University of Rochester, Department of Biology, Graduate Program Assessment Plan

A. Program title: Biology

B. Program degree: PhD

C. Program objectives:

Core knowledge:
The Biology Department provides two PhD tracks: Cell, Developmental and Molecular Biology (CDM) and Ecology and Evolutionary Biology (EEB). The objective for first and second year CDM students is to master fundamental knowledge in the areas of cell biology, developmental biology, molecular biology as well as biochemistry. The objective for first and second year EEB students is to master fundamental knowledge in ecology, evolutionary biology, phylogenetics, population genetics, and evolutionary genomics. All first year PhD students obtain practical research knowledge and experience during three three-month rotations in different laboratories.

Research skills in specialized areas:
At the end of the first academic year, all PhD students join a permanent laboratory to pursue their dissertation research. During the second year, PhD students develop their dissertation research objectives, acquire relevant practical skills through preliminary research, and cultivate scholarly authority of their area of specialization. In subsequent years, these specialized research skills are deepened through ongoing dissertation research.

Creative synthesis:
PhD students develop a broad perspective on their specialized areas beyond their laboratory research through their participation in courses, journal clubs, and a range of weekly seminars given by PhD students, program faculty, and external seminar speakers.

Development of research agenda/scholarship:
During year two, PhD students work with their advisors to develop a long term research plan and gather preliminary data in support of their research objectives. At the end of year two, PhD students provide a written proposal and an oral presentation of their intended research as part of a PhD qualifying exam; a faculty committee evaluates the merit and feasibility of the dissertation research and, separately, the ability of students to communicate the context, motivation, and significance of their proposed work.

Oral communication:
Communication skills are essential to scientists. Biology PhD students develop strong oral communication skills through teaching and

through presentations in laboratory meetings, courses, Departmental seminars, and at scientific conferences.

Written communication:
Biology research is disseminated primarily through published articles in scientific journals. The PhD program teaches students to present complex and/or quantitative research with strong, clear, well-organized prose.

Teaching skills:
Many of Biology PhD graduates seek jobs as assistant professors. To prepare PhD students for their future teaching responsibilities, the program requires at least two semesters of teaching experience. PhD students learn to prepare and deliver classroom and/or laboratory presentations to undergraduate students.

Professional Ethics:
PhD students receive ethics training from their advisors and through a semester-long seminar course in ethics and professional integrity in the conduct of scientific research, the management and dissemination of data, and recognizing and mediating potential conflicts of interest.

D. Assessment of Student Progress

Progress towards program objectives is monitored during the PhD student career through the following evaluation mechanisms.

1. Laboratory rotations: During the first year, each student completes three 11-week laboratory rotations. Students complete small research projects and participate in other laboratory activities, including meetings and journal clubs. At the end of each rotation, students present their research projects in "rotation talks", receive a letter grade and detailed written evaluations from the host PI. Student performance is monitored by the Biology Department's Graduate Affairs and Admissions Committee (GAAC).

2. Course work: PhD students must complete five courses during their first two years, for which they receive course credit based on letter grade evaluations.

3. Teaching evaluations: PhD students serve as teaching assistants for one semester of each of their first two years. Teaching evaluations are provided by the course director as well as undergraduate course participants. Teaching evaluations are reviewed by the GAAC.

4. Research seminars: PhD students present their research at least once per year in Departmental seminar series.

5. PhD Qualifying Exam: At the end of the second year, PhD students submit a written PhD dissertation research proposal abstracts

to the GAAC. The GAAC then selects an appropriate PhD Qualifying Examination committee comprising four faculty with expertise in the area of proposed research. PhD students prepare detailed dissertation research proposals with guidance from their PhD supervisors. During qualifying exams, PhD students are evaluated on (1) their ability to discuss and defend a full written PhD dissertation research proposal, and (2) their command of, and ability to communicate, essential general knowledge in CDM or EEB areas.

6. Thesis Advisory Committee Meetings: PhD students who pass the qualifying exam select a Thesis Advisory Committee (TAC) of three Department faculty members and one external faculty committee member (either from a different department at the University of Rochester or from another institution). Students present their research progress annually in written progress reports and oral presentations to the TAC. The TAC provides feedback during the meeting and in written assessment forms.

7. Doctoral dissertation: PhD students submit written dissertations to TACs. The first chapter is a broad review of the research topic, presenting the state of the field and presenting motivation for subsequent chapters based on original research. Original research-based chapters typically correspond to material published, or intended for publication, in scientific journals.

8. PhD Defense: PhD students present dissertation research in a formal Departmental seminar, including an open question and answer period. Following the oral presentation, the TAC leads a closed PhD defense during which the student is further evaluated in more in-depth discussions.

E. Summary of program components and assessment mechanisms

	Year in program				Assessment
	1st	**2nd**	**3rd+**	**Final**	
Ethics course	1				Graded*
Rotation course	3				Graded*
Rotation talk	3				Faculty review
Course work	1-3	1-2			Graded*
Teaching evaluations	1	1			GAAC review
Research seminars		1	1		Graded* or faculty review
PhD qualifying exam - Research proposal		1			Phd Qualifying Committee Review
PhD qualifying exam - General knowledge		1			Phd Qualifying Committee Review
Thesis Advisory Committee Review			1	1	TAC
PhD Dissertation				1	TAC
PhD Presentation / Defense				1	TAC

* PhD student course grades monitored each semester by GAAC