

**Overview:** The reassessment of the Microbiology Program began on July 27, 2006, with a meeting of the Educational Steering Committee. This committee is comprised of students and faculty who are active participants in the Program. Issues to be addressed were clarified during that meeting and tasks were assigned to faculty and students. On August 31, 2006, a second Educational Steering Committee meeting was held to discuss the progress on each of the tasks that were assigned at the previous meeting. A Town Meeting of the students and faculty took place on October 31, 2006 with the purpose of discussing the 2-4 Project and issues related specifically to the Microbiology Program. A meeting of the Executive Board of the Microbiology Program was held on December 8, 2006 to discuss the issues raised regarding the 2-4 Project and their proposed solutions. The Executive Board is comprised of 6 members of the faculty including the DGS and DGA.

**Identification of issues:** The Educational Steering Committee carefully studied the document on the 2-4 Project that was sent to all Directors of Graduate Study and identified key issues for discussion.

**Issues that the committee felt did not warrant further investigation:**

1. **Definition of good academic standing.** Everyone present felt that this was clearly outlined in our handbook.
2. **Handbook improvements.** All members present felt that the handbook was quite good and not in need of improvements. It is handed out in paper form each year to the students and is easily accessible on the internet. The committee noted that improvements and clarifications are made to the handbook on an ongoing basis.
3. **Formulation of a dissertation topic.** All present felt that this was clearly outlined in the handbook and that students received excellent advice and support on formulation of their research topic from their faculty advisors.
4. **Research techniques and where to find them.** All present felt that proper guidance was provided by faculty mentors and other laboratory staff.
5. **Collaborative frameworks.** All members felt that collaborative frameworks were plentiful and accessible by all students in the Program.

**Issues that warranted further study:**

1. **Laboratory rotation evaluation form.** The Microbiology Program did not have a form and was relying on oral presentations for evaluation. Little, if any, feedback, was provided to the students. The committee also felt that a fixed and less flexible rotation schedule should be implemented.
2. **Written assessment of student progress each year.** The committee felt that after the third year the Prospectus, thesis committee meeting reports, and the annual Dissertation Report to the Graduate School served this function. However, a written evaluation was found to be lacking during the first two years.
3. **Mentoring and Advisors.** The committee felt that students needed additional mentoring.
4. **Coursework and writing.** The committee felt that the students may not receive enough formal instruction in writing, especially pertaining to the preparation of grant applications.

## **Proposed solutions to key issues.**

**1. Laboratory Rotation Evaluation Form.** A form was drafted and studied by the members of the Steering Committee, and by students and faculty at the Town Meeting. The final version of this form is attached to this report. The faculty registrar will email evaluation forms to each rotation advisor at the completion of the rotation. The faculty advisor will fill out the form and discuss it with the rotation student. Both the faculty advisor and the student will sign the form and return it to the registrar. The registrar will place the original form in the student's file and send copies to the DGS, the faculty advisor, and the student.

The Program has implemented 10 week laboratory rotations to coincide with the dates of the MCGD Track each year.

**2. Written assessment of student progress during the first and second years.** The DGS will provide a written evaluation of each student during their first and second years. The evaluation will become part of the permanent record of the student and will be given to the student and faculty advisor. The first year evaluation will include course grades and each rotation evaluation. If necessary, the DGS will speak with course directors, especially in cases where a grade lower than High Pass was earned by the student, in order to identify problems that could be corrected by the student. This information will be written into the report and communicated to the student. The DGS may choose to discuss specific issues and their solutions with the student if deemed necessary. Goals may be set during such a meeting with the purpose of improving the student's progress. A summary of this conversation and the goals will be written into the report. This report will be used to guide the student, advisor, and DGS in constructing a plan of action for the upcoming year.

The second year assessment will be comprised of all of the above but also include the report of the Qualifying Examination Committee. Any specific issues raised during the Exam will be highlighted in the report and communicated to the student with the goal of improving the performance of the student.

In subsequent years, the Dissertation Progress Report will serve as the major means of student evaluation. Advisors will be obliged to discuss this report with their students. The DGS will make sure that students, advisors, and members of the thesis committee receive a copy of the completed report.

**3. Mentoring and Advisors.** A questionnaire, which is attached to this document, was emailed to each of the students in the Microbiology Program. The students were asked to fill it out and return it within two weeks. A summary of the student replies follows.

There are several discreet phases in a graduate student's career and there are a few essential things that students would like to experience in terms of mentoring during each of these stages:

### **a. Choosing a lab.**

Rotating students rank 'mentoring reputation' and personality of PI as their two highest priorities when choosing a lab. Many students would like a more formal environment to discuss their choices with older students and in general, would like more guidance in choosing a lab. Rotating students also need a clearly stated set of guidelines from their rotation advisor regarding what is expected of them during their rotation in the lab so that they have the opportunity to put their best foot forward.

### **b. The early years. ( years 2 – 3).**

Students value regular one-on-one meetings with their advisors and are still seeking both hands-on help as well as a clear description of expectations and goals.

**c. In the trenches.** (years 4 – 5)

Students would like their advisors to give them more independence scientifically, while maintaining regular one-on-one meetings. “Big picture” conversations are desired to help direct students to the most productive lines of inquiry leading to publishable work. Students would also like the opportunity to critically review papers, to have their writing critiqued by their advisors and to begin discussing careers and exit strategies.

**d. Finishing up.**

Students are eager for more discussion/advising about how to efficiently finish up experiments, graduate in a timely manner and navigate the career search. Though aware that non-academic jobs are not their advisors’ expertise, they would like to have more discussion of options aside from academic postdocs.

**e. Plan of action.** This information will be distributed to faculty and discussed at faculty meetings. In addition, the DGS along with the Executive Board will facilitate meetings of the students in order for discussions on choosing a lab to take place. The DGS sends a letter to each faculty advisor when a student joins their laboratory. The DGS will amend this letter to strongly encourage faculty advisors to have regular meetings with their students as outlined above in the responses to the survey.

**4. Coursework and writing.** In response to the request by the students for more instruction in preparing grant applications, we have designed a grant writing course; a document describing this course is attached. This course will be headed by a faculty member of the Program. All faculty advisors of first-year rotation students will be required to participate in this course to read and critique grant applications. Fellowship applications that are prepared in this course by students will be submitted to funding agencies.

**Summary:** The evaluation of the Microbiology Program should result in several improvements, including better student evaluation and better communication between faculty and students. The members of the Program look forward to implementation of the suggestions provided by students and faculty during the evaluation process.

## Attachments

**ROTATION EVALUATION FORM  
(Microbiology Program)**

Student's Name:

Rotation Dates

From:

To:

(Month/Day/Year)

Rotation Project: (General Description)

**A. Please rank this student's performance on a scale of 1 to 5 in the following categories:**

Relative Performance Level:	<i>Worst</i>				<i>Best</i>
	1	2	3	4	5
Overall motivation for scientific research					
Knowledge about the subject of the rotation					
Familiarity with the scientific literature					
Proficiency in bench work					
Interactions with coworkers in the lab					

**B. Please use this space below to comment on potential problems or unusual talents the student may have:**

Please meet with the student to discuss this evaluation and ask the student to sign the form at the conclusion of the meeting.

Student Signature \_\_\_\_\_

Date \_\_\_\_\_

Faculty Name:

Faculty Signature \_\_\_\_\_

Date \_\_\_\_\_

*(Please return the completed form to Darlene Smith BCMM-336B by **December 5, 2006** )*

## Microbiology Graduate Program Mentoring Survey

**Please type your responses into the attachment, save the file as “MicroMentoring.doc”, and email the attachment back to Darlene. Your responses will be anonymous.**

1. What year are you in the program?

2-2<sup>nd</sup> years, 1-3<sup>rd</sup> year, 1-4<sup>th</sup> year, 4-5<sup>th</sup> years, 3-6<sup>th</sup> years

2. As a rotating student, what were your information sources about joining a lab and/or choosing a mentor?

Students, (both fellow first years as well as upperclassmen), BBS orientation, BBS handbook, faculty websites, DGS, personal meetings with faculty members.

3. Please rank the following items (1-8) in their order of importance to you for **(1-rotating student)** choosing a lab and then **(2-more senior student)** what is important to you in your lab right now.

Data summarized by ranking each category overall from 1<sup>st</sup> to 9<sup>th</sup>, as well as average score for each category (ranked for 1 – highest priority to 9 – lowest priority).

	Rotating Student	More Senior Student
Quality of Science	<b>3<sup>rd</sup>, (3.7)</b>	<b>1<sup>st</sup>, (2.5)</b>
Topic of Research/Project	<b>5<sup>th</sup>, (4.0)</b>	<b>2<sup>nd</sup>, (2.9)</b>
Lab Funding Levels	<b>8<sup>th</sup>, (7.0)</b>	<b>6<sup>th</sup>, (5.0)</b>
Mentoring Reputation of the PI	<b>1<sup>st</sup>, (3.3)</b>	<b>8<sup>th</sup>, (6.3)</b>
Personality of the PI	<b>2<sup>nd</sup>, (3.4)</b>	<b>4<sup>th</sup>, (4.1)</b>
Building/Lab Space	<b>9<sup>th</sup>, (7.8)</b>	<b>9<sup>th</sup>, (8.1)</b>
Lab Size and Composition	<b>6<sup>th</sup>, (4.6)</b>	<b>7<sup>th</sup>, (6.1)</b>
Lab Atmosphere (people in the lab)	<b>4<sup>th</sup>, (3.9)</b>	<b>3<sup>rd</sup>, (3.8)</b>
Lab/People Management Skills of PI	<b>7<sup>th</sup>, (6.8)</b>	<b>5<sup>th</sup>, (4.8)</b>

Overall, the most obvious and striking change from rotation student to more senior student priorities is the value placed on the mentoring reputation of the PI. Most (though not all) more senior students seem to have shifted their interest to the quality and subject of research in their labs.

4. As a rotating student, what mentoring qualities did you look for in an advisor? Did the advisor you chose have these qualities?

- Hands on mentor who provided one on one help.
- Hands on, involved mentor.
- Hands on mentor.
- Mentor needed to be accessible and easy to talk to. Student did not want to be assigned to a postdoc or grad student, but wanted interaction with PI.
- Accessible, easy to talk to. Open to student ideas.
- Accessible, responsive, keeping track of student's work.
- Open minded to new ideas, willing to let student pursue own interests.
- Wanted mentor who could teach writing.
- Mentor who could identify weaknesses/strengths.

- Good guide without being overbearing.
- Good guide through grad school while allowing for individual development.

In all cases, students responded that the advisor they chose had the qualities they sought.

5. How have your mentoring priorities changed since you joined your lab?

Yes – student needs less help with science, more help finishing up and moving on to postdoc.

Yes – three students have realized that they'd like more help learning scientific writing, how to write critical reviews.

Yes – four students would like more help navigating the job/postdoc search.

Yes – two students generally comment that they would like more independence than they originally sought during rotation.

Yes – one student realized they value having postdocs around and would like to have had more in their lab.

No – two students are still very content with their scientifically hands-on, involved mentor.

6. What are the most:

- effective mentoring strategies experienced by you, lab mates, or classmates?  
(ie. one on one meetings, strategies for writing papers, journal clubs, etc)

Eight students say that one on one meetings are essential while two feel that a general, more casual open door policy fosters the most helpful scientific discussion. In addition, journal clubs, and critical review of scientific writing are good opportunities for good mentoring. Also, on the part of the mentor – straightforward discussion of what is required/expected of the student and on the part of the student – a willingness to clearly describe what help is needed rather than expecting the mentor to intuit it.

- ineffective mentoring strategies experienced by you, lab mates, or classmates?

- Too many meetings!! (prevents independent development)
- Mentors who employ the “come and find me if you need help” approach.
- Students who employ the “they’ll come and help me even if I don’t ask” approach.
- e-mail as only correspondence or discussion of data only in lab meeting
- large group meeting brainstorming
- constant monitoring of bench progress
- neglect of reviewing submitted work, getting papers published

7. Are your mentoring needs currently being met by your advisor? If not, what do you think is missing?

Across the board, students felt that their mentoring needs were being met, however:

Two students comment that good mentoring has required vigilance on the part of the student to make sure the advisor was helping/paying attention.

Two students would have liked their mentors to have helped them focus their scientific work earlier in their careers so that they could have been asking/answering questions more likely to form into published papers.

One student would like more help with critical thinking, writing.

8. What strategies have you and your mentor taken which may have increased the effectiveness of the mentoring relationship?

- Advisor doesn't seem to have mentoring strategies.
- Shifted focus of weekly meetings from data review to brainstorming
- Casual lunch meetings to discuss data
- Mentor keeps track of "whole student" not just scientific progress
- Weekly one on one meetings. (2)
- Open/frank discussion improved bad mentoring relationship (what was bad was not described in survey response.)
- Meetings are evolving to better focus student's work
- Generally open door policy and constant availability

9. What are the most commonly unmet mentoring needs among you, lab mates, or classmates?

- Advisor is unavailable (four students.)
- More guidance needed in initial choice of mentor
- More clearly stated expectations of students during rotation, beyond.
- More help with scientific writing needed
- More focus on enabling students to progress and graduate.
- More advice needed on big picture career development and non-academic jobs.

10. What are the ways that the Microbiology Graduate Program promotes mentoring and/or interaction between faculty and graduate students?

Happy hours, RIPs, the Micro retreat. Science hill students seem to feel isolated.

However, most students simply said:

"I cannot think of any"

11. If you were the DGS of the Microbiology program, what measures would you take to improve mentoring in the program? If your response is 'none' (and assuming this is not because you think all Micro advisors are perfect), what do you see as obstacles to making improvements in mentoring?

Here's what they're saying around the water cooler:

- Encourage faculty to come to RIPs.
- PIs need to be made more aware of pressure on students to graduate.
- Scientific writing course wanted: mock NIH R01 style grants written/reviewed in course taught by faculty of the program
- mentoring between older and younger students
- promote more interactions between students and faculty at more town meetings
- improve mentoring by making mentoring a component of the tenure process
- require faculty to have career guidance discussions (at least once) with their students
- students feels that first 'old school' faculty must be made to see that there actually is a problem with mentorship (though student does not describe what this problem is).
- rather than trying to improve bad advisors, help first years to not join 'bad advisor labs' by holding meeting with upper year students.
- encourage advisors to be more involved in job hunt/career search of students throughout grad career.
- mentoring workshop for mentors. Student acknowledges that mentoring is very low on the list of things necessary for a successful scientific career but feels that PIs should now that happy people working in a well-managed environment are more productive than depressed ones working in a circus.

## **Microbial Pathogenesis Grant Writing Class Proposal**

During our first Steering Committee Meeting to evaluate the Microbiology PhD program we raised the issue of student's training in scientific writing. Joann and I have met and devised the following goals and proposals for the second meeting:

1. Decide whether Microbial pathogenesis students need additional training in scientific writing.
2. If the committee decides a grant writing class is needed, Joann and I propose the following grant writing course. The committee will decide if the class outlined below should be adopted as part of the Microbiology curriculum.

### **Microbial Pathogenesis Grant Writing Course:**

**Course Objectives:** Students will prepare a grant proposal based on their thesis topic to (1) be submitted to a grant agency and (2) serve as an initial draft for the dissertation prospectus.

**When taken:** Fall semester of Year 2. As most grant deadlines are in November, the class will not be for the entire semester.

**Course Format:** The course will be divided into three sections.

1. Introduction to Grant Writing: The first section will teach skills in grant writing, including instructions on how to write a grant and critiques of sample student grants.
2. Grant Writing: Following the introduction, students will write their own grants, tailored for the main student grant applications such as NSF.
3. Grant Reviews: Once the grants are written, students will read and then critique fellow student's grants in a round table format. Both fellow students and faculty will offer comments and suggestions on each grant's strengths and weaknesses. In addition, the faculty advisor can independently help in the writing and review process. Following the review session, students will have the opportunity to revise their grants before submission deadlines.

**Grading:** Satisfactory/ Nonsatisfactory.