# *The Graduate and Professional Student Senate*

# ***Program Review of***

# ***Bioengineering***

# ***Winter 2010***

***The Graduate and Professional Student Senate (GPSS) conducts program reviews of academic departments to coincide with Graduate School's Program Review process. GPSS reviews are a vital component of the final Graduate School Program Report. These reports are the primary source of student feedback in the review process.***

***For each review, the graduate students in the program in question are administered a survey requesting their feedback about their program. The survey results are analyzed into a data report. Two GPSS Senators conduct an in-house interview session with available graduate students. The Senators take their results and the survey data and compile the final report.***

1. ***For more information about the GPSS Program Review Process or questions regarding this Report please contact*** **gpsspa@u.washington.edu**

# Executive Summary

The graduate students who were interviewed expressed satisfaction with the intellectual rigor of the program as well as with the quality of the faculty. All the students that attended the interview spoke highly of the professors as well as the office staff. More than one student expressed that the front office staff really listened and were a catalyst for a positive change in the program within the last few years.

**Educational status of survey and interview participants**

Seventeen students showed up to the interview and about one-third of those students are first-year graduate students. Three different times were set up for first-year, intermediate, and senior graduate students. However, due to communication problems, graduate students from various stages in their degree came to the last interview originally reserved for first year graduate students.

**Feedback on the academic program**

The program has several benefits over other programs, according to the students. One is that the professors treat the students like colleagues and there is flexibility of working with different professors over the course of their academic career. One of the reasons why a particular student came to UW instead of her first choice was interview weekend and the follow-up conversations after she was accepted. These two reasons drove her to change her mind about the UW bioengineering program because of the strong sense of community that the program has. One problem that the students expressed was that they had to take a majority of classes outside the department and wanted more classes offered within the bioengineering department itself.

**Feedback on students' research experiences**

One of the most positive aspects of the bioengineering program for the graduate students is the process of rotation in different labs. Each rotation is for one quarter and after two to three rotations, the student meets with their academic advisor. The ability for students to work in several different labs gives the students the opportunity to work with different advisors/professors in order to find a good fit for the student with a professor. The diversity of the professors offers a variety of different labs to work in. So, if a student did not get their first choice in a lab, because sometimes their first choice would fill up, they could still have the option to work in many different labs with various professors. As a first year student, they have the option to enroll in the early start program, which allows them to work in a lab starting in June instead of October, with the rest of the first year group. The lab rotation allows for flexibility within the department and gives the department a sense of community. The one drawback to the rotation process is that international students found it hard to find a lab to work in because of restrictions on the funding source.

**Feedback on career counseling and job search**
During the interview, one of the expressed concerns related to the lack of preparation that the professors provided for finding a job outside of faculty positions. Since the professors do not have experience outside the scholarly field, they cannot provide adequate advice on how to get other jobs or internships. The department relies on the Career Center to provide information. This is a problem because the majority of the students raised their hands when asked how many were thinking about an industry career over an academic career. However, there is a student run initiative called the Biocareer Committee that is geared towards getting students into the business side of bioengineering.

**Feedback on departmental advising**
This area was not specifically talked about during the interview. However, it seems that the students have a high opinion of the office staff as well as the professors and feel that they are heard as colleagues during their graduate careers.

**Feedback on departmental climate**
According to the students, the departmental climate is very positive overall. The professors as well as the staff are very involved in the students' academic progress. The diversity of degrees among the graduate students is seen as a strength of the program as four out of the seventeen students in the interview had degrees in other areas in their undergraduate programs. Several students commented on the balance between research and culture as a positive aspect. Also, the faculty was reported as being outgoing, well-spoken, and focused. The bioengineering culture can fit with any personality and is well-tied to the Seattle community as well.

**Feedback on funding**
Funding was not discussed during the interview.

# Data Summary

A 43 item survey was administered to graduate students in the Department of Bioengineering from January, 12th – February 10th. 27 students out of 125 enrolled students completed the survey resulting in a 22% response rate.

Educational Status

Among the students that responded, 19 identified as doctoral students and eight identified as doctoral candidates. All but one of the students was pursuing a degree in Bioengineering, were attending school full-time and the majority estimated that it would take 5-6 years to complete their program.

Table 1. Years of admission

| | |
|---|---|
| 2003-2008 | 11 |
| 2009-2010 | 16 |

Academic Program

Table 2. Evaluation of the academic quality of program, faculty, and faculty-student relationships

| | Excellent | Very good | Good | Fair | Poor |
|---|---|---|---|---|---|
| Academic standards in the program | 10 | 10 | 6 | 1 | - |
| Integration of current developments in field | 9 | 13 | 2 | - | 3 |
| Program space and facilities | 10 | 14 | 2 | - | 1 |
| Intellectual quality of the faculty | 12 | 12 | 3 | - | - |
| Intellectual quality of fellow graduate students | 10 | 13 | 2 | 2 | - |

Table 3. Student's evaluations of graduate program

| | Strongly agree | Agree | Neutral | Disagree | Strongly disagree | No response |
|---|---|---|---|---|---|---|
| Program activities foster a sense of intellectual community | 5 | 16 | 1 | 3 | 1 | 1 |
| Program content supports my research or professional goals | 8 | 11 | 4 | 3 | 1 | - |
| Program structure encourages collaboration and/or teamwork | 6 | 15 | 2 | 2 | 1 | 1 |
| Program structure provides opportunities to take coursework outside my own department | 13 | 9 | 2 | 3 | - | - |
| Program structure provides opportunities to engage in interdisciplinary work | 10 | 11 | 6 | - | - | - |
| The amount of coursework required seems appropriate | 7 | 15 | 4 | - | 1 | - |

Teaching experience

6 of the 27 students have had a teaching appointment while in graduate school. The majority of these students have assisted other faculty on their courses for an average of four quarters. Only one student served as a primary course instructor.

3 of the students reported that their program did not provide teacher training and the other three were not sure.

Table 4. Student's ratings of the quality of the teacher training (n=6)

| | Excellent | Very good | Good | Fair | Poor | No opinion |
|---|---|---|---|---|---|---|
| Quality of teacher training | - | - | - | - | 3 | 2 |

One student provided the following comment instead:
"Really depends on the professor."

Table 5. Extent to which teaching experience affected their interest in teaching (n=6)

| | |
|---|---|
| Increased my interest | 2 |
| Made no difference | 2 |
| Decreased my interest | 2 |

Research experience

Table 6. Student's experiences with research, publications and conferences

| | Yes | No | No response |
|---|---|---|---|
| Received adequate training before beginning own research or scholarly work | 24 | 3 | - |
| Received adequate faculty guidance in formulating a research topic | 19 | 8 | - |
| Conducted research in collaboration with one or more faculty members | 22 | 5 | |
| Received funding through a faculty member's grant | 21 | 5 | 1 |
| Received funding to do your own research or scholarly work | 16 | 11 | - |
| Assisted in writing a grant proposal | 11 | 16 | - |
| Published one or more papers as sole author | - | 27 | - |
| Published one or more papers as lead author | 7 | 20 | - |
| Published one or more papers as a co-author | 12 | 15 | - |
| Have attended a professional conference | 21 | 6 | - |
| Have presented paper or poster at a professional conference | 14 | 13 | - |

Career counseling and job search

Table 7. Student's satisfaction with career counseling

| | |
|---|---|
| Very satisfied | - |
| Satisfied | 14 |
| Dissatisfied | 5 |
| Very dissatisfied | 2 |
| No opinion | 6 |

Table 8. Career counseling from faculty

| Did you receive advice on the following topics from your advisor or other faculty members? | Yes | No |
|---|---|---|
| Employment opportunities inside academia | 17 | 10 |
| Employment opportunities outside academia | 14 | 13 |
| How to search for a job | 4 | 23 |
| How to prepare a resume or curriculum vitae | 7 | 20 |
| How to prepare for an interview | 4 | 23 |

Advising

Table 9. Accessibility of information

| | Usually | Sometimes | Never | No opinion |
|---|---|---|---|---|
| Is information on degree requirements available? | 25 | 2 | - | - |
| Is information on degree requirements clear? | 20 | 7 | - | - |
| Are faculty and staff well-informed about degree requirements? | 11 | 13 | 1 | 2 |
| Have you had input into the design of your individual program of study? | 13 | 10 | 2 | 2 |

Table 10. Student's satisfaction with the quality of advising in the program

| | |
|---|---|
| Very satisfied | 7 |
| Satisfied | 16 |
| Dissatisfied | 2 |
| Very dissatisfied | 2 |
| No opinion | - |

Table 11. Interactions with advisor on the following items:

| | 4 + times a month (at least one a week) | 1-3 times a month | Less than once a month | No response |
|---|---|---|---|---|
| Your ongoing research results | 11 | 12 | 4 | - |
| Writing your thesis | - | 3 | 22 | 2 |

Table 12. Satisfaction with amount of communication with advisor

| Very satisfied | Satisfied | Dissatisfied | Very dissatisfied | No opinion |
|---|---|---|---|---|
| 8 | 11 | 4 | 2 | 2 |

All 19 students identified as doctoral students and they were asked specifically about the type of advising they had received in relation to their PhD.

Table 13. Type of advising received

| Have you received advice on the following? | Yes | No | No opinion | Not applicable |
|---|---|---|---|---|
| Preparing for oral examinations | 13 | 5 | 3 | 6 |
| Preparing for written exams | 13 | 4 | 3 | 7 |
| Developing thesis/dissertation proposal | 7 | 5 | 8 | 7 |
| Selecting thesis/dissertation advisor | 12 | 7 | 1 | 7 |
| Doing your research | 19 | 6 | 1 | 1 |
| Plagiarism and other violations of the standards of academic integrity | 20 | 2 | 1 | 4 |
| Your thesis/dissertation draft | 4 | 4 | 4 | 15 |
| Preparing for your final defense | 3 | 4 | 4 | 16 |

Departmental climate

One question on the survey was whether or not students felt that their peers were overly competitive. 20 of the 27 students responded to this question and the majority of them said that their peers were not overly competitive. These students' comments are listed below:

- No, but there is very little interaction between students within the department because there is no culture of interaction or feeling that we are all pursuing our academic interests together as a group. Compared to several other departments on campus, the BioE department does little to foster a community from within, and what little community exists forms in spite of the efforts by the department rather than because of it.
- I've had individual bad experiences, but overall everyone is very collaborative and supportive. Not overly competitive.
- No, mostly everyone is very collaborative.
- No, people are generally helpful.
- No, the whole class has a good balance of intellect and the environment is fairly competitive.
- No, very friendly
- No. I feel there is a healthy level of competition that drives people in this department.

Two students did feel there was some competition and said the following:

- If there weren't competitive students, you would think something was wrong with the quality of the students the program is recruiting.
- Some competition, but for the most part its more about helping each other. Competition to some extend is hard to avoid.

Table 14. Sense of community

| | Excellent | Very good | Good | Fair | Poor | No opinion | No response |
|---|---|---|---|---|---|---|---|
| Sense of community in program | 10 | 11 | - | 3 | 2 | - | 1 |

Table 15. Issues of diversity

| | Yes | No | Unsure | No opinion |
|---|---|---|---|---|
| Program open to cultural diversity | 24 | - | 3 | - |
| Program committed to attracting and retaining underrepresented students | 15 | - | 11 | 1 |
| Program provides support for needs of diverse students | 14 | 1 | 11 | 1 |

Table 16. Witnessed discrimination in the graduate program

| | Frequently | Occasionally | Never | Unsure | No response |
|---|---|---|---|---|---|
| Gender | - | 2 | 23 | 2 | - |
| Race or ethnicity | - | 1 | 24 | 2 | - |
| Country of origin | - | 2 | 23 | 2 | - |
| Religion | | 1 | 24 | 2 | |
| Sexual orientation | | 1 | 25 | 1 | |
| Disability | | | 24 | 3 | |

Table 17. Experienced discrimination in the graduate program

| | Frequently | Occasionally | Never | Unsure | No response |
|---|---|---|---|---|---|
| Gender | | | 25 | 2 | |
| Race or ethnicity | | | 26 | 1 | |
| Country of origin | | | 26 | 1 | |
| Religion | | 1 | 25 | 1 | |
| Sexual orientation | | 1 | 25 | 1 | |
| Disability | | | 26 | 1 | |

Table 18. Student's response to discrimination (more than one response possible)

| | |
|---|---|
| Spoke with perpetrator(s) of discrimination | 1 |
| Spoke with target(s) of discrimination | |
| Discussed incident with friends or family | 3 |
| Spoke to other graduate students | |
| Spoke to faculty or staff in my department | |
| Contacted the UCIRO | |
| Spoke to someone in the Graduate school | |
| Not applicable | |
| No response | |

One student provided the following comment:
"I have witnessed females given more aid and support than males. It suggests the opinion of the perpetrator is that females are less capable and need the extra help. Also, the sciences have an inherent atheistic view point and members of this department often ridicule individuals with a belief in a higher power."

Finances

Table 19. Student's funding

| | More than 9 quarters | 7-9 quarters | 4-6 quarters | 1-3 quarters | None | No response |
|---|---|---|---|---|---|---|
| Teaching assistantship | | | | 7 | 19 | 1 |
| Research assistantship | 6 | 2 | 10 | 9 | - | - |
| Non-service fellowship | 1 | - | - | 2 | 20 | 4 |
| Traineeship or grant | 1 | 1 | 2 | 2 | 17 | 4 |
| Need-based financial aid/loans | 1 | - | - | 1 | 20 | 5 |
| Personal funding | - | 1 | - | 1 | 20 | 5 |
| Other | | 1 | | 3 | 16 | 7 |

10 students have had research or teaching opportunities outside of the program.

Table 20. Are the criteria for financial support eligibility clear?

| | |
|---|---|
| Usually | 17 |
| Sometimes | 8 |
| Never | 2 |
| No answer | - |

Table 21. Does the program provide sufficient funding?

| | |
|---|---|
| Yes | 22 |
| No | 2 |
| Unsure | 2 |
| No opinion | 1 |

Table 22. Anticipated accumulated debt from graduate school

| | |
|---|---|
| $0 | 20 |
| $1-$9,999 | 5 |
| $10,000-$19,999 | 1 |
| $20,000-$29,999 | 1 |
| $30,000-$39,999 | - |
| $40,000-$49,999 | - |
| $50,000-$59,999 | - |
| $60,000-$69,999 | - |
| $80,000 or more | - |
| No response | - |

General assessment

Table 23. Quality of their overall academic experience at this university

| | |
|---|---|
| Excellent | 5 |
| Very good | 16 |
| Good | 5 |
| Fair | 1 |
| Poor | - |
| Other | - |

Table 24. Obstacles to student's academic progress

| | Not an obstacle | A minor obstacle | A major obstacle | Not applicable |
|---|---|---|---|---|
| Work/financial commitments | 15 | 6 | 2 | 4 |
| Family obligations | 15 | 6 | 3 | 3 |
| Availability of faculty | 13 | 8 | 4 | 2 |
| Program structure and requirements | 14 | 11 | - | 2 |
| Defining a research topic | 11 | 9 | 5 | 2 |
| Course scheduling | 10 | 12 | 3 | 2 |
| Immigration laws or regulations | 14 | 3 | 2 | 8 |

The majority of students said it was very likely that they would be able to complete their degree objective. Only seven students said it was "somewhat likely."

Table 25. Satisfaction with program and university

| How likely are you to pursue graduate studies… | Definitely | Probably | Maybe | Probably not | Definitely not | No opinion | No response |
|---|---|---|---|---|---|---|---|
| at this university | 16 | 8 | - | 1 | 1 | 1 | - |
| in your graduate program | 13 | 6 | 5 | 1 | 2 | - | - |
| in your field | 11 | 10 | 4 | - | 2 | - | - |
| in another field | 1 | 2 | 14 | 7 | 2 | - | 1 |

Table 26. Recommending program and university

| | Definitely | Probably | Maybe | Probably not | Definitely not | No opinion |
|---|---|---|---|---|---|---|
| Would you recommend this University to prospective students in your field? | 16 | 8 | 2 | 1 | | - |

Students responded to several open-ended questions. In the first question students were asked what they saw as the most positive characteristics of their program.

1. Academic strength of research faculty. The program is relatively well funded. There are good scientific resources. The majority of faculty do care about mentorship as well as scholarship
2. great research, emphasis on collaboration, accessible faculty
3. I like the collaborative environment, as well as the knowledgeable faculty.
4. Social aspects of the program --- smart, but still outgoing / extroverted students
5. cultural diversity, comradeship, new discoveries
6. Adequate focus on interdisciplinary research and balanced workload. Highly intellectual research environment.
7. A large number of faculty: adds expertise and exposure to different research topics
8. It has a very good reputation. It attracts very bright, motivated, well-rounded students. The community environment within the graduate students is excellent and friendly. It is a very collaboration-friendly group of faculty.
9. Very diverse in people and research, very committed faculty and advisors
10. Interdisciplinary and collaborative
11. Great facilities, great professors, everyone is very helpful
12. Friendly people. Nice outdoor scenery.
13. Interdisciplinary program
14. Freedom of choosing the field, and the accessible to various facilities, plenty of research funding
15. Sense of community
16. Very strong sense of community, departmental pride, and accomplishment. Faculty/students are friendly and helpful, collaborative nature is beneficial to student

learning. Well funded department with plenty of resources/equipment makes research much easier, faster, and more accurate.

17. This graduate program offers freedom to its graduate students to explore beyond its walls. They are open-minded about opportunities beyond the lab and the courses they design. I have discovered that a life of scientific research does not suite me well. Because the department did not restrict my curiosity, I was able to carve another career path for me that is more suitable for my skills and passions.
18. The closeness of the students,
19. Openness of the department among faculty and students.
20. The opportunity to take classes outside of the department, the number of faculty involved in innovation and industry, the commitment of faculty to help mentor and provide support as advisors or merely as outside support
21. Exciting research, faculty, and peers.
22. The people who make it are so nice and open. Young and motivated faculty and just in general nice people make a good and positive environment. Graduate students are happier if people around are happy.
23. Very collaborative environment.

In the second question, students described what they found to be the most challenging aspects of their graduate program?

1. There does not exist a cohesive community within the department, particularly within the graduate student population. Because of this, there is far less cross-fertilization of ideas and collaboration than there should be in a department that works in a very interdisciplinary field. The faculty are sometimes disconnected from student needs/requirements/experiences. Also, for such a highly ranked program, students and faculty do not take the time to recognize/realize their own excellence.
2. Coursework doesn't always seem relevant, not enough advice on how to develop overall research goals/ a thesis.
3. Typical graduate student stuff. Keeping on task, being able to focus and juggle multiple projects.
4. Finding out personalities of the faculty with whom I might want to work with --- takes time.
5. Balancing it with work, a child and commuting.
6. Inadequate advising by faculty advisers
7. Obtaining career advising for choices outside of academia. Getting information and support from faculty to pursue business or industry related endeavors that require small sacrifices in time spent in lab. The department does not make it clear what connections it has to career options outside of academia. There is little preparation for finding and obtaining a job after graduation. It is not clear what avenues exist to receive mentoring and advising from other sources if your primary advisor does not provide it, or does not have the proper career experience to provide relevant advice.
8. Finding courses that apply to my research
9. Long time to degree, unclear job prospects after graduation
10. Structure of exams seems unnecessary (especially qualifier exam)
11. Lack of a scientific community. Too much stress due to funding issues.

12. Self-motivation of the students, and selecting the useful resources from abundant tools. More advice is needed from the past students and advisory other than the research supervisor
13. Irrelevance of required classes
14. The department has poor quality control measures in place to protect the grad student from their advisers own interests or beliefs. When issues arise, we do not have someone in the department to turn to that has the power to intervene. If we do, it is not well advertised. Also, the requirements for graduation are variable. Like many others, I have been required by my adviser to produce enough work for three first author publications before I graduate. Some of my classmates have graduated earlier than I with one or no first author publications. Yet when we graduate, we will both have the same degree.
15. Selecting a professor/project.
16. Less direction given.
17. Finding courses with good professors that are applicable to my research. It seems that many professors don't want to teach so the classes aren't that interesting.
18. Choosing an advisor after the rotations are finished because we have to lock in to a lab before we find out about whether we received NSF funding or not. Feeling integrated with the grad student community - there aren't too many joint events in the department.
19. Not having much representation in the BIOE department for the specific research that I do. There is a specific focus of the department and I would like to have more representation of the research I do.
20. Required coursework is not clear. Number of available and interesting graduate coursework within the department is very limited.

The third question asked students, if they could change one thing about their graduate education to make it more successful of fulfilling, what would it be?

1. Greater graduate student community/feeling of together-new.
2. More help/ advice developing a plan for my thesis/ overall research objectives
3. I'd change some of the required courses. Some of them are too simplistic for those who have the previous background, while too difficult for those who don't.
4. Join the UW sailing club earlier.
5. Not have debt obligations to fulfill while in school
6. Better interaction with advising faculty
7. I would seek out more information about what advisors are connected and experienced with career paths outside of academia. I would spend more time learning from graduate students about the actual advising they receive, or in most cases don't receive and how they dealt with it. I would ultimately select a different advisor that was more knowledgeable and supportive of career paths related to the business side of biotech industry. In the end, I would not select to get my PhD at any school. This decision has nothing to do with the department itself, it is simply a personal realization of not enjoying graduate school research at all.
8. More courses applicable to my research
9. Start thinking about 2-3 solid thesis project from the first year itself
10. Required courses
11. Being more active

12. More opportunity to get to know/meet with faculty
13. The core classes for the major are too basic and broad in topic to make worthwhile and just prove to be a burden by wasting time without any significant educational gain by the students.
14. I would have the department make sure that graduate school is appropriate for the applicant. We focus so much on grabbing the as many of the best candidates as possible but we do not verify that the graduate school is right of the student's personality. When we enter, however, the professor's expect a certain mindset that may never have been there. The recruitment process needs to be a two-way conversation like most professional job interviews are. Many of us had a misconception about what graduate school was going to be like. The recruitment process need to be more forthright and less concerned with the numbers game. This will make for a happier graduate student and a happier department.
15. Join my current group earlier.
16. To have more mentor-mentee interaction with older grad students early on.
17. Different times for the core classes for first year PhD students - the current core classes conflict with many electives (mornings at 9:30).
18. DO some hands on bioengineering demos as a first year instead of going to class. There are a lot of labs and people in Foege that could give demos of protein engineering/ and all the topics that the classes we have to take cover. I would like instead of a lecture to meet in a lab and learn about this techniques in lab.
19. Better coursework.
20. There's too much overlap between the material covered by different classes within BioE - it was an issue at my undergrad too and I think since it's a relatively new subject, people are still determining the best ways to break down the various subjects into individual classes. However, overlap can waste time that would be better spent covering additional topics.