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# GUIDELINES FOR PROGRAM IN GENETICS AND MOLECULAR BIOLOGY GRADUATE DIVISION OF BIOLOGICAL AND BIOMEDICAL SCIENCES

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July — 2006

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## ORGANIZATION

The PROGRAM IN GENETICS AND MOLECULAR BIOLOGY (GMB) shall consist of a Program Director, an Executive Committee, the GMB faculty, and the GMB students.

The GMB shall be headed by a Program Director, elected by faculty vote and approved by the Director of the Graduate Division of Biological and Biomedical Sciences (GDBBS). The Director shall serve a three year term and be responsible for the overall administration of the program and shall assure student performance to the University in the conferring of degrees achieved within the program. The Director will serve with the assistance of an Executive Committee.

The Executive Committee shall consist of a minimum of four members from the GMB faculty, one member being the GMB Director. Executive Committee members are elected by vote of the GMB faculty and communicated to the Director of the GDBBS. The Executive Committee shall serve to advise the Program Director in all matters. The Executive Committee shall, as a body and through its appointed committees, make recommendations to the Director on: a) admission of students to the program, b) the development of policy within the program; c) development of the curriculum of the program, including the development of new courses for the program, and d) the progress of students in the program.

One member of the Executive Committee shall serve as the Director of Graduate Studies (DGS). The DGS should serve for at least three years. The DGS will: a) supervise the progress of enrolled students; b) coordinate new student laboratory rotations; c) aid new students in choice of laboratory; d) coordinate the qualifying exams; and e) approve thesis committees.

One member of the Executive Committee shall serve as the program Recruiter. The recruiter should serve for at least three years. The Recruiter will serve to coordinate the applicant review process for the GMB program.

The Director and DGS will be available to discuss all issues with students and faculty in the program.

## FACULTY

Members of the GMB faculty shall be appointed by the Program Director with the advice of the Faculty Review Committee and GMB faculty vote. The Faculty Review Committee will be appointed by the Director. Final approval for membership is by the Director of the GDBBS.

Faculty wishing to join the GMB Program will be required to submit an application and deliver a research seminar as described below (*amended March 2006*).

**An application.** All applying faculty should meet with the GMB Program Director to discuss appropriateness and faculty responsibilities of membership in the GMB program. A written application should include a brief description of research interests (200 words for web site), a one-line description for web site, and a complete CV, including a list of grant support. New faculty should provide a letter of support from their chairman indicating their independence, space, and overall level of support. Also, there should be some indication of the type of teaching the applicant would like to do in the graduate program. Faculty not belonging to another GDBBS program will have to complete the necessary paperwork required of the GDBBS for appointment to the GDBBS and the Graduate School. Faculty applicants should have a tenured or tenure track appointment.

**A seminar.** All GMB faculty applicants will have to present a seminar to the GMB program at large.

An opportunity will be provided for current faculty to meet individually with faculty applicants. Faculty opinions will be solicited by the Faculty Review Committee.

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## REVIEW OF FACULTY

- This should occur every year.
- Faculty members will be notified by the Director to submit an updated c.v. (including a list of current grant support), a brief description of what he/she thinks were his/her most important contributions to the Genetics Program during the previous year.
- As indicated in the Guidelines of the GDBBS, assurance from faculty members that funds are available to them for student support (including stipends) should be provided.
- All faculty are expected to make a major contribution to teaching an advanced graduate course in the Program. Faculty who have major responsibilities for introductory courses should teach advanced courses at least once every five years; those with little or no introductory course responsibility should teach at least every three years. To insure that courses proposed by the faculty are those desired by students, all new courses should be discussed with, and reviewed by the Curriculum Committee. Faculty should be aware that it takes six months to a year to get a new course approved and should therefore initiate the process early.

*Faculty may earn teaching credit in the following way (Amended 7/98).*

Compliance in teaching can include:

- Faculty teaching 13 or more contact hours in a single course once every three years.
- Faculty teaching 24 hours or more contact hours over the last three years combined. All graduate courses may be combined.
- Faculty holding the rank of chair, dean.... teaching 13 or more contact hours in a single course once every five years or 24 contact hours in the last 5 years, combined as above.
- Individual Directed study courses will not count towards this requirement.
- Faculty can earn 2 hours teaching credits if they teach 13 or more contact hours in non-graduate school courses. Such courses could include undergraduate courses, medical school/PA courses and etc. ( amended 10/1/00)

Faculty must provide this teaching information in their annual reports in a clear and organized fashion.

- All faculty are expected to participate actively in the recruitment of graduate students for the Program in ways to be determined by the Executive Committee.
- All faculty are expected to give a seminar on their research at least once every three years.
- Faculty are also expected to participate in GMB seminars, attend GMB functions, and the GMB retreat.
- In the absence of mitigating circumstances, faculty members who are not in compliance with the policy cannot take new students into their laboratories for either thesis research or laboratory rotations until such time as they are again in compliance with the policy. Existing students will not be affected, and faculty will be able to participate in other Program activities.

In its implementation of the faculty review, the Faculty Review Committee defines non-compliance as either a lack of peer-reviewed grant support for three years or not making a major contribution to teaching as defined above. A faculty member will be considered to be again in compliance with the policy either upon receipt of a "Notice of Award" or equivalent document, or on the first day of a class to which the faculty member makes a "major contribution." Upon notification of non-compliance by the Faculty Committee, a faculty member will be able to present to the Committee any mitigating circumstances that might lead the Committee to decide that no penalty should be imposed. Faculty not participating in programmatic activities for more than 3 years will be removed from the roster.

*Amended October 3, 2000.*

Faculty may choose to become an ADJUNCT member of the GMB faculty. Adjunct membership precludes faculty from taking GMB students, but allows the faculty to participate in all other GMB activities without the need to satisfy the requirements stated above. A faculty member in non-compliance for two years will be moved to Adjunct status. Faculty may move to Full status by meeting the requirements stated above.

## **ADMISSION OF STUDENTS**

- The Executive Committee or a separately appointed Recruiting Committee will serve as the admissions committee and will make admission recommendations to the Director.
- Applicants must have a strong background in the biological and physical sciences. It is expected that applicants will have Graduate Record Examination (GRE) scores totaling at least 1200 for the two parts (verbal, quantitative) and a grade point average (GPA) equivalent to a "B" or better. All other requirements of the Graduate School of Arts and Sciences and the Graduate Division of Biological Sciences must be met. Students are also expected to have some research experience.

## **RESPONSIBILITY OF FACULTY TO STUDENTS. (Amended 11/95; 6/02)**

- Upon agreeing to take a student into their laboratory, faculty agree to mentor the student and provide the stipend for that student in the years that are not covered by the GDBBS.
- Faculty admitted to the GMB program who have not demonstrated previous training of Ph.D. students will be limited in accepting no more than an average of one GMB student/year for the first two academic years of their appointment into the program. Exceptions to this rule must be approved by the Executive Committee.

## REQUIREMENTS OF STUDENTS

- **Coursework** *Revised on Monday, July 19, 2004*

**Students must complete a total of 72 hours of credit to graduate.** This is accomplished in two parts. Part 1 - 24 hours are completed during the first year. At the end of the first year, students successfully completing their 24 hours of course work are placed in advanced standing.

Part 2 - Once in advanced standing, students must complete 48 additional hours.

*Credit Hours for students entering in 2002 and beyond*

Following admission to Advanced Standing, all GMB students must complete at least **16** hours of course credit for candidacy towards their PhD. These 16 hours may not include Directed Study hours. The balance of the 48-hour total may be derived from the Bioethics course, TATTO, directed study (4 hour max) and dissertation research (IBS 799r).

*Credit hours for students entering in 2001 and earlier*

Following admission to Advanced Standing, all GMB students must complete at least **24** hours of course credit for candidacy towards their PhD. These 24 hours may include up to 4 hours of Directed Study (IBS797). The balance of the 48-hour total may be derived from the Bioethics course, TATTO, and dissertation research (IBS 799r).

**Required Classes (rev May 04)** . All students are required to have completed the following basic courses:

IBS 504	Prokaryotic Molecular Biology
IBS 561	Eukaryotic Chromosome Organization and Regulation
IBS 515r	Current Topics in Molecular Genetics
IBS 555/556	Basic Biomedical and Biological Sciences (rev May 04)
IBS 546r	Presenting Genetics
IBS 606	Values in Science
GMB 570r	Intro. to Graduate Seminar (two semesters)
GMB 597r	Laboratory Rotations

Strongly recommended:

IBS 560 Model Genetic Systems

Students reach Advanced Standing by completion of 24 hours of coursework during their first year.

**GMB Seminars (rev. May 2006)**

All GMB students are required to attend and participate in the GMB seminar program during their entire tenure in the program. GMB students will enroll in IBS 546r for one credit each semester. Their attendance will be monitored at the GMB seminar. Students are allowed two unexcused absences / semester.

**Responsible Conduct in Science (Jan 2004)**

All GMB students will enroll in IBS 606 Values in Science. Additionally, students in years 2 and 3 will participate in the Case Study Sessions provided by the GMB program in the Spring semester. This will be considered a component of IBS 546 for those semesters.

**Directed Study**

The purpose of Directed Study (GMB 797r) is to allow students the opportunity of specialized training in areas not represented by the current courses offered by either our program or other programs. According to graduate school rules, a student in advanced standing (second year) may apply only 4 hours of this course to their 24 hours of coursework needed in advanced standing to graduate.

- GMB students will normally be allowed only 4 hours of Directed Study.
- An outline of the directed study must be submitted to the DGS or the curriculum committee for approval prior to registration.
- To receive credit, a brief summary of the course must be submitted with the grade at the end of the semester (e.g., list of papers, experimental approaches, etc.)

- Approval for more than four hours will only be allowed after approval by the DGS after consultation with the Director or the Executive Committee. Additional directed study hours will not replace any portion of the 24 hours of coursework needed in advanced standing to graduate.

M.D./Ph.D. Students.

Because M.D./Ph.D. students have completed more than 24 hours of basic science course work, they enter the program in advanced standing and thus their first year of courses can be counted towards the 24 hours required.

M.D./Ph.D. students must take all the GMB required courses to fulfill their degree requirements. (rev. 6/97)

- **Lab Rotations, Thesis Advisors (rev. 7/97; 6/02; 3/06)**

As per GDBBS policy, GMB students may perform their rotations and thesis research in the lab of any faculty member who is a member of the GDBBS in good standing. Three rotations are required and the choice of each rotation must be approved by the DGS. No GMB faculty member may take more than an average of one GMB rotation student per rotation period. No more than 2 GMB students may rotate in a lab during any given rotation. Students may elect to rotate in additional labs but should have chosen a laboratory by the end of the first year. Permission to complete fewer than three rotations must be provided by the Director of the program.

Rotation write-up (rev. 7/99). At the completion of each laboratory rotation, the student will submit for discussion with their rotation mentor a short description (2-3 pages) of the rotation, including the intended goals and rationale, methods, and results. Prior to the end of the semester, the mentor will grade the proposal, review it with the student, and submit it to the DGS along with the grade for the rotation.

Choice of thesis advisor (rev. 6/02; 7/06). At the end of the third rotation period, or no later than the end of the summer of the first year, a student should choose a thesis advisor and submit that choice to the Director for approval.

Approval by the GMB Director requires that the faculty member submit an updated BioSketch with current support and the current "Mentor Assignment" form from the GDBBS, which includes a financial pledge of the faculty member's chair. Final approval is made by the Director of the GDBBS. No GMB faculty member may take more than two GMB students per year into their lab.

Students entering labs of GDBBS but non-GMB faculty (rev 3/06) must request specific permission from the Director to do so. For approval, the faculty must be a tenured or tenure-track, a member of the GDBBS, and must agree in writing to abide by the training policies for GMB students.

- **Comprehensive Qualifying Exam**

The GMB qualifying examination shall consist of two components: a written exam will cover basic concepts in genetics and molecular biology in a problem solving setting; and an oral exam will cover basic concepts in genetics, as well as concepts related to the student's program.

- **Written Exam**

- The executive committee will be responsible for creating and grading the written exam for all of the students.
- The exam will be broad based and may cover many areas of genetics including: basic mechanisms of molecular biology; prokaryotic genetics; eukaryotic genetics; human genetics; developmental genetics; and population genetics.
- The exam will be given at the very beginning of the Spring semester of the second year.
- The exam will contain 5 groups of questions (rev. July 99)
  - Students will be required to answer one question within each group.
  - The exam will be closed book.
  - Each question should require about 30-45 minutes to answer.
  - Students will have five hours to complete the exam.

- Graders will be advised what a passing grade is for each question. (rev 10/04)

- A grade of 70% is passing. If a student does not achieve an initial grade of 70%, the executive committee will review the exam and apply the following guidelines to determine whether a student will be allowed to retake the

written exam. ). (rev 10/04)

1. A student scoring between 60 and 69.9% may at the discretion of the Executive Committee be allowed to retake a written exam.
2. Unless the Executive Committee has justifiable reason to make an exception, a grade below 60.0% on the qualifying exam will be considered too low to allow a retake of the written exam. The student will be dismissed from the program at the end of the semester.
3. Students who score between 60 and 70 on the first written exam and fail the second exam but are within 15% of the passing mark may petition the Executive Committee to be allowed to redirect their studies towards the completion of a terminal Masters Degree. Consideration for a Masters Degree will require a brief proposal from the student and a letter from the student's advisor. The advisor's letter will:
  - a. provide a recommendation for the student's laboratory skills;
  - b. state the he/she believes the experimental plan will lead to a Masters Thesis;
  - c. indicate the time to completion; and,
  - d. provide a source of support for the student if completion of the project will extend beyond the Spring semester.
4. The length of GDBBS funding for support of the student will be decided by the Executive Committee, but in no case shall GDBBS funding extend beyond the end of August of that year.
5. Students who pass the written exams and fail the oral exam, may also be eligible for a Masters Degree following the same conditions as described in 3.
6. All terminal Masters Degrees will follow the established GMB guidelines.

The written exam may be retaken only once. Passing of the written exam must be completed by the end of the Spring semester in the second year.

Students passing the written exam will be allowed to form their oral exam committee and take their oral examination.

- **Oral Exams (rev August 02; rev April 03; rev May 04)**

*The purpose of the oral exams is to determine if the student has acquired enough basic knowledge so that they may pursue a doctoral dissertation.*

A standing committee of at least nine (9) faculty members from the GMB program will be appointed by the Program Director. One member of this committee will serve as Chair. One third of the committee will be replaced each year so the average term will be three years.

The oral exam will be given by four GMB faculty members; three (rev May 04) members will be from the standing committee. The student will choose one (rev May 04) other GMB faculty members for their exam committee.

One of the standing committee members will serve as chair of the exam committee and explain the format and rules to the student and the committee at the beginning of the exam.

The format of the examination will remain as previously established in the GMB guidelines:

*During the exam, the thesis advisor will not participate in questioning (or answering!) but will serve as a moderator to keep the exam on track. One member of the standing committee will be assigned as "chair" of the session, will describe the "rules" of the exam to the student and will provide a written report of the results of the exam to the Oral Exam Committee (rev 4/2003). Each of the four members of the committee is allowed to ask the student two sets of questions, each set lasting up to 10 minutes. These question periods should not be interrupted by other committee members; such interruptions have led to much meandering and sometimes inappropriate tangents. Each 10 minute question period should be followed by ~5 minutes of follow-up questions in which the rest of the committee can have their say. The entire exam should last about 2 hours. Like the written exam, the oral exam should cover general information pertinent to genetics and molecular biology. Each committee member will be given a copy of the student's written exam prior to the oral exam.*

After the examination, the student will leave the room and the committee, exclusive of the advisor, will vote to

pass/fail the student using one of the following three descriptors: excellent, acceptable and unacceptable (rev 4/2003). Three of the four examiners must be in agreement on the vote. If a student received a marginal pass on the written exam (70-75), their performance on the oral exam must be better than a marginal pass (acceptable). The advisor will communicate the decision to the student. The committee must sign the Oral Exam form. The chair of the exam session will write a report to the Oral Exam Committee to communicate the results (rev 4/2003).

A student who has failed this oral exam has the option of repeating the oral examination only if they have passed the written exam on the first try.

### **Timing for the exam**

The Chair of the standing committee will convene a meeting of the entire standing committee shortly after the written exam has taken place. The purpose of this meeting is to assign dates and committee members for each student taking the exam.

All exams will take place during a two-week period approximately two months after the written exam. Dates for each student exam will be set by the standing committee, and three members of the standing committee will be assigned to each exam.

The student, with the help of their advisor, will recruit one other GMB faculty members to complete the committee for the scheduled time and date.

### **Review**

- This committee will meet after all exams are completed to review and discuss the value of these changes and to decide if other changes need to be made. Such recommendations will be forwarded to the Director for discussion by the Executive Committee.
- Students must have their exam requirements satisfied before the beginning of the Fall semester of year three.

- **Candidacy**

Students can apply for candidacy after passing their Comprehensive Exam and completing 24 hours of advanced study course credit.

- **Thesis Proposal** (revision 3-2006)

Following completion of their qualifying exams and by October 1 of the next semester, GMB students shall compose a proposal that outlines the aims, basis, and experimental design of their dissertation research. The goal of this proposal is to serve as a blueprint for the student's dissertation. Proposals will be due on October 1<sup>st</sup> of each year and submitted to the DGS and to the student's thesis committee members. Students may receive advice on the contents of their proposal from any source, including their mentor. The proposal will not be graded but satisfactory approval by the thesis committee is required. The thesis committee is expected to provide feedback on the proposal's contents with respect to organization, writing style and skill, and science. The proposal should be no more than 10 pages in length with 1 inch margins and a 12 point font. It is expected to be single-spaced. The format for the proposal is as follows:

- Specific Aims – 1 page or less
- Background and Significance – 4 pages or less
- Experimental Design – 7 pages or less and can include preliminary data and current results.
- References do not count for the page limit.

Along with the proposal, 3<sup>rd</sup> year students should submit their first scheduled thesis committee meeting date. The first thesis committee meeting must occur before the end of the fall semester.

Students are encouraged to use these proposals as the basis of a research grant for outside funding.

Proposals should be updated yearly with a progress report section and distributed to their thesis committees prior to the full annual meeting.

**For current rising 4<sup>th</sup> years (2003 entering class).**

Proposal should be handed to the DGS and their thesis committee on Oct 1 or 1 week before their Fall 06 meeting if earlier.

- **Thesis Committee Meetings (rev 7/98, 7/99, 8/05)**

*The purpose of these meetings is to evaluate the progress of the student towards obtaining a Ph.D. This includes progress in coursework and research.*

The thesis committee must consist of 5 members of which three are members of the GMB program.

The first committee meeting should be as soon as possible after the student has passed their qualifying exams. For the first committee meeting, students should present a brief written outline of their research plan (3-4 pages). The "thesis proposal" will satisfy this latter criteria

Thesis committee meetings must occur at least twice every academic year. It is suggested that students have a less formal meeting (shorter) following their yearly oral progress seminar to the GMB program. A more formal meeting should occur 5-7 months following the GMB seminar.

At subsequent meetings, a brief written progress report should be presented to the committee along with any papers that the student has completed.

A student must have a committee meeting by the end of the Spring semester of their third year.

Comments of the committee should be placed on the Thesis Committee form and sent along with the proposal and/or progress reports to the DGS (goes into student's file).

M.D./Ph.D. students should have their first committee meeting at the beginning of their second year. For students in year 5 and beyond. Committee meetings must occur in the Fall and Spring semesters.

Students in year 6 and beyond must have thesis committee meetings in August, December and April/May. Satisfactory progress is required for stipend continuance. An "It is expected that the following will be completed at the next meeting," series of statements should be planned at these meetings. Completion of these objectives will be deemed satisfactory progress.

- **Dissertation**

Each student will be expected to submit a written dissertation in compliance with the requirement of the Graduate School of Arts and Sciences. The dissertation is based on research proposed and done by the student. The dissertation must be submitted to the student's Thesis Committee. After approval of the written document by the committee, the student shall orally present his/her results at an open seminar. After a period of open discussion, the Dissertation Committee may continue a closed examination of the student and his/her work.

(Amended 11/99) To satisfy the GMB oral thesis exam requirement, students must announce the title, time, and location of the thesis defense at least 14 days prior to the defense date. This can be done electronically or through the mailing of seminar announcement flyers. The dissertation announcement, which includes in addition to the above, the abstract, publications, presentations, thesis committee, etc., must be distributed to the faculty of GMB no less than one week prior to the defense date. The time of the defense should be between 9 AM and 4 PM and should not conflict with a GMB scheduled event.

- **Terminal Masters Degree**

In the event that a student cannot complete the requirements to complete a Ph.D. they may apply for a Masters Degree. Award of the Masters Degree will require that 1) students pass their written and oral qualifying exams;

and 2) that the student completes a written thesis and thesis oral exam. It is assumed that the scope and depth of the Master's thesis is significantly less than that of the Ph.D. dissertation.