of training.

Beginning in their first year, INP students are required to give an annual Research-in-Progress talk to the Neuroscience Community. The talks are organized by our second year students and faculty evaluators are scheduled for each session. The faculty member scheduled for each set of talks provides feedback to each presenter on the organization and presentation of their talk. Students, postdocs, faculty and other lab members are invited to attend our talks and speakers become familiar with presenting in a public forum and taking questions from the audience both during and at the end of their talks. Typically, the robust exchange of ideas and experimental proposals ends up being limited by time constraints.

Our student run Journal Club offers another opportunity for students to present and critique a paper before their peers. Mentorship in this setting is provided by the senior graduate students who attend the Journal Club.

Rotation students are included in their host lab's group lab meetings. Some labs participate in larger multi-lab meetings and rotation students attend these if they are in a participating lab. It is common for rotation students to present a short lab meeting on their work at the end of their rotation and they receive feedback from the group at this time.

The INP provides financial support for all first and second-year students to attend the annual Society for Neuroscience Meeting. First year students are prepared for this meeting (25,000+ neuroscientists attend each year) both within the framework of the Principles of Neuroscience course and by the Student/Faculty Luncheon topic "Strategies for Attending Conferences" which is covered in the month before the meeting. Most INP faculty encourage their graduate students to submit abstracts and present their research at meetings as early in their careers as possible, as well as to apply for student travel fellowships. Poster presentation at meetings such as SfN requires students to talk to a wide audience over a period of several hours, an excellent opportunity to receive feedback from the greater Neuroscience community.

Program improvements over the last several years

Several years ago, INP students expressed interest in meeting with faculty more casually to explore topics of interest such as grant writing, publishing, balancing work and family, what to look for when selecting a postdoc position, how to make the transition to a faculty position and a number of other topics selected by the students. Student interest in this was and continues to be very high, therefore the Program committed funds to provide lunch for a monthly meeting. Two students coordinate this series and identify and invite two to four faculty members who can share their insight and experience with the selected topic. All neuroscience students are invited to attend and participate. This series is very popular with the students and faculty, several of whom express a desire to be invited back. This series provides an opportunity for all students to meet and learn from a variety of faculty they otherwise may not meet in their coursework, laboratory rotations or qualifying examinations.

Some time ago, the INP Curriculum Committee found that formal training for Neuroscience graduate students in Bioethics was lacking. Several senior graduate students, a subset of those serving on the Curriculum Committee, created a new course, *Bioethics in Neuroscience* and Program requirements were changed to include this course for all first year Neuroscience students. Under the guidance of Professor Charles Greer, the course is organized and taught by two senior graduate students and two second year students. This framework provides continuity from year to year as well as the continued involvement of non-first year students in a mentoring role for the new students. Student course leaders invite faculty and staff experts to cover specific topics such as Research with Animals, Authorship Responsibility and Collaborative Research, Stem Cells, and Choosing a Mentor. Required textbooks for this course are provided to Neuroscience Track students by the INP. It is a well-run course and word has spread about its success. Postdocs and students from other programs regularly ask permission to participate in this popular class.

A position for a student representative to the INP Executive Committee was appointed about five years ago in response to student feedback at that time. This student is elected by the student body and is responsible for bringing student issues to the attention of the committee, providing organized student feedback on issues the Committee requests input about, and bringing information from the Committee back to the student body. This provides a direct mechanism for any student to bring an issue to the Committee at any time as well as providing a conduit for information to flow back directly to the students from the Committee. The Executive Committee meets monthly and this student representation has facilitated discussion and has informed the committee of student views on topics such as the proposed grading change.

Two years ago, first year students requested that additional materials, lectures or labs be added to the *Structural and Functional Organization of the Human Nervous System* course to provide

them with information they felt was more relevant to their graduate studies. The chair of the Curriculum Committee met with a representative of the first year students and subsequently worked with the course director to address these concerns. Additional workshops were added to the syllabus to provide the graduate students with supplementary or new material.

Student Meeting (March 23, 2007)

The Program Director, Charles Greer, and the Student Services Officer, Carol Russo, met with the Interdepartmental Neuroscience Program students, including our first year Neuroscience Track students. Students were encouraged to bring up all concerns and issues that were of interest and specifically the students were asked about milestones in years Two through Four. Students were generally very pleased with the graduate program and had some specific comments to share.

Professor Greer shared general feedback and topics addressed in the anonymous online survey of INP graduate students completed in the Fall semester by the Graduate School. Most responses were quite favorable and supportive but some concern was raised in this feedback that not enough specific guidance was provided to students about such things as procedures for the Qualifying Examination and the Prospectus Committee Meeting. Professor Greer explained that our guidelines for these are in the Handbook and that each student will have a different experience from their peers due to the nature of the field and committee members. Consultation with Program Directors and the INP office is encouraged at any time.

The current course requirements are regarded as appropriate by the students. Required courses provide a foundation in basic neuroscience and electives allow our students to tailor their remaining courses to their own academic needs. Professor Greer invited feedback on the graduate student-focused special sessions added to the *Neuroanatomy* course several years ago in response to requests from the graduate students for more comparative non-human neuroanatomy experience. Response to this was generally positive with specific criticisms taken and passed on to the course director. In past years, students have approached faculty with requests for specific courses of interest to them and several of the faculty have proceeded to offer these popular courses: *Neurophysiology*, *History of Modern Neuroscience*, and *The MAP kinase pathway and Cognitive Disorders*. Students were encouraged to continue to approach faculty in this way.

Students felt that an annual meeting early in the Fall semester with Professor Greer would be very useful for those expected to soon complete the Qualifying Exam and the Prospectus. This meeting will be used to review the expectations of both the Qualifying Exam and the Prospectus and will include a discussion of the deadlines that must be met. At this time, students will have a good idea of remaining coursework that is needed and teaching assignments they will undertake for the current year. Students will also be encouraged to consider the timing of any scientific meetings they plan to attend. This will aid second year students in planning for appropriate scheduling of their Qualifying Exam.

Deadlines for completion of the Qualifying Exam and Thesis Prospectus submission are reasonable and attainable for most students. Any instances of students not meeting these deadlines are brought to the attention of the DGS and students are counseled appropriately. The point at which students are most concerned or seem to have the most questions is when it is time to prepare the Prospectus. Some students do not feel that clear enough guidelines are established about the preparation of the Prospectus and presentation of their work to their committee. Because the Program is interdepartmental with faculty who are active in multiple

graduate programs, some students were concerned that faculty members have different expectations of this stage based upon some of their other programs' requirements. Concern was also raised that some junior faculty may feel that the student's Prospectus reflects more on the PI than the student, thus resulting in delay by the PI of the Prospectus meeting in order to gather more preliminary data or complete experiments. Professor Greer discussed this at length in the meeting and further efforts to lower the anxiety level about this step will be made at the annual meetings in the fall term to discuss the Prospectus. It was agreed that an annual communication to the advisors of third year students should be sent out from the INP office that will include our Prospectus guidelines and encouragement to create the Thesis committee and submit the Prospectus sooner rather than later.

Students shared a concern that there were not enough Neuroscience courses for them to TA in considering our two term teaching requirement. The INP requires students to complete at least one teaching assignment in a core Neuroscience course (*Neurobiology, Principles of Neuroscience, Structural and Functional Organization of the Human Nervous System*) or from Professor Arnsten's *Brain and Thought* undergraduate course. Students also shared a concern that the teaching experience was highly variable from course to course. Specific course concerns have been discussed with the course director(s). It was noted by Professor Greer that one of the teaching requirements could be fulfilled by teaching in other departments, such as Psychology, MCDB, or Engineering and Applied Science, as has been done in the past. This information will be added to the Student and Faculty Handbook. It was generally agreed upon that TA evaluations of courses would be valuable and the INP office will coordinate gathering these.

Additional useful suggestions that refine guidelines or practices already in place within the Program came out of the DGS meeting with INP students. These include revising our annual letter to advisors to highlight (bullet points were suggested) the specific milestones each student must achieve during the next academic year (i.e. the Qualifying Exam, coursework and teaching for advisors of Second Year students) and to emphasize the importance of these milestones for the student, as well as the expected deadline for completion. Posting these documents on the INP website, independent of the Handbook for simplified access, was suggested.

Students stated that a general annual meeting with the DGS would be welcome and it was decided that this could be added to the annual planning meeting at the end of each Spring Term.

Recent successes

INP graduate students have a robust history of applying for and receiving outside funding. Fellowships have come from the National Science Foundation, the American Psychological Association, Ruth L. Kirschstein National Research Service Awards, the Epilepsy Foundation, the Department of Defense and the Canadian Institutes of Health Research. We introduce our students to grant-writing in the first year when we require all first year students to prepare two page fellowship applications under the guidance of their rotation advisor, the *Principles of Neuroscience* course directors and the Directors of Graduate Studies. These applications are submitted to the National Science Foundation and/or the National Defense Science and Engineering committees. Unsuccessful applicants are encouraged to re-submit in the fall of the second year. Eligible third and fourth year students are urged to submit their prospectus as a Ruth L. Kirschstein National Research Service Award application. We have found good success with this early grant-writing mentorship. Students become familiar with the process of preparing their science for funding institutions, requesting faculty feedback and how to handle

critical review. Typically more than 50% of our students are awarded outside funding and they become more confident in looking for and applying to funding opportunities, skills that are necessary for a successful scientific career.

Two of our graduates (Tadzia GrandPré, Ph.D. and Elissa Hallem, Ph.D.) were honored (consecutively, 2003 and 2005) with the Distinguished Dissertation Award in Biology & Life Sciences as awarded every second year by the Council of Graduate Schools/UMI. Many of our graduates have pursued academic postdoctoral fellowships and a number of our graduates are now faculty members at well-respected academic institutions such as UCSF, Emory University, University of Michigan, Case Western Reserve School of Medicine, Johns Hopkins University, University of Minnesota, Cold Spring Harbor Lab, Hofstra University, McLean Hospital/Harvard University, UT Southwestern Medical School, University of Cincinnati, University of Pennsylvania School of Medicine, National Yang Ming University (Taiwan), University of Toronto, UCLA Health Sciences, University of North Carolina, Vanderbilt University, and Children's Hospital of Philadelphia.

National assessments of Neuroscience Graduate programs consistently rank the Neurosciences at Yale as one of the very best training programs. Just this year, the Chronicle of Higher Education ranked Yale Neuroscience as the #1 Neuroscience Program in the U.S. and included us as one of the six featured graduate programs on the cover of their January 12 issue. We are confident that the ongoing NRC review will highlight the strength of our diverse graduate training program. We continue to draw an increasing number of applicants each year. Next year's incoming class all ranked in the top ten of our accepted applicants and one brings a newly awarded NSF fellowship to Yale. Accepted applicants who chose to go elsewhere are matriculating at the other top neuroscience programs around the country. We are pleased that one of our incoming students was selected to participate in the new Yale-China Scholars program and this promises to strengthen ties with this important Yale initiative.

While the INP has not undergone internal review by the BSAC for at least 10 years, a form of outside review of the program has been undertaken. Seven years ago, Haig Keshishian wrote an institutional training grant application for the Interdepartmental Neuroscience Program. The grant was very warmly received by reviewers, requested funding was provided and the training grant is now a core funding source for first and second year neuroscience students. The training grant was submitted for competitive renewal last year and received the best score of all institutional training grants within the BBS programs. While funding for many training grants both at Yale and other institutions are being cut, our current funding level was maintained.

In summary, the INP strives to improve on a regular basis. The leadership in the Program is fortunate to work with the guidance of a talented Student Services Officer, Carol Russo, who is critical to assessing the pulse of the Program and can be counted on to provide important insights into both our successes and those areas that require more attention. The Engleman Report and the more recent feedback from the fall survey provided the impetus for our recent meeting with the graduate students and from that have emerged new ways in which the Program can be improved. As the neurosciences continue to evolve and as the diversity of interests among our students continues to expand, we will face further challenges, but we look forward to those challenges and to finding solutions that optimize the education and experience of our Yale INP students.