Handbook for the
Genetics, Genomics &
Bioinformatics (GGB)
Ph.D. Graduate Program
GUIDELINES FOR GRADUATE STUDIES IN THE
GENETICS, GENOMICS & BIOINFORMATICS Ph.D. PROGRAM

Revised Apr., 2017

I. Preamble

These Guidelines provide Ph.D. students, program faculty, the GGB Steering Committee and the Program Director with a description of the program and policies for graduate study in the Genetics, Genomics & Bioinformatics program.

II. The GGB Steering Committee (GSC)

The GGB Steering Committee (GSC), chaired by the Director and consisting of at least three other faculty members will be responsible for administering all facets of the graduate program. The Director is appointed by the Dean and the other members of the Committee are voted on by the program faculty.

III. Admission Requirements

A Bachelor of Arts or Science is required. A background in genetics, other areas of biology or mathematics or computer science is typically required for admission. Doctoral candidates are admitted primarily through the Ph.D. Program in Biomedical Sciences (PPBS).

IV. Training Program for the Ph.D. Degree

The graduate program in Genetics, Genomics and Bioinformatics is based on the principle that the most effective curriculum is one that emphasizes self-study, in-depth discussions and problem solving.

The first year curriculum follows the PPBS program. This includes one-semester fall courses in the Principles of Biochemistry, Cell Biology, and the Essentials of Genetics and Genomics. In spring of years 1 or 2 the students will take Introduction to Bioinformatics and Computational Biology as a GGB required course. Students take 3 lab rotations that will foster proficiency in areas that are beyond formal courses. Other required and elective course are described below. The training program provides a variety of research-related experiences for the graduate student which includes a Program seminar program of visiting scientists and a Presentation Seminar course. The Presentation Seminar provides experience not only in reading, evaluating and presenting current research papers but also in oral presentation of scientific work. All students are required to attend Program seminars regularly throughout their training.

During their third semester, students will be assisted in developing an original research proposal, which they will defend before their Thesis Committee. Preparing an original research proposal provides an opportunity to apply and sharpen a combination of the skills acquired throughout the first year of the program. This program is designed to prepare students for their Ph.D. research work and for the continual learning process of a career in science. The largest part of developing into a productive research scientist occurs during the research for the dissertation.

V. Student Classification

A. Matriculating Students

Matriculating students pursue a course of study that will lead to a Ph.D. degree. Students are most commonly admitted through the Admissions Committee of the PPBS. The Ph.D. requires a minimum of 72 credit hours. Matriculating students are divided into two categories: full-time students and part-time students. Part-time students are full-standing students who would ordinarily be accepted into full-time study, but because of circumstances, e.g. holding a job, wish to study part time. A student who is, or intends to be, in the doctoral program can normally be registered as part-time for only one year. At the end of this period, the student should become full-time.

B. Non-matriculating Students
This status is reserved for students who are not seeking a degree at this university but wish to take Genetics, Genomics and Bioinformatics courses. Such individuals should provide evidence of meeting course prerequisites. The non-matriculating student status is granted for a one-year period, but may be renewed. A non-matriculating student who wants to enter a degree program, must have a complete application for matriculation considered by the GSC. Transfer of credits obtained during non-matriculating status to a matriculating degree program is not automatic, but may be granted upon review by the GSC.

VI. Student Advisors

During the first two semesters, students are normally advised on academic matters by the Director of the PPBS. Students are also strongly encouraged to consult with other faculty, especially those who may become thesis mentors. At the end of their second semester, students will choose their dissertation research advisor/mentor. Students are expected to start working in their mentor’s laboratory in the summer following their first year.

The Thesis Committee is chaired by the mentor (after the Dissertation proposal is approved), and consists of a minimum of four graduate faculty (including the mentor), three of whom must have an appointment in the Genetics, Genomics and Bioinformatics program. The mentor must have an appointment in the Program. A non-tenure track faculty member may serve as a committee member if he/she is a member of the graduate faculty. Additional graduate faculty members may be appointed upon agreement between the student and his/her mentor, usually with the goal of bringing some special expertise into the committee. One member of the GSC is a full or ex officio member of all Thesis Committees. Beginning in the student’s third semester in the Doctoral Program in Genetics, Genomics and Bioinformatics, the student will register for 1 hour of GGB 702, Research Progress Report. In these meetings, the student will report to the Thesis Committee on the progress of her/his research, and outline plans for the next year. Students are required to meet with the Thesis Committee at least once per year. Students are required to submit Thesis Committee Report forms following each meeting.

VII. Course Requirements for the Ph.D. Degree

The Ph.D. degree requires a minimum of 72 credit hours that include both academic course work as well as thesis research. The first year required courses follow the PPBS first year curriculum which consists of: BMS/GGB 502, Essentials of Genetics and Genomics; BMS 503, Principles of Biochemistry; BMS 501, Cell Biology 1; BMS 509 A, BMS 510 A & B Lab Rotations and BMS 511 Fundamentals in Biomedical Sciences - Informatics and Literature. Once a decision has been made to join the GGB doctoral program students must take BCH/GGB 519, Introduction to Bioinformatics and Computational Biology. In addition the student will take at least two of the following courses:

BCH/GGB 512, Developmental Genomics and Stem Cell Biology (2 credits)
GGB/MIC 611, Advanced Microbial Genetics (2 credits),
GGB 505, Human and Medical Genetics (3 credits)
BIO 425/525, Human Evolutionary Genomics (3 credits)
BCH/MIC 607, DNA Replication and Repair (2 credits)
PHC 509, Pharmacogenomics in the Pharmaceutical Sciences (2 credits)
ORB 510, Saliva and the Oral Microbiome (4 credits).

These latter courses can be deferred to the second year. Additional courses are: GGB 606, Dissertation proposal (taken in the 3rd semester); GGB 607, Presentation Seminar (taken in years 2 - 4) and GGB 702, Research Progress Report (taken in years 2 and following). At least 6 credits of electives in a minimum of two courses are to be chosen by the student in consultation with the mentor. The electives must be 500-600 level courses in science, math, or computer science. The remaining credits will be research credits (GGB 701, Research).
VIII. Typical course schedule for the Ph.D. Degree

Typical BMS FIRST YEAR CURRICULUM - FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 509A</td>
<td>Lab Rotation</td>
<td>3</td>
</tr>
<tr>
<td>BMS/GGB 502</td>
<td>Essentials of Genetics and Genomics</td>
<td>3</td>
</tr>
<tr>
<td>BMS 503</td>
<td>Principles of Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>BMS 501</td>
<td>Cell Biology</td>
<td>4</td>
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TOTAL CREDITS 14

Typical BMS/GGB FIRST YEAR CURRICULUM - SECOND SEMESTER

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
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<tr>
<td>BMS 511</td>
<td>Fundamentals in Biomedical Sciences- Informatics and Literature</td>
<td>1</td>
</tr>
<tr>
<td>BMS 510 A</td>
<td>Lab Rotation</td>
<td>3</td>
</tr>
<tr>
<td>BMS 510 B</td>
<td>Lab Rotation</td>
<td>3</td>
</tr>
<tr>
<td>BCH 519</td>
<td>Introduction to Bioinformatics &amp; Computational Biology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective (1) see GGB or other graduate curricula for current selections</td>
<td>2-3</td>
</tr>
</tbody>
</table>

TOTAL CREDITS 12-13

Typical CURRICULUM BEYOND THE FIRST YEAR

*TWO OF THE FOLLOWING (some requirements may be fulfilled in second semester above):

*GGB/MIC 611   | Microbial Genetics                          | 2       |
*GGB 505      | Human And Medical Genetics                   | 3       |
*BCH/GGB 512  | Developmental Genomics & Stem Cell Biology   | 2       |
*BIO 425/525  | Human Evolutionary Genomics                  | 3       |
*BCH/MIC 607  | DNA Replication and Repair                   | 2       |
*PHC 509      | Pharmacogenomics in the Pharmaceutical Sciences | 2       |
*ORB 510      | Saliva and the Oral Microbiome               | 4       |

GGB 606       | Dissertation Proposal                        | 2       | Fall Second Year once only
GGB 607       | Presentation Seminar                         | 1       | Each semester of registration up to 8 semesters/credits
GGB 701       | Research                                      | 1-12/semester
GGB 702       | Research Progress Report                     | 1       | Fall of 3rd and subsequent years in program

500/600 Level Special Topics/Electives     As required to fulfill 72 credit requirement.
Computer Science, Biostatistics, Neuroscience, Microbiology, Biology or other courses
(Can also be fulfilled by additional GGB courses above)
GGB 501  Laboratory Rotation  3  Generally taken only by students accepted directly into the M.S. or Ph.D. program from outside of the PPBS portal.

IX. Description of Program and Required Courses
Cell Biology - BMS 501  Essentials of Genetics and Genomics - BMS/GGB 502
Principles of Biochemistry - BMS 503  Intro. to Bioinformatics & Computational Biology – BCH 519

These courses introduce students to the fundamental facts and principles of modern biomedical sciences. Topics covered include the following: Genetics, Genomics, Bioinformatics, enzymology, molecular biology; lipids; membranes and lipid chemistry; intermediary metabolism; hormones and hormone action, principles and practices used in computational analysis of DNA and protein sequences, developmental genomics, human genetics and other topics. Detailed descriptions are in the course catalog.

These courses will progressively deliver selected material in depth and equip students for experimental science by introducing them to the critical use of the literature. The later courses will be oriented towards problem solving. Where appropriate, the emphasis will be placed on reading and discussing the primary literature, both historical and current, i.e. in-class discussion of outside reading. Evaluation of students’ performance may include in-class written quizzes or oral exams and midterm and/or final exams.

Laboratory Rotation – GGB 501 (Only for students accepted from outside of the PPBS Portal)
Students admitted directly into the GGB Ph.D. program will in general rotate through at least three laboratories during their first year of study. An optional fourth rotation is also permitted. All incoming students will be assigned laboratory rotations by the GSC after consultation with incoming students and graduate faculty. After the completion of the faculty research orientation, and no later than mid-October, students should indicate preferences for the second through fourth rotation in writing to the Program Director. Students should rank the research areas and up to three faculty members in each area in order of preference. This information will be used by the GSC to place as many students in their top-ranked laboratories as is feasible. Rotations for students accepted into the PPBS program are assigned by the PPBS Program Director.

The faculty rotation advisor will meet with the incoming rotation student to describe the project, the appropriate literature preparation, and the experimental approach. Each faculty advisor will also explicitly define what is expected from the rotation student.

The rotation is an extremely important aspect of the first year graduate student experience. The purposes of the rotation are to introduce students to laboratory research, to teach them a variety of lab techniques that they may draw on throughout their careers, to acquaint them with individual faculty and to provide them with information that will be essential in their selection of dissertation mentors. Students are expected to integrate into the lab team during each rotation. Realistically this means that students should be devoting their time to the rotation when they are not actually in class. A grade of S or U will be given for each rotation by the rotation advisor. Student-generated documentation of the rotation will be placed in the student’s file.

Selection of Dissertation Mentors
Selection of the Mentor is one of the most important decisions a student will make. The decision should be a careful and deliberate one. The process of explicitly discussing the possibility with the faculty members under consideration should not begin until the student has nearly completed the laboratory rotation process. Each student is to apply in writing to the GGB Program Director for her/his choice of Mentor after the end of the last rotation. Students will enter the lab of their first choice if the faculty member agrees. The choice of the Mentor must be approved in writing by the Director of PPBS and the GGB Program Director in the case of PPBS enrollees, and by the GGB Program Director only in the case of students admitted directly into the GGB program.
Public Presentation of Research

Part of doctoral student training and experience is oral presentation of primary research in a public format. Presentation skills are critical to success in science and our effort to provide assistance in acquiring those skills has three components as described below. Note: “First year” refers to students in their first year in the Doctoral Program in Genetics, Genomics and Bioinformatics, their overall second year in the doctoral programs within the Graduate School or third year in the Medical Scientist Training Program (MSTP).

Course Registration and Course Credit Requirements

GGB 606 – Dissertation Proposal (2 credit course/Fall semester). Students register for GGB 606 in the Fall Semester of their first year in the Doctoral Program in Genetics, Genomics and Bioinformatics. Requirements for GGB 606 are described in detail in the Dissertation proposal Section.

GGB 607 –Presentation Seminar (1 credit course/each semester). Students are required to register for GGB 607 in all semesters registered in the Doctoral Program in Genetics, Genomics and Bioinformatics up to a maximum of 8 credit hours (8 semesters).

GGB 607 Requirements: Student attendance at GGB 606 and GGB 607 presentations is required. Active participation in the form of comments and questions is an essential aspect of this and all Program-sponsored presentations (Student, Program, and Distinguished Scientist Seminars) and is strongly encouraged. To facilitate audience participation in the Presentation Seminar/Journal Club Format, the paper being presented must be circulated to the Program at least one week prior to the presentation. Third/fourth year students will be assigned by the GSC to one Presentation Seminar per year to serve as host and moderator to encourage active participation by their fellow students.

Students will be given an S grade based on presentation (presenting students) and attendance (all students). Evaluation and critique of the presentation will be the responsibility of the student’s Thesis Committee; comments from the audience are also recorded on Evaluation Forms available at all student oral presentations.

Programmatic Components of Training in Oral Presentation

A. Overview

1) First Year Students. Students in year 1 of the Program as Doctoral students prepare the Dissertation proposal that is the Program's Preliminary Examination for Application to Candidacy for the Ph.D. degree (see Research Proposal below). The Proposal process begins with a presentation by the student of the background, specific aims and research plan that outlines the Dissertation proposal itself. This presentation is given in the Presentation Seminar. First year students register for GGB 606 in the Fall Semester to receive credit for both the presentation and a successful defense of the Proposal. As doctoral students in Genetics, Genomics and Bioinformatics, these students also register for and participate in the Presentation Seminar, GGB 607.

2) Second Year Students. Students in year 2 of the Program as Doctoral students select and prepare for presentation to the Program a recent primary research paper of their choice. This “Journal Club” presentation is given in the Presentation Seminar 607 course.

3) Third/Fourth Years. Students will be required to offer a minimum of one additional public research presentation in GGB 607. This can be: 1) a second journal club or 2) a formal seminar on their thesis research. The choice between the two types of this third, required oral presentation in the Presentation Seminar is made by the student in consultation with her/his Thesis Advisor; as indicated, this requirement can be fulfilled in either the third or fourth year in the Program. Students may give a fourth Doctoral Research Seminar presentation, i.e., a student who gives a second Journal Club in the third year may, in consultation with her/his Thesis Mentor, chose to give a Thesis Research Seminar in the fourth year.

B. Genetics, Genomics and Bioinformatics Program Research Day.
First Year. Students in their first year in the Program are expected to present a Poster at the Research Day Second/Third Years. Students in their second and third years in the Program are expected to make an oral presentation. Fourth Year. Oral presentations are not expected of students who anticipate defending their thesis in that calendar year.

C. Presentation Seminar - GGB 607

Monitoring this course is the responsibility of the GGB Steering Committee. The objective of the Presentation Seminar is to provide a mechanism for students to gain experience and expertise in preparing and presenting orally a Research/Teaching Seminar. There are three vehicles for doing so: 1) the Dissertation proposal Presentation (GGB 606); 2) the Journal Club; and 3) Thesis Research-In-Progress seminar. The first of these is described in GGB 606. The last of these is to follow the format of a research seminar: Introduction and Background, Research Plan and Experimental Design; Results and Discussion; Summary and Conclusions. The Journal Club is based on recent, topical paper from the primary research literature. The choice of paper is the student’s and it and its subject may or may not be related to the student’s Doctoral Research. The student will be urged to discuss the paper choice with her/his Thesis Advisor and with a member of the GSC.

In the Journal Club, the paper is to provide the context for presentation and discussion of the broader theme upon which the paper is based; the student will not simply go through the paper, figure-by-figure as is typically done in the paper-based courses that have provided guidance to the student in learning how to present scientific data. In other words, the specific subject of the paper is to be a paradigm for a broader question in biomedical science; it is the student’s responsibility to paint this broader picture and to “teach” the audience about it. In this way, the Journal Club will be similar to the Research Proposal and Thesis Research presentations which put a strong emphasis on the “why” of the research and on its broader significance.

Student presentations in the Presentation Seminar will be reviewed by the Proposal Committee (first-year students) and then by the Thesis Committee (second through fourth-year students). The Committees will prepare the appropriate Evaluation forms to be placed in the students’ graduate document files.

D. Special Topics and Electives

These are advanced courses in the 500 and 600 level in specialized areas of Genetics, Genomics and Bioinformatics. The format of each depends on the subject and the instructor. Up-to-date descriptions can be obtained from the course catalog or the SMBS website. Special Topics and Electives may be taken at any time but a minimum of 2 courses and 6 credit hours are required before a student may graduate. The electives may be selected from courses taught outside of the program, subject to the approval of the GSC. The Special Topics requirement can be fulfilled by achieving a grade of B (not B minus) or better. A student cannot take a course addressing the same material more than once to fulfill the requirement. Students should discuss the most appropriate courses to fulfill their elective requirements with their Advisor prior to registering.

E. Dissertation proposal - GGB 606

The research proposal process will begin with a Thesis Research Prospectus presentation/Presentation Seminar in the first semester (Fall) of the second year, the student’s third semester in the School. This 30-40 minute presentation will present an overview of the research in their lab, the objective of their thesis research within that context, and the Specific Aims of the work they plan to complete directed toward that objective. This presentation counts towards the requirement that all doctoral candidates present three Presentation Seminars (GGB606). This presentation will be evaluated by the student’s Proposal Committee specifically for its suitability as a starting point for a Research Proposal.

The Research Mentor will not be a participant in the review and evaluation of the student’s Presentation Seminar presentation, of the written Research Proposal or of the Proposal’s oral defense; the Thesis Committee without the Mentor will be referred to as the Proposal Committee. In addition, for the purposes of the Research
Proposal, each Proposal Committee will be chaired by one of the members of the GSC; this Chair will be a full member of the Proposal Committee. Appointment of these several Committee Chairs to the various Proposal Committees in any given year will be made by the Program Director. This Chair will serve as the Committee’s administrative head ensuring that the student and Committee adhere to the Proposal Timetable; that both student and faculty are being responsive to this timetable and to the academic objectives of this process; and that discussions of the written drafts and the oral defense are objective and consistent with the Program’s academic goals. This member will Chair the Presentation Seminar evaluation meeting and the Oral Defense. A copy of the Presentation Seminar critique prepared by the Proposal Committee members will be given to the student and to the Research Mentor. Copies of the Oral Defense summary also prepared by the Proposal Committee members will be given to the student, the Mentor and to the Program Director, and will accompany the grade submitted for GGB 606.

The Proposal Committee will meet with the student following the Presentation Seminar to present and discuss each member’s evaluation. The written critique prepared by the Proposal Committee members will include the criteria described under Presentation Seminar, but will be extended to evaluate whether an adequate discussion was presented of possible future experiments and/or further hypotheses to be tested that can be derived from the review of the lab’s research and supporting paper(s) presented. If this evaluation is positive, the student may continue with the proposal process. This approval may be contingent on modification of the Specific Aims of the proposed research; such changes should be made and approved within one week of the Research Presentation.

If the Committee concludes that: the Dissertation proposal presentation; the discussion of possible future experiments; and/or hypotheses to be tested were not adequate, the student will be given an opportunity to repeat the Presentation. Students who do not present satisfactorily with respect to the proposal criteria for the second time will receive a U grade for the Proposal. This is grounds for dismissal from the Doctoral Program in Genetics, Genomics and Bioinformatics.

Each student will submit a written proposal to his/her Proposal Committee within 5 weeks of the Research Presentation, allowing for the one week for approval of any changes in the Specific Aims. The written proposal will follow the format of the NIH pre-doctoral fellowship (F31 NRSA Forms—see http://grants.nih.gov/training/nrsa.htm and http://grants.nih.gov/grants/guide/pa-files/PA-14-147.html ) and will consist of the following sections (page limitations are maximums and are not meant to imply that each proposal must reach the maximum limits; they refer to single-spaced pages): Specific Aims, 1 page; Background and Significance and Research Design and Methods, 6 pages; References, no limit. Figures and Tables will be incorporated directly into the text and are therefore included in the 6-page limit. The other sections for the fellowship don’t need to be included for the thesis proposal.

The Specific Aims should be a logical extension of published research from the mentor’s and other labs and should contain a brief but explicit statement of the hypothesis to be tested. The Background and Significance section should briefly describe the background; critically evaluate the most pertinent existing knowledge; and specifically identify the problem with which the proposal is intended to address. This section should draw from the material described in the Research Presentation. The Research Design and Methods should briefly describe how the Specific Aims can be accomplished. This section need not contain exquisite detail, but the student must be sufficiently conversant with the design and procedures to defend their proper application; discuss their limitations; and to describe probable results and their interpretations. The student should also be able to discuss the work proposed in the context of her/his field in general, e.g., if the work proposed is to be on transcription initiation, the student should be able to discuss transcription in general including mechanisms of regulation, the role of chromatin, and processing of the nascent mRNA.

Within one week of receiving the written proposal, each member of the Proposal Committee will return his/her copy of the document to the student along with a written evaluation. The evaluation should point out
major problems to be addressed and corrections to be made. No grade is assigned at this point. Two weeks after receiving the Proposal Committee’s evaluation, the student must return a revised version to the Committee. The Committee will not return this version to the student but will schedule an oral exam within one week. If one or more Committee members feel that the quality of this second draft is unacceptable, he/she can request that the Committee meet to discuss these concerns. If all members of the Committee concur, the student can be given a “U” grade for the Research Proposal at that time without an oral defense. Students are encouraged to meet individually with Proposal Committee members to discuss the revised version before the oral exam.

The Oral Exam typically begins with a brief (15-20 min) summary by the student of the background, hypothesis, Specific Aims, and Research Plan presented in the written Proposal, with the major focus on the Experimental Design adopted to address the proposal’s Aims. The Proposal Committee members then question the student about this Plan: its rationale; choice of experiments and experimental design, exploring possible short-comings of the experimental protocols and possible alternative, negative, or false positive results; and evaluate the student’s knowledge of the general area of the proposal, e.g., if on bacterial replication, how does this compare to eukaryotic replication? The objective of the Oral Exam is not simply to have the student recite orally what has been presented in writing but to examine the student’s overall grasp of the research area in which the lab works and about which the Proposal is written.

The Proposal Committee will evaluate the oral exam and the written proposal and decide upon one of the following courses of action:

1. an unconditional pass (S)
2. a conditional pass - an S grade will be given when limited written revisions or responses to specific questions are deemed satisfactory by the Committee - the oral exam will not be repeated
3. an incomplete - the written proposal must be revised and another oral exam must be taken. The student has two weeks to submit the revisions. An incomplete can be given once only.
4. unsatisfactory (U).

An S or U grade for GGB 606 must be submitted by the mentor within 12 weeks of the Presentation Seminar presentation. Failure to do so (to adhere to the above time-table) is grounds for dismissal of the student from the doctoral program.

F. Research Progress Report - GGB 702

The student’s Thesis Committee will meet at least once yearly (or more often at the discretion of the student/mentor, and/or committee). This will occur during the Fall semester of each year. Students are to register for GGB 702 in the Fall semester in the second and subsequent years of the program (the student’s fifth and subsequent odd semesters of enrollment as a graduate student in the University). Meetings should continue up to the time the Mentor and Committee determine the student can be encouraged to prepare the Doctoral Thesis for written evaluation and oral defense. Results of Thesis Committee meetings will be summarized on the annual thesis committee form, and will include: (a) courses taken and grade; (b) progress toward goals stated the previous year; (c) goals for the coming year; (d) complete citation to all abstracts and papers published in preceding year; (e) indication of whether progress toward thesis is satisfactory. If progress is deemed unsatisfactory, the basis for this judgment, and its potential consequences should be explicitly stated.

The Research Progress Report meeting is designed to assess: 1) the progress that the student has made in their intellectual and scientific development, 2) the progress that the student has made towards the work that will be included in their Thesis, 3) any coursework completed since the last committee meeting and 4) any public presentations or publications by the student. It will test the student on their thought processes and the rigor of their logical reasoning, as well as the practical aspects of their experimental work. The student will prepare a 30-40 minute presentation of the work that they’ve done,
presenting it in the format: hypothesis being tested, experimental approach and procedures, results, conclusions, implications for future studies. The student should expect to be interrupted by the committee during this presentation with questions of the type: "Why is this important to know?, What is the evidence for that?, Are there alternative interpretations of your data?" etc. The student should be expert in all of the techniques that they use in their studies and should be expected to answer questions about how the experiments were designed, the proper controls for each experiment, and the alternative interpretations of results from the experiments. They should be prepared to defend each experiment performed. It will NOT be just a list of experiments done, although that may be part of it. Ideally, the committee and student will work together to generate alternative interpretations, clearer experiments and a working model of the system being analyzed that the student can further test. Over several such meetings, the student will become so clear, precise and facile at describing the system they have studied, what they have learned about it, and what they have yet to learn about it, that they will show that it is time for them to write and defend their thesis. At this stage they'll proceed to writing their Thesis.

The report on the status of the student thesis report form must be completed after each thesis committee meeting, and a signed copy put in the student’s program office file. This form will be completed by the thesis advisor and reviewed and signed by the student, the advisor and all committee members present. Thesis committee reports will be copied to all committee members. This written report must be submitted before a grade can be filed for GGB 702. Any Incomplete (I) grades in GGB 702 arising from failure to have a thesis committee meeting must be removed no later than the start of the next (Spring) semester.

At the first meeting of the Thesis Committee (in the student’s fifth semester) the student presents the abstract of her/his thesis research. Once reviewed and approved by the Committee, this abstract then becomes part of the student’s Application to Candidacy for the Degree of Doctor of Philosophy in Genetics, Genomics and Bioinformatics. This Application must be completed and submitted by the student at or before the beginning of the student’s fifth semester in the University.

X. Standards for the Ph.D. Program

Grading in Courses - GGB 606, 607 and 702 will receive S or U grades. GGB 502, 611, 505, 512, 519, BMS 501, 503, and any other Special Topics and electives will receive letter grades. GGB 701 can be graded as either S/U or A-F depending on the mentors preference.

Academic Standing - The conditions for dismissal from the Ph.D. program are as follows: failure to achieve an overall B average in the first year; two or more B- or lower grades among the other required courses (failure to achieve a grade of B or better upon repeating the course will be cause for dismissal); failure to earn an S grade in the Research Proposal within 12 weeks of the Presentation Seminar presentation; failure to earn an S in three of the four rotations; or receipt of two consecutive U grades in Presentation Seminar presentation. An overall GPA of 3.0 in required course work applied towards a graduate degree is required by the graduate school. A GPA of less than 3.0 will be cause for dismissal.

XI. Financial Aid

A. Students accepted with support may receive State or research grant funds or fellowships.
B. University Fellowships: Presidential and Graduate School Fellowships are awarded by the Graduate School. It is the responsibility of the Program Director, in conjunction with the GGB Steering Committee in the case of new students, to submit applications for these fellowships to the Graduate School according to a timetable established by the Graduate School; normally late February for the following year.
C. Grant support. After the end of the first year, a student’s stipend normally will be provided from the grant funds of the student’s Mentor.
D. Time limit for support. Students are expected to complete their Ph.D. requirements in five years. This will normally be the maximum time financial support will be provided. Under extenuating
circumstances, a student and/or the Mentor may petition the GGB Steering Committee for relaxation of this requirement.

XII. Filing for Ph.D. Candidacy

After completion of the fourth semester (the second semester in the Program) Ph.D. students must complete an Application to Candidacy form and have it approved by the Program Director and committee members. The Application then goes to the Assistant to the Program Director for preparation in final form. As soon as it has been checked and typed, it is the student’s responsibility to get the required signatures and return it to the Assistant to the Program Director for transmittal to the Graduate School.


The Doctoral Thesis Defense will consist of two presentations by the candidate. First, the written thesis will be reviewed by the Thesis Committee and by the Outside Reader. With the written approval of the Outside Reader (Letter to the Program Director, see below) and oral approval by all members of the Thesis Committee, the student will ask the Administrative Assistant for Graduate Affairs to schedule an Oral Presentation of the Thesis to be held with the Thesis Committee; attendance by the Outside Reader is encouraged but not required. Second, following a successful Oral Presentation to the Thesis Committee by the student, the Administrative Assistant will schedule an open Program Thesis Seminar at which time the student will present her/his doctoral research. Successful completion of both presentations will constitute a successful defense of the Doctoral Thesis as indicated by the completion of the Graduate School M Form.

An Outside Reader is at least a tenure-track faculty member (or equivalent) in another Program in the University or at another academic or research institution. The Thesis Approval Letter can be submitted as an electronic file but must be on institutional letterhead and it must state that the thesis is approved for Oral Presentation to the Thesis Committee. If the Outside Reader does not attend the Oral Presentation and/or Thesis Seminar, she/he should be encouraged to submit written questions to the Thesis mentor to be presented to the student at the Oral Presentation.

The time-table for Doctoral Thesis Review is given below based on the following two considerations: 1) the Thesis Committee members and Outside Reader must have at least 3 weeks to review the thesis and approve it for Oral Presentation and 2) at least one week must separate the Oral Presentation from the Program Thesis Seminar.

The Thesis, as approved by the student’s mentor, must be received by the Thesis Committee members and Outside Reader no later than 4 weeks prior to the projected date for the Program Thesis Seminar. This Thesis Draft must be in full compliance with the format required by the Graduate School.

The Presentation to the Thesis Committee must be held a minimum of 1 week prior to the projected date for the Program Thesis Seminar.

There are three administrative requirements to the Doctoral Thesis Review as follows:

1) Progress towards a successful Defense of Thesis will be monitored by the GSC.

2) The standard Thesis Research Presentation form will be used by the Thesis Committee to note approval of the dissertation and Oral Presentation; this approval is required for the student to proceed to her/his Program Thesis Seminar presentation.

3) The Outside Reader will be arranged by the candidate and mentor, but a formal request to serve as Outside Reader will come by letter from the Program Chair.
XIV. Direct admission into the GGB Ph.D. program

While it is planned that the vast majority of GGB Ph.D. students will be admitted through the PPBS program, under some circumstances a student may enter the Ph.D. program directly upon completion of a Bachelor's or Master's degree. Some credits from a UB Master's program may be applied towards the GGB Ph.D., although the Graduate School requires that at least 50% of the credits applied to the GGB Ph.D. degree be from new coursework not applied to the previous degree. Credits for coursework taken outside of UB will be considered on an Ad Hoc basis and are subject to the same 50% rule. Students interested in applying directly into the GGB Ph.D. program should begin early and identify a GGB faculty member willing to accept them into their laboratory prior to applying to the program.

XV. Student Participation in Program Activities

1. Students are expected to participate actively in the evaluation of candidates for faculty positions. In addition to attending the candidates’ seminars, the students meet with prospective faculty members to discuss their research and ideas concerning graduate training. Written evaluations solicited from students are useful to the search committees in assessing teaching abilities, communication skills and interpersonal skills.

2. Graduate students meet with applicants to our graduate program who visit the program to discuss the graduate program and life in Buffalo.

3. Input from graduate students on other issues of the graduate program is encouraged and may be given to the Program Director, a member of the GSC, or any Program Faculty.

4. The faculty feel that it is important that graduate students have opportunities to present their thesis work on an ongoing basis and in an internal forum other than the thesis defense. Therefore, each student in year’s three or beyond will present a 20 minute talk (plus time for questions and answers) on his/her research during the annual program research day/retreat. This research day may include a talk by an outside speaker, to be invited by the students. This research day will take place in Winter interlude.

5. Senior students will be assigned roles as Moderators of Presentation Seminar (GGB 607). This assignment will be made by the Program Director and all students are expected to fulfill this role at least once.

6. The GGB GSA club will allow students to interact on a less formal basis, share common interests, plan events, etc.

XVI. Student Leave Policies

1. Vacation Leave

Program policy is that doctoral student stipend and tuition support be provided by the student’s thesis advisor. These funds typically are administered by the Research Foundation of the University at Buffalo. Therefore, doctoral students are considered Research Foundation employees. The fringe benefits offered through the Research Foundation (e.g. health insurance, Student Health visits) are detailed in literature made available to all new students.

As Research Foundation employees, doctoral students also are entitled to annual leave appropriate to their time-in-service. As students, they do not fill out time sheets, nor do they receive actual leave accruals. However, Program policy is that students will have available to them 2 weeks of leave per year to use for vacation. Those students who need a longer vacation period because of extended travel times may pool two years allowance into a single trip; otherwise, the annual leave time shall be non-accumulating. In regards to vacation leave, the period chosen should result from discussion between the student and mentor and should be consistent with the educational and research commitments associated with the student’s academic and research objectives and responsibilities. Students shall also be allowed reasonable medical absences for sickness or treatment. Time spent fulfilling program or Medical School assignments or responsibilities are not considered vacation or leave time (e.g., assisting in courses, student mentoring and recruitment, organizing research day). These policies also apply to Genetics, Genomics and Bioinformatics program doctoral students paid from State funds.
Two principles shall be followed by the student and mentor in discussing leave time: 1) the student and mentor have made a mutual commitment to training and research objectives; and 2) achieving these mutually reinforcing objectives requires flexibility in effort and time-of-effort. Although the mentor cannot forcibly deny a leave request, she or he can certainly view such a request as inconsistent with the student’s commitment to these training and/or research objectives. If disagreements arise which student and mentor are unable to resolve, the Program Head and Program Director should be informed by either the student or mentor or both and an effort will be made to mediate the dispute.

2. Maternity Leave

Students requesting maternity or paternity leave will be granted up to 8 weeks continuous absence during which registration will be continued and stipend support paid. A more prolonged leave may be negotiated by mutual consent of student and advisor. A student taking such leave shall not take additional vacation during that year.

XVII. Petitions

Petitions must be submitted to the Program Director and/or the Graduate School (and approved by the Divisional Committee in the latter case) for the following purposes:

A. Extension of time limit for completion of degree. Students must submit a petition listing justifying reasons for an extension beyond five years for completion of the Ph.D.
B. Leave of absence. If a student wishes to take a leave of absence a petition must be submitted detailing the reasons for the leave.
C. Change of status. A petition to change status from Ph.D. candidate to M.S. or vice versa must be submitted in the form of a letter to the Program Director. A copy of this letter and the approval must accompany the student’s program form when it is submitted to the Graduate School.
D. Change of Dissertation Advisor. The same procedure for a letter is followed as in C, above.
E. Course requirements. If a student requests that an exception be made to the normal course requirements, the same procedure is followed as in D, above.

XVIII. Grievance Procedure

Students should feel free to contact the Program Director on personal and academic matters or with grievances. On matters under Program jurisdiction in which a student believes he/she has been aggrieved, a formal grievance review may be requested. The request must be in writing from the student concerned to the Program Director (or to another member of the GSC if the grievance involves the Program Director) and must be filed within one month of the alleged grievance. It must clearly state the charge of grievance, its effects, and summarize the particulars concerning it. The Program Director (or other GSC member), in consultation with the concerned parties, will appoint an ad hoc committee with student representation to investigate the grievance. The ad hoc committee’s action is restricted to procedures or administrative matters, as opposed to judgments of academic performance. All hearings of the Grievance Committee will be closed. No formal minutes will be taken. The committee will report its recommendation for resolution of the grievance within one week after filing. Grievance reviews for graduate students are also available through the Graduate School.

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