

**GUIDE FOR GRADUATE STUDY IN THE
GENETICS & GENOME SCIENCES PROGRAM
AT MICHIGAN STATE UNIVERSITY**

Updated Summer 2021

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I. Program Overview

A. Introduction

The degree granting Genetics and Genome Sciences (GGS) Program at Michigan State University provides an opportunity for predoctoral students to concentrate their studies and research in areas of genetics, genomics and molecular biology of eukaryotes, bacteria and viruses. Acceptance into the interdepartmental GGS Program allows graduate students to select mentors and PhD Guidance Committees from approximately 100 participating faculty members, whose academic appointments are with one of the following departments: Biochemistry & Molecular Biology, Microbiology & Molecular Genetics, Animal Science, Chemical Engineering, Entomology, Epidemiology, Fisheries & Wildlife, Forestry, Horticulture, Integrative Biology, Large Animal Clinical Sciences, Obstetrics Gynecology & Reproductive Biology, Pathobiology, Pediatrics and Human Development, Pharmacology and Toxicology, Physiology, Plant Biology, Plant, Soil & Microbial Sciences, Small Animal Clinical Sciences, and Statistics & Probability. Faculty in the GGS Program have well equipped laboratories with research programs supported by grants from federal, state and private agencies and foundations. Michigan State University has state of the art facilities for automated DNA and protein sequencing, DNA and peptide synthesis, mass spectrometry, amino acid analysis, cell sorting and microscopy, and high performance computing. Graduate students receive their PhD or MS degree directly from the GGS Program. The Program also has arrangements for the award of joint degrees with affiliated academic departments or interdepartmental programs such as the Molecular Plant Science Program, the Ecology, Evolutionary Biology and Behavior Program, the Environmental and Integrated Toxicological Sciences Program, and the Computational Mathematics, Science and Engineering department. Dual major doctoral degrees must be approved by the Dean of the Graduate School. A request for the dual major degree must be submitted within one semester following its development and within the first two years of the student's enrollment at MSU. A copy of the guidance committee report must be attached. See Academic Programs (<https://www.reg.msu.edu/academicprograms/Text.aspx?Section=111#s407>) for details.

All GGS Program graduate students receive financial support throughout the course of their studies. First year students enter through the Biomolecular Science Gateway, and are supported by graduate research assistantships or fellowships for their rotations. Subsequent years of support come primarily from the research mentor. Stipends are set annually and are competitive with those provided by departments and other programs at MSU, and other prominent universities in the USA. In addition, all graduate assistants receive up to nine credits tuition waiver per semester for Fall and Spring (three credits is full time for doctoral students on assistantships) and five credits for summer semester, waiver of matriculation fees and paid health insurance. See the "Financial Aid, Stipends for Graduate Assistants" section for more information.

B. Overview of Genetics & Genome Sciences PhD Program Requirements

GGs doctoral programs are tailored to meet individual student goals and interests. To ensure that each student obtains a solid foundation in genetics, the GGS Program requires a minimum of 20 credits in 800 and 900 level courses (see Course Requirements, page 8). Four credits will be obtained by participation in GGS seminar courses which give the student an opportunity to read, discuss, and present scientific literature related to current scientific discoveries (see GEN 800, page 10). Research will play a major role in the graduate program and a minimum of 24 research credits is required. During the second year of graduate school, each student should establish their Guidance Committee and meet with its members at least yearly thereafter. The Comprehensive Examination is given when approximately 80% or more of the required course work is completed and the dissertation research proposal has been prepared (see Comprehensive Examination, page 16). It is expected that this examination will be completed during the third year of study. Teaching experience is essential and all GGS Program graduate students are required to complete a minimum of one semester of teaching (see Teaching Experience, page 25). The GGS Program graduate students will also have numerous opportunities to expand their scientific knowledge by participating in symposia, seminars, and retreats.

C. Time Line for Graduate Studies in the Doctoral (PhD) Program

1. Typical First Year

All incoming Biomolecular Science (BMS) students will participate in an orientation session. Students will be advised by the BMS director or associate director on participating program requirements and coursework to be taken during the first year. Students interested in the GGS Program are also encouraged to consult with the GGS director or associate director. Students should complete the required year 1 Responsible Conduct of Research training modules (see page 11). All students interested in the GGS Program should complete the on-line training on the MSU employee Relationship Violence and Sexual Misconduct Policy (<http://ora.msu.edu/RVSM>). Not only is this training important, but the training is mandatory for all students supported by a graduate research or teaching assistantship, and most GGS students will be funded by an assistantship at some time during their program. Students should also complete MSU's DEI (diversity, equity and inclusion) training (<https://ora.msu.edu/train/index.html>). During the first year, a typical graduate student interested in the GGS Program will complete three eight-week laboratory rotations, and three or four required courses including Molecular Biology (BMB 801) or Plant Molecular and Omic Biology (PLB/BMB 856) (see page 7). Generally, after completing three laboratory rotations (approximately six months) but before the end of the first nine months, the graduate student seeking to join the GGS Program should have selected a major professor who is a member of the GGS Program faculty, and will have initiated research in an area well-served by the molecular or computational genetics emphases of the program.

2. Typical Second Year

In the second year, a GGS Program graduate student continues the required course work and will generally fulfill the teaching requirement. Before the end of the first eighteen months, a doctoral dissertation research theme, under the guidance of a GGS Program faculty member, should be

arranged, a Guidance Committee established (see page 15) and the first Guidance Committee meeting held (see page 16). The student should discuss with their mentor what they would like to present at the first Guidance Committee meeting. Decisions are made with the Guidance Committee concerning additional course work, the objectives and the details of the experiments for the research project, source of support, teaching requirement and the date and format of the comprehensive exam (see page 16). Following the first committee meeting, students need to submit their Ph.D. degree plan in the web-interactive system GradPlan at <https://student.msu.edu/>. The names of all guidance committee members should be entered into GradPlan, and the major professor should be designated as the committee chair. Subsequently, a Guidance Committee meeting should be scheduled at least every 12 months after the first meeting, and the GGS Program Guidance Committee Report form (see page 50) or a similar report documenting the meeting should be submitted to the GGS Program Office. During spring semester of the second year, the student is encouraged to enroll in GEN 840 (Genetics Writing Skills), which is designed to assist students with preparation of the research proposal.

3. Typical Third Year

With the exception of GEN 800 requirements, a GGS Program graduate student should have completed all course work by the end of the third year. Before the end of the third year, the comprehensive exam should also be completed. MSU requires that the comprehensive examination be completed within five years from the time when a student begins the first class at MSU that applies to their doctoral program. The third, fourth and fifth years should be devoted almost exclusively to PhD research. Another PhD Guidance Committee meeting should be scheduled within a year of the last committee meeting and before the end of the third year. Discussion at this committee meeting is usually devoted to research progress, provided the student has passed all portions of the comprehensive exam. At least one week before the meeting, and for every subsequent annual meeting, Guidance Committee members should be provided with a detailed written report of the student's research progress and pre-prints and/or reprints of publications authored or co-authored by the student. The student should give the Guidance Committee members an approximate date for completion of the research project and dissertation. The GGS Program Guidance Committee Report (see page 50) or a similar report documenting the meeting is to be completed at each Committee meeting and filed with the GGS Program office.

4. Typical Fourth and Fifth Years

The goal in the fourth and fifth years is to finish the PhD research, complete any remaining course requirements, usually GEN 800's, write and defend the dissertation, and participate in GGS Program activities including the GGS Program Seminars and/or Symposia, GGS Research Forum, and relevant journal clubs and workshops (see page 27). The average time period for graduate students receiving their PhD in GGS is five and a half years.

5. Typical Timeline for Graduate Studies in the Genetics & Genome Sciences PhD Program

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6 +
Biomolecular Science Retreat	Biomolecular Science Retreat	Biomolecular Science Retreat	Biomolecular Science Retreat	Biomolecular Science Retreat	Biomolecular Science Retreat
Courses BMB 801 – Fall or PLB 856 – Spring Genetics course and/or Computational course and/or Elective courses	Complete required/elective courses GEN 800 Research credits (GEN 999) Establish guidance committee First Committee Meeting -progress report for committee - report form for program Teaching experience IBIO 341 (GEN 810)	Courses: GEN 800 Any additional coursework required Research credits (GEN 999) Written Research Proposal and Comprehensive Exam Annual Committee Meeting RCR annual refresher	Courses: GEN 800 Research credits (GEN 999) Annual Committee Meeting RCR annual refresher GGS Research Forum GGS Symposium	Courses: GEN 800 Research credits (GEN 999) Writing dissertation Dissertation Defense and/or Annual Committee Meeting RCR annual refresher GGS Research Forum GGS Symposium	8 year limit to complete all work Writing dissertation Dissertation Defense and/or Annual Committee Meeting RCR annual refresher GGS Research Forum GGS Symposium
Three 8-week Rotations					
Responsible Conduct of Research – Year 1 CITI modules					
Select Mentor	GEN 840				
GGS Research Forum	RCR Year 2 CITI modules/workshops	GGS Research Forum			
GGS Symposium	GGS Research Forum GGS Symposium	GGS Symposium			

II. Description of the Doctoral (PhD) Program of Study.

A. Coursework

1. Course Credit Requirements

At least 20 credits in 800 and 900 level courses and a minimum of 24 credits of doctoral dissertation research (GEN 999) are required. The following categories (I, II, III, IV, V) of requirements must be completed.

- I. Complete each of the following:
 - BMB 801 - Molecular Biology (3 credits, Fall) or PLB/BMB 856 – Plant Molecular and Omics Biology (3 credits, Spring)
 - GEN 810 - Theory and Practice of Teaching Genetics (1 credit/semester) One credit is required, students may accumulate a maximum of 3 credits

- II. Complete one genomics, quantitative or computational biology course. A course from the following list typically fulfills this requirement. However, other courses as well as appropriate workshops or on-line courses may also be acceptable at the discretion of the GGS Program Director.

ANS 824: Methods in Quantitative Genomics (Fall, 3 credits)

BMB 961 - Genomics and Proteomics of Complex Genetic Systems (2 credits, Fall even years)

CMSE 801 - Introduction to Computational Modeling (3 credits, Fall, Spring)

CMSE 802 – Methods in Computational Modeling (3 credits, Fall, Spring)

CMSE 890 – Selected Topics in CMSE (topics vary, Fall, Spring)*

CSS 941 - Quantitative Genetics in Plant Breeding (3 credits, Spring even years)

EPI 808 - Biostatistics I (3 credits, Fall)

EPI 808B - Advanced Biostatistics (3 credits, Fall)

EPI 853B - Statistical Computing (3 credits, Fall)

EPI 855 - Biostatistical Modeling in Genomic Data Analysis (3 credits, Fall)

FW 849 - Applied Bayesian Inference Using Monte Carlo Methods for Quantitative Biologists (3 credits, Fall even years)

HRT 841 – Foundations in Computational and Plant Sciences (3 credits, Fall)

IBIO 830 – Statistical Methods in Ecology and Evolution I (3 credits, Fall)

IBIO 831 – Statistical Methods in Ecology and Evolution II (3 credits, Spring)

PLB 812 – Plant Genomics (3 credits, Fall)

PHM 830 - Experimental Design and Data Analysis (3 credits, Fall, Summer)

STT 814 - Advanced Statistics for Biologists (4 credits, Spring)

STT 855 - Statistical Genetics (3 credits, Fall odd years)

*A total of 3 credits of CMSE 890 fulfills the computational course requirement

- III. Complete one course in genetics. A course from the following list typically fulfills this requirement. A second course from List II may also fulfill this requirement. Other courses may also be acceptable at the discretion of the GGS Program Director.

ANS 804 – Introduction to Quantitative Genetics (3 credits, Fall)
FW 828 - Molecular Ecology & Conservation Genetics (3 credits)
MMG 833 - Microbial Genetics (3 credits, Fall)
MMG 861 - Advanced Microbial Pathogenesis (3 credits, Spring odd years)
PLB 849 - Evolutionary Biology (3 credits, Spring)
PLB 856 - Plant Molecular and Omic Biology (3 credits, Spring)
PLB 866 – Molecular Plant Physiology (3 credits, Fall)
PLP 881 - Molecular & Biochemical Plant Pathology (3 credits, Spring)
PLP 884 - Prokaryotic Diseases of Plants (3 credits, Spring odd years)

- IV. Complete two other elective courses. Any 800/900-level course may fulfill this requirement including a course from List II or List III.
- V. Complete four semesters of GEN 800, Genetics Seminar (1 credit each) during the four to five years of graduate study in the GGS Program. Seminar courses from other departments may be acceptable at the discretion of the GGS Program Director.
- VI. The student's Guidance Committee may require additional coursework and/or students may elect to take additional optional courses.

2. Course and Research Credit Load per Semester

All students who receive funding through a graduate assistantship or fellowship are required to enroll as full-time graduate students. Full-time for a PhD student is at least three credits for fall and spring semesters, one credit for summer semester. Once comprehensive exams are completed, MSU defines full-time as one credit for all semesters. A summer research only option is available for PhD students who have passed their comprehensive exams in which students appointed as graduate research assistants in the summer enroll for one credit, but no tuition is charged. For details visit:

http://www.hr.msu.edu/hiring/studentemployment/gradasst/grad_nofringe/index.htm.

Credits can be in the form of formal courses and research credits. PhD programs require a minimum of 24 doctoral dissertation credits (GEN 999) and a maximum of 36 credits. Each student working towards a doctor of philosophy degree must conduct original research and prepare a dissertation that makes a significant contribution to their particular research area. The research is to be carried out under the direction of the Guidance Committee and must be acceptable to all of its members. Enrollment in courses, credit load per semester, and training activity should have prior approval of the major professor and the Guidance Committee.

3. Required and Elective Courses

The program of study outlined above consists of at least 20 credits of required and elective courses, 24 - 36 credits of doctoral dissertation research (GEN 999) and a dissertation topic that is approved by the major professor and the Guidance Committee members. The GGS Program graduate student, major professor and Guidance Committee will decide upon courses that will be counted towards the degree. Within one semester after the formation of the Guidance Committee, the program of study should be entered into GradPlan. Students may access GradPlan at <https://student.msu.edu/>. The student should work closely with their Ph.D. advisor while creating their Ph.D. Degree Plan. The approved program is considered as a binding record of the requirements for the student's PhD degree. Any change in the program after filing the GradPlan entry must be approved by the major professor, members of the Guidance Committee, the GGS Program Director and the Office of the Dean, College of Natural Science.

If unusual circumstances warrant a GGS Program graduate student and the Guidance Committee to plan a program of study which differs from the GGS Program requirements, a statement outlining the reasons for such a decision should be prepared and signed by the Guidance Committee members submitted to the GGS Program Director. This statement is not a petition for approval or a request for a waiver of requirements. The responsibility for the decision rests with the Guidance Committee and the statement is solely for the permanent record. The program of study must, of course, conform to College and University requirements.

4. Genetics 800 Courses

GEN 800 seminar courses are offered during the fall and spring semesters. Each one focuses on a narrowly defined topic in genetics, genomics and/or molecular biology. The format of the class may vary at the discretion of the instructor(s); however seminars usually require reading primary literature, discussion of articles and oral presentations. All GGS Program PhD students are expected to successfully complete four semesters of GEN 800. GEN 800 uses the Pass/No Grade (P-N) grading system. Dates and topics of GEN 800 courses will be announced by email to all students and faculty in the GGS Program and listed on the GGS website.

Seminar courses offered by other departments may be considered for fulfillment of this requirement upon the review of course content and approval of the GGS Program Director. Students should send the description of potential courses to the GGS Program Director for approval.

5. Responsible Conduct of Research

Students must complete training in the Responsible Conduct of Research (RCR) each year as noted in the following table. RCR training is documented in the Ability Learning Management System (<http://ora.msu.edu/train/>), and is recorded and compliance monitored in the student's GradPlan. Information for enrolling in online RCR modules through the CITI program can be found at <https://ora.msu.edu/CITI-RCR-registration>. The Graduate School sponsors a Responsible Conduct of Research and Scholarship Workshop Series, and workshops from this series may be used to fulfill additional RCR training requirements. The schedule and registration information for this workshop series is available at <https://grad.msu.edu/rcr>. At least six hours of discussion-based training must be completed by the end of the second year; workshops from the Graduate School RCR workshop series or other RCR discussion activities may fulfil this requirement. Each semester, a session of the GGS Research Forum will be devoted to discussion of an RCR topic, and participation in these sessions will partially or completely fulfill the annual refresher training, as well as contribute toward the discussion-based training requirement. Students should record the topic, format and date of all RCR training activities on the annual guidance committee report form (see page 50).

Year 1	Year 2	Year 3 forward
<p>Complete four required CITI online modules</p> <ul style="list-style-type: none"> • Introduction to the Responsible Conduct of Research • Authorship • Plagiarism • Research Misconduct 	<p>Complete three modules selected from list:</p> <ul style="list-style-type: none"> • CITI Collaborative Research • CITI Conflicts of Interest • CITI Data Management • CITI Financial Responsibility • CITI Mentoring • CITI Peer Review <p>By the end of year 2 have completed 6 hours of discussion-based training</p>	<p>Three hours per year of annual refresher training</p> <ul style="list-style-type: none"> • Training activities may be selected to coincide with activities pursued by the faculty advisor's laboratory • Activities may include: <ul style="list-style-type: none"> ○ Graduate School Workshop ○ On-line Module ○ Workshop/Forum ○ Seminar ○ Lab Meeting ○ One-on-One Discussion

B. PhD Research

1. Laboratory Rotations

During fall and spring semesters of the first year, students will complete three eight-week laboratory rotations. The approximate rotation dates will be announced at the BioMolecular Science (BMS) orientation.

Rotations allow exposure of the student to different MSU faculty and their research. At the beginning of each laboratory rotation, the graduate student is assigned a role in the ongoing research effort of the laboratory in which they are rotating. The laboratory rotations are valuable for establishing relationships with faculty and other students on campus, for learning strategies, approaches and techniques, and for gaining appreciation of a variety of experimental organisms and diverse areas of research within the field of genetics and genome sciences. Throughout the eight-week laboratory rotation, the student should initiate frequent meetings with the mentor to discuss their progress in the laboratory. At the first meeting with their rotation mentor, the student should inquire as to how the mentor will evaluate the student's performance and how many hours per week the student is expected to carry out research in the laboratory.

Laboratory rotations are arranged in consultation with the BMS director or associate director. Students are encouraged to view BMS and GGS Program faculty web sites to learn about research interests and recent publications. Faculty web sites are available as links from the GGS Program web site at www.ggs.natsci.msu.edu/. New students should attend the BMS orientation faculty talks, and the BMS Fall Retreat. The weekly GGS Research Forum also provides insight into campus research programs. It is suggested that the student read one or two recent publications written by the faculty member in whose laboratory they might wish to do a rotation, and then meet with the faculty member and discuss the possibility of a laboratory rotation.

The next step for the graduate student is to make decisions about the laboratories in which they wish to do the three rotations. The student should be sure that the faculty members have also agreed to the laboratory rotations. If a new graduate student would like advice or help in selecting a laboratory rotation, the GGS Program Director will be happy to assist.

Finding the right laboratory and mentor is crucial in one's pursuit of a PhD degree. MSU's commitment to graduate student mentoring is articulated in the Guidelines for Graduate Student Mentoring and Advising (<https://grad.msu.edu/msu-guidelines-graduate-student-mentoring-advising>). The GGS Program recognizes the value of finding the appropriate match between student and mentor and encourages students to make careful, well-informed decisions regarding their selection of rotations. Students are expected to decide upon a major professor after participating in three laboratory rotations.

There are times when unforeseen circumstances would prevent a student from selecting a mentor after the three rotations. In those occasions, the student may request a fourth rotation. The granting of a fourth rotation will be at the discretion of the BMS Director and depends upon the availability of funds. The student will be expected to identify an acceptable laboratory and mentor after the fourth rotation. In the event that a student is unable to do so, it shall be the

responsibility of the BMS Program Director to resolve the problem. In the event that no suitable mentor is identified the student may be asked to withdraw from the BMS Program.

The BMS Director may excuse a student from one or more of the rotations when the student requesting an exemption from this requirement makes a strong argument in writing. For example, a graduate student with an MS degree in a biological science or related area may come to MSU with the intent of working with a particular faculty member. In addition, a student who has identified their mentor and permanent lab after two rotations may obtain a waiver for the third rotation.

2. Selecting a Graduate Dissertation Research Topic

A graduate student's research project is usually related to or a part of the research interests of the major professor. A discussion with the major professor will often uncover unanswered problems of immediate interest. From these biological questions, the area of research develops. The general area of the research program is determined when the program of study is developed. Details regarding conduct of research are planned and approved in consultation with the major professor and Guidance Committee members. If possible, initial plans should be completed prior to beginning the actual research program. The nature of a PhD research project usually requires adjustments as progress is made. The GGS Program graduate student should not expect the advisor to provide a complete and clearly defined hypothesis from which they will derive a research project. The purpose of a thesis project is to develop and perform a novel project, which must be a collaborative effort between student and mentor. It is expected that a GGS Program graduate student will develop and then demonstrate creative thinking, technical expertise and the appropriate communication skills.

Before initiation of any research project involving human subjects and materials of human origin, federal and MSU regulations require the research project be reviewed and approved by an Institutional Review Board (IRB) (see page 38). Similarly, any research involving animal subjects must be approved by the Institutional Animal Care and Use Committee (IACUC) (see page 38).

3. Major Professor

a. Selection of Major Professor

The major professor must be a faculty member in the GGS Graduate Program. The major professor serves as the student's academic advisor, doctoral dissertation research advisor, and as chair of the student's guidance committee. To aid the process of selecting a major professor, first year graduate students are encouraged to become familiar with the research programs of as many professors in the GGS Program as possible. Faculty research descriptions are located on the GGS Program web site at <http://ggs.natsci.msu.edu/>.

Factors to consider in selection of the major professor are: 1) the research area and its exceptional interest to the student, 2) space in the laboratory and financial support for the student's research, and 3) personal compatibility with their research mentor. On the latter issue, a

mutual understanding between professor and student is important to promote the development of the student's creative potential and ability to conduct research.

Students are normally expected to defer selection of the research mentor until the middle of their third rotation (or at least the middle of the second rotation). This selection process is by mutual agreement between the student and professor. Upon selecting the major professor, the student will promptly notify both the BMS and GGS Program offices.

b. Responsibilities of the Graduate Student and the Major Professor

Completion of all of the requirements for the PhD degree is the responsibility of the GGS Program graduate student and the major professor. The GGS Program graduate student will maintain accurate records of progress with their major professor and the GGS Program office. It is the responsibility of the GGS Program graduate student to be familiar with the administrative forms mentioned throughout this handbook (see page 50) and those of the Graduate School, and to keep their file complete and up-to-date. Forms to be filed include:

- Program of Study entered in GradPlan (completed after student's first committee meeting)
- GGS Program Guidance Committee Report (completed at yearly committee meeting)
- Record of Comprehensive Examination (due at time of comprehensive exam)
- Record of Dissertation and Oral Examination (due at time of oral defense of dissertation)

Forms are available from the GGS office or on the GGS web site (<https://ggs.natsci.msu.edu/>), and should be completed at the appropriate times as indicated and submitted to the GGS Program office. The information in a GGS Program graduate student's file is used to track student's progress, assure compliance with various University requirements for graduation, as a basis for awarding and continuing assistantships and for various departmental and university awards. Therefore, it is in the best interest of the student that these files be as comprehensive as possible.

The Program of Study is recorded through GradPlan (<https://student.msu.edu/>), which is the official website for all doctoral student program planning, guidance committee reports and changes, comprehensive and final defense reports, submission of the dissertation to the Graduate School, and the final University degree certification. It provides electronic circulation for checking/approvals and generates automatic emails when needed.

A GGS Program graduate student and their major professor have the responsibility of executing a program of graduate study. Until a Guidance Committee has been appointed, the major professor or the GGS Program Director is the key figure in designing a program. The GGS Program graduate student should maintain close contact with their major professor and/or Guidance Committee. A major professor on leave should provide a replacement adviser during their absence and also arrange for continuity of financial support. The methods used to maintain contact with the major professor will vary with each individual.

It will be to the student's advantage to keep their major professor informed about their intentions and plans. Frequent short meetings are usually better than one major conference.

The major professor cannot be expected to initiate all contacts for meetings, discussions and planning. Remember, the two most important people in a graduate program are the graduate student and their major professor. A professional relationship is expected between student and mentor. If irresolvable disagreements arise between student and mentor and/or guidance committee, the initial task of conflict resolution rests with the GGS Program Director. The student and faculty member may be advised to seek assistance from the Office of the Ombudsman, the MSU Counseling Center, or the Dean of the Graduate School. In situations where a conflict between a student and faculty member cannot be resolved by discussions with the involved parties and consultation with the GGS Program Director and others, students also have the right to request an academic grievance hearing. Procedures are posted on the GGS web site (<https://ggs.natsci.msu.edu/>).

c. Change of Major Professor

A change of major professor is possible but will require three-way discussions between the graduate student, the GGS Program Director and the Guidance Committee and should be requested as early as possible in the graduate training program. If possible, the GGS Program graduate student should ensure that another GGS Program faculty member will serve in that capacity before formal working relations with the student's major professor are altered. A particular research assistantship may be associated with a specific program or faculty member's research grant and, therefore, may not be transferable from one faculty member to another. The Guidance Committee, on request, will assist students with this transition.

4. Guidance Committee

a. Functions of the Guidance Committee

The Guidance Committee's functions are to:

- (1) assist in planning the entire program of study and research,
- (2) complete a yearly progress/evaluation report (see page 50) which will be permanently filed in the student's GGS Program file,
- (3) approve the final program of study through GradPlan at <https://student.msu.edu/>,
- (4) administer the comprehensive and final examinations,
- (5) provide guidance and advice in addition to that given by the major professor, and
- (6) involve the GGS Program graduate student in constructive discussions concerning their research.

b. Selection

The Guidance Committee must be established at the beginning of the second year of the student's doctoral study. The GGS Program graduate student and the major professor mutually select the Guidance Committee. The University requires that a Guidance Committee consist of at least four tenure-track faculty members. An exception may be granted by the Dean of The Graduate School to allow a non-tenure stream faculty member or an academic specialist to serve on a doctoral student's guidance committee as one of the four required faculty members or as the chairperson of a doctoral student's guidance committee. Also, a non-MSU scientist may be approved by the Dean of the Graduate School to serve as one of the four required faculty members. Requests for non-tenure-track or non-MSU faculty members to serve on a guidance committee will be

submitted by the GGS Program Director. In addition, with the approval of the GGS Program Director, an exception may be granted to allow an Emeritus faculty member to serve as one of the four required faculty members on a GGS student's guidance committee, and an Emeritus faculty member may continue to serve as the chairperson of a guidance committee.

Three of the faculty, including the major professor, must be participating members of the GGS Program faculty. More than four faculty may be members of the Guidance Committee. Additional committee members can contribute to the student's program and need not be tenure-track faculty or members of the GGS Program faculty.

c. Change in Guidance Committee Member

Any change in a Guidance Committee member should be discussed first with the major professor and, then, with the GGS Program Director. If a student desires to change a member of the Guidance Committee, the change should be requested as early as possible in the graduate training program. All changes in membership must be entered in GradPlan.

d. First Guidance Committee Meeting

The following topics are some of the issues to be considered and resolved at the first Guidance Committee meeting.

- 1) Discuss course work requirements and make decisions regarding courses to be taken to ensure that the student has a comprehensive knowledge of genetics and related subjects. The courses that a student is required to complete will depend on prior academic background in relation to the selected graduate program. The PhD Degree Plan should be filed by the student and approved by committee members online through GradPlan.
- 2) The graduate student should discuss the topic of their dissertation research, and planning for the comprehensive examination.
- 3) Discuss plans for completing the GGS Program teaching requirement. (see Teaching Experience page 25).

e. Frequency of Committee Meetings

GGS Program graduate students should make the initial contact and subsequently work closely with their Guidance Committee. Frequent consultation with all committee members is essential. They can provide valuable information regarding the student's selection of courses, academic planning, experimental progress and interpretation of research results. Frequent consultation with Guidance Committee members will return excellent dividends.

The GGS Program requires graduate students to meet at least once a year with their entire advisory committee. A written report of the yearly meetings must be provided to the GGS Program Office. The form GGS Program Guidance Committee Report (see page 50) may be used for this purpose.

5. Comprehensive Examination

The GGS Program comprehensive (preliminary) exam for candidacy to the PhD consists of three parts. Each student will prepare a written research proposal on their own research project, present a public seminar on the topic, and have an oral questioning period with the guidance committee. Students must be enrolled in the semester in which they complete the comprehensive exam. For students who were enrolled in the spring semester and are taking their comprehensive exam during the following summer semester, a waiver can be requested to remove the requirement that the student be enrolled for at least one credit the semester the comprehensive exam is completed. These requests are to be directed to the Graduate School and must be endorsed by the GGS Program and the College of Natural Science.

GGS Program graduate students should complete the comprehensive examination during the third year of enrollment as a PhD student. The exam is chaired by the GGS Program Director, Associate Director, or another faculty member who is not on the committee but is designated by the Director to represent the GGS Program. The program representative will be asked to serve on the comprehensive exam committee after the student informs the Program Director of the approximate scheduling of the exam. Final scheduling of the exam should also take into account the program representative's availability. This external faculty member will participate in all aspects of the examination.

a. Research Proposal

The student is required to prepare a written research proposal on the topic of their proposed research and then give a seminar to defend the proposed research which will be followed by a period of questioning by the examination committee. Examples are available through the GGS Program Office. Part or all of the proposal may be written in conjunction with GEN 840 (Genetics Writing Skills).

The applicant should develop the proposal in collaboration with the mentor, but without their direct input to the writing. For example, sections from the mentor's grants are not to be copied. However, the student and mentor are encouraged to have intellectual conversations throughout the process of outlining the proposal including development of objectives and discussion of experimental procedures. Once a detailed outline is developed for the proposal, the student should refrain from discussing specific aspects of the proposal further with the mentor. It is appropriate and encouraged that the student seeks feedback on the proposal for content, clarity, grammar, etc. from other individuals. Such individuals should include faculty, postdocs and students, but may not include committee members. In addition, the GGS Program peer writing group is available to provide constructive feedback about the research proposal, with initial feedback usually provided through enrollment in GEN 840. If a student is interested in having their proposal handled by the writing group, the Director should be informed 1-2 weeks before a draft of the proposal is ready. Other students in the program will be asked to volunteer to participate as reviewers. The writing group should be given the proposal 7-10 days ahead of the time when they will meet with the student writer to discuss the proposal. Occasionally, the student reviewers will suggest that a proposal should go through a second draft before being sent to the student's advisory committee. Because of this possibility, students should keep some flexibility in their scheduling of the comprehensive exam.

The completed proposal should be given to the committee members, mentor, and the GGS Program representative, and also sent to the GGS Program office at least two weeks prior to the student's oral seminar and subsequent examination. Committee members should be asked if they prefer a printed or digital version of the proposal, or both. Before the seminar and subsequent exam, the student should refrain from discussing the proposal with the mentor or committee members. Students are encouraged to get assistance in preparing slides for the seminar, and to give practice seminars to other students and/or faculty, but the mentor and committee members are not to be involved in the preparation of the seminar.

1) General Guidelines for the Written Proposal

The GGS Program Comprehensive Exam is to be in the form of a proposal on the topic of the student's research. Specific information is listed below. It may be useful to review the proposals written by students who have successfully completed the exam. Examples are available in the GGS Program office. It is suggested that the student discuss the general layout of the proposal with the mentor prior to actually writing the proposal.

The proposal is to cover a three-year period. It is to be written in English, avoiding jargon and initialization of terms that are not in the general scientific vocabulary. For a small number of terms that are not universally known, spell out the term the first time it is used, with the appropriate abbreviation in parentheses, and then use the abbreviation thereafter. The proposal should be substantially free of grammatical or spelling errors. It is suggested that you use spell and grammar check software and ask others to read the proposal. Prepare the proposal single sided and single-spaced with 1-inch margins. The print must be clear and legible. Use an Arial, Calibri, Palatino Linotype, Georgia, or similar typeface, a black font color, and a font size of 11 points or larger. (A Symbol font may be used to insert Greek letters or special characters; the font size requirement still applies.) Figures, charts, tables, figure legends, and footnotes may be smaller in size but must be legible.

2) Page Limitations and Content Requirements

A suggested format and page limitations are provided below. Variations on this general format are acceptable. For example, some students may wish to follow the proposal format of a particular granting agency such as NIH, NSF or USDA. Page numbers are required throughout the document. A summary is given in the following chart:

Section	Page Limit	Contents
Abstract	1	
Table of Contents	1	
Research Plan	15	Text plus all figures, charts, tables, and diagrams
Potential Funding Sources and Rationale	<1	
Literature Cited	none	Complete citations, including titles and authors

The proposal should contain the following sections:

Face Page (1 page):

Include the title of the project. Choose a title that is specifically descriptive, rather than general. Be sure to include your name and the date of submission. List your committee members.

Abstract (1 page):

The abstract should be a one paragraph summary of the entire proposal. It should be written such that the proposed hypothesis and methodologies to test the hypothesis can be understood by individuals with a general knowledge of biology. The abstract should stand alone and not make use of the reference list. If references are cited, they must be included in the abstract. The abstract should not exceed 2/3-1 page in length.

Table of Contents (1 page):

List all sections of the proposal and provide page numbers for the beginning of each section.

Research Plan (up to 15 pages):

This section should be well formulated and presented in sufficient detail that it can be evaluated for its scientific merit. It is important that it be developed in collaboration with the mentor (generation of Specific Aims and detailed outline of the document), but it is to be written by the student. It is appropriate and encouraged that other individuals excluding committee members review the proposal for content, clarity, grammar, etc. No part may be copied from the mentor's grant proposals, nor may the mentor directly participate in the writing or editing of the research proposal. Include sufficient information to permit an effective review without the need for committee members to refer to the literature. Brevity and clarity in the presentation are considered indicative of a student's ability to design and execute an effective experimental approach to a research problem.

The research plan should include answers to the following questions: (1) What do you intend to do? (2) Why is the work important? (3) What has already been done? (4) How are you going to do the work? The research plan should be organized as discussed in sections a-e below. Items a-e should normally fit within the limits of 15 pages.

- a. **Specific Aims (1 page maximum).** Provide an introductory paragraph and follow with a list of numbered Specific Aims to be completed in this project. Two to four Specific Aims are recommended. List the broad, long-term objectives and what the specific proposed research is intended to accomplish. State the hypotheses to be tested.
- b. **Background and Significance (suggested maximum 5 pages).** Sketch the background leading to the present proposal, critically evaluating existing knowledge, and specifically identifying the gaps that the project is intended to fill. State concisely the importance of the research described in this proposal by relating the specific aims to the broad, long-term objectives. This section should establish clearly what is known already about the topic of the proposal and then lead into the rationale and the scope of the proposed research. Begin with a general yet relevant literature review and proceed to describe the background information specific to the proposal.

- c. **Preliminary Studies/Progress Report (suggested maximum 4 pages).** Use this section to provide an account of the preliminary studies pertinent to the proposal and/or any other information that will help to establish the experience and competence of the investigator to pursue the proposed project. The complete references to appropriate publications and manuscripts submitted or accepted for publication by the student may be listed. While three to four pages are recommended for the narrative portion of the Preliminary Studies/Progress Report, significant preliminary data are not necessarily expected. If minimal preliminary data are presented, then it is expected that the Research Design and Methods Section (as discussed below) will be more extensive.
- d. **Research Design and Methods.** Describe the research design and the procedures to be used to accomplish the specific aims proposed for the project. Include a description of how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. A summary at the end of the discussion of each Specific Aim is suggested to provide the reader with a clearer sense of the goals the student expects to achieve through the experiments presented and how those goals translate to the overall goals of the project. A final concluding paragraph is also advisable. Although no specific number of pages is recommended for the Research Design and Methods section, the total for items a-e should normally not exceed 15 pages, including Tables and Figures. The tables and figures may be placed at the end of the text, or preferably, inserted into the body of the writing.
- e. **Timetable.** Provide a tentative sequence and timetable for the project.

Potential Funding Sources and Rationale (1-2 paragraphs):

Imagine that you are a principal investigator (PI) and would like to apply for funding to support your proposed research. In this section, identify funding sources that could be explored to fund the proposed research. You should identify specific agencies, for example NIH, and, if possible, identify specific institutes within that agency, for example NICHD, NIA, NIDCR, and others. Indicate the reasons why the research is relevant to the goals of those funding agencies.

Literature Cited (no page limit):

List all references cited in the text. Each reference should be listed alphabetically according to the first author and must include names of all authors, book or journal, volume number, page numbers, and year of publication. The citations should be limited to relevant and current literature. Be concise and select only those citations pertinent to the proposed research.

3) Seminar and Defense of the Proposal

Seminar. Once the proposal is written and submitted to the Guidance Committee, the student must present a formal seminar on the proposal, explaining all pertinent background and preliminary data necessary to give a cohesive presentation on the proposed studies. This seminar should be 45-50 minutes long and illustrated using PowerPoint or other appropriate visual aids. This seminar must be announced in advance and open to the public.

All the members of the student's guidance/examination committee should attend. At the end of the seminar, members of the audience may ask questions and make comments. Members of the examining committee may not ask questions nor make comments during the public phase of this examination.

Oral Defense. Following the seminar, the examination committee will convene with the student in a closed session for an oral discussion and detailed examination of the research proposal, as well as the student's breadth of knowledge. This examination typically lasts 2 hours. The Director-appointed GGS Program representative will serve as chairperson, and participant and voting member of the examination committee. Attendance of the faculty mentor at the oral defense is optional. If the mentor chooses to attend the closed questioning session, they should participate only as a silent observer.

The committee should provide constructive feedback to the student on the proposed research topic, hypotheses and approaches to be used. The intention is to discuss the proposed research with a helpful tone, yet nonetheless determine whether the student has a realistic approach to the project, is able to justify the proposed experiments, and has adequate depth and breadth to proceed with the research plan. Students should expect to defend the research proposal, field questions regarding the proposed research, and provide answers to questions on alternative strategies and experimental approaches.

4) Evaluation of the Written Proposal and Oral Defense:

Once the committee has finished asking questions and the exam is complete, the student will be required to leave the room to allow the committee to discuss the candidate's performance. For this discussion, the mentor, if present, may be allowed to participate at the discretion of the committee. After a brief discussion, the candidate will be notified of the result of the examination. The student's performance will be judged as pass, conditional pass, or fail, with specific feedback provided to the student regarding their understanding of basic concepts, grasp of experimental issues, and ability to think critically. A student who fails the qualifying exam has one opportunity to repeat it.

Pass: indicates that all requirements for the examination were acceptable as completed and all voting faculty are in agreement. To pass the comprehensive examination, a unanimous decision of the examining committee is required. The student is admitted to official PhD candidacy.

Conditional pass: indicates that some improvement is needed in the presentation and/or preparation of the proposal, either in the written or oral aspect of the presentation. The deficiency may be remedied through a revision of the written proposal, additional literature review, or other type of additional study. A conditional pass may be granted if a single dissenting vote is cast from the committee. If a conditional pass is recommended by the examining committee, then the condition(s) for passing the examination will be defined in writing by the Chair of the exam committee and provided to the GGS Program graduate student within one week of the original examination. Copies are to be sent to all members of the student's Guidance Committee, the GGS Program office, and the GGS Program director. All conditional pass situations must be remedied within three months of the initial exam.

Fail: indicates that the student did not perform adequately. If two or more committee members are in agreement that the student has not performed adequately, then the student fails the examination. A student who fails the examination has one opportunity to repeat the exam. Oral and /or written portions of the exam may be repeated as required by the committee. If the examining committee deems that the student failed the written portion of the exam, a new or revised proposal must be written and provided to the committee within three months of a failed exam. If the examining committee deems that the student failed the oral portion of the exam, the committee should be reconvened for a second oral examination within three months of the first attempt. If the student fails a second time, the student will be dismissed from the GGS Program. The committee will discuss the possibility of the candidate receiving a terminal master's degree in Genetics & Genome Sciences, pending completion of the appropriate requirements (see section on Master's Degree in Genetics & Genome Sciences).

c. Record of Comprehensive Examination

After completing the comprehensive examination, the results (either a pass or fail) will be reported to the GGS Program Office. The results are reported on the form, **Record of Comprehensive Examination**, (see page 50) which can be obtained from the GGS Program web site (<https://ggs.natsci.msu.edu/>) or from the GGS Program Office (2168 Biomedical & Physical Sciences). The student is responsible for obtaining the appropriate form prior to the comprehensive examination. If a GGS Program graduate student is judged to have failed the exam, they will be given a second opportunity to repeat the examination within three months of the first examination (as discussed above). An extension beyond three months must be requested in writing by the GGS Program graduate student and approved by the examination committee members. The student must be enrolled in the semester in which they take the examination.

6. Dissertation and Abstracts

When the research project is nearly complete, the GGS Program graduate student should write a draft of their dissertation that meets the approval of their major professor. The dissertation should describe in detail the body of original research conducted by the student, and this research is expected to make a significant contribution to knowledge in the field that is worthy of publication in a peer-reviewed journal(s). GGS Program graduate students typically choose to format their dissertation as a series of manuscripts presented in a logical order of progression for the dissertation project. Often one or more manuscripts have already been published before the dissertation is completed, a practice that is encouraged by the GGS Program. If one or more dissertation chapters have been published, the citation(s) for the publication(s) should be provided including a list of all authors. In addition, the contributions of each author should be indicated. For publications that are not in open access journals and/or for which the authors do not hold the copyright, a copy or notation of the written permission from the copyright holder (generally the publisher) to reprint the article should also be included.

A scientific abstract, not exceeding 600 words, is to be included with the dissertation. In addition, a second abstract written in non-technical language for a lay audience and also not to exceed 600 words, is to be included preceding the scientific abstract. The lay audience abstract should highlight the significance of the dissertation project, and this abstract will be posted on the GGS Program website (www.ggs.natsci.msu.edu).

The dissertation must be prepared in accordance with the specifications described in **The Graduate School Formatting Guide**, which is found on the Graduate School website at <http://grad.msu.edu/etd/>. This guide should be extensively consulted. Students should also complete the on-line application for graduation by the end of the first week of the semester they expect to graduate (<https://reg.msu.edu/StuForms/GradApp/GradApp.aspx>).

The student must provide a copy of the dissertation and abstracts to each member of the Guidance Committee **at least two weeks prior to the final oral examination**, so that the Guidance Committee members will have time to review it before the final oral examination. The dissertation must be in completed form (but not bound), typed with finished diagrams, and acceptable to the student and the major professor. A public seminar on the dissertation research is required immediately preceding the final oral examination by the Guidance Committee. The student should give their title, scientific abstract, names of committee members, and seminar information to the GGS Program Administrative Assistant **at least two weeks** in advance so that GGS Program graduate students and interested faculty can be informed and plan to attend the public seminar portion. To ensure fairness in the examination procedure and maintenance of academic standards, the GGS Program Director **may** appoint an outside member to the examining committee. The outside member of the committee, if appointed, will read and critique the thesis/dissertation, will participate in the oral part of the exam, and will submit a report to the GGS Program Director.

a. Final Examination

All candidates for a doctoral degree are required to pass a final oral examination. The final oral examination in defense of the dissertation is conducted by the Guidance Committee members. Other interested GGS Program faculty members are encouraged to attend the public seminar

portion of the examination. GGS Program graduate students are generally expected to attend these seminars.

The final oral examination, following the public seminar, occurs behind closed doors and is in defense of the dissertation, but may also pertain to general knowledge. The GGS Program graduate student should establish a time (usually three hours) when all members of the Guidance Committee can be present for the seminar and exam.

The student must be registered for at least one credit during the semester in which the final oral examination is taken. All students defending their dissertation in the summer need to be registered for at least one credit during that summer, regardless of their being enrolled in the preceding spring semester. Students should consult the Graduate School website (<https://grad.msu.edu/etd/etd-deadline-dates>) for deadlines the semester before graduation is anticipated.

For the final oral examination on the dissertation, the GGS Program graduate student should be prepared to review briefly:

1. The problem investigated, the hypothesis tested and the scientific or practical implications of the study.
2. Methods used.
3. Important findings and their significance.
4. Unanswered questions/problems suggested by the research.

The dissertation and the student's performance on the final oral examination must be approved by a positive vote of at least three-fourths of the voting examiners and with not more than one dissenting vote from faculty members of the Guidance Committee. The form **Record of Dissertation and Oral Examination** (see page 50) bearing the vote and signature of each member, and additional comments by any dissenting members, is filed in the student's permanent file in the GGS Program Office.

b. Dissertation Submission and Distribution

When the Guidance Committee has reviewed and approved the dissertation and the student has passed the final oral examination in its defense, the student should incorporate in the dissertation recommended and agreed upon changes and corrections before submitting the final version to the Graduate School and to the GGS Program Office. Not later than the deadline date indicated by The Graduate School in the semester in which graduation is expected, the student must submit the dissertation to the Graduate School Office. Michigan State University only accepts electronic submissions via ProQuest at www.etdadmin.com/grad.msu. The Graduate School staff reviews only the PDFs for the main body of the dissertation that are uploaded through ProQuest. Supplementary material that is not included in the main body of the dissertation, but that is approved by the major professor, may be accepted by ProQuest to be included with the dissertation. This supplementary material will not be reviewed by the Graduate School for formatting requirements. Supplemental material may also be accepted by the MSU Library for inclusion with the dissertation (questions about submission of supplementary materials to the MSU Library should be directed to the Assistant Director for Digital Information. **Be aware**

that a submission via ProQuest does not mean that the document has been ACCEPTED.

The review process is interactive and can take anywhere from a few hours to weeks, depending upon the extent of the necessary revisions and how diligent the author is when making the necessary revisions.

Students submitting a dissertation to ProQuest may request a hold/embargo of publication by ProQuest by contacting the Graduate School at msuetds.approval@grd.msu.edu. In response to the request, the Graduate School will send directly to the student a form that needs to be completed and returned to the Graduate School prior to the document submission to ProQuest. The form needs to be signed by the student's major professor and by the Associate Dean of the student's college. The request for the hold/embargo may be for six months, one year or two years. Requests for a period longer than six months must include a brief justification for the length of the requested hold/embargo.

At the time of submission to ProQuest, authors have the opportunity to create an ORCID (Open Researcher and Contributor ID) that provides researchers with a unique identifier for linking their research outputs and activities. An ORCID (1) improves recognition of research contributions, (2) reduces form filling, (3) works with many institutions, funders and publishers, and (4) is a requirement of many journal manuscript submission systems and grant application forms. More information about ORCID is available at: <https://vimeo.com/237730655>.

The Graduate School website (<http://grad.msu.edu/etd/>) includes other graduation requirements including links for exit surveys. The student must submit the approval form at <https://grad.msu.edu/etd/Required-Paperwork-and-Surveys>). The signed Approval Form is taken as evidence that the document has been examined and approved by the major professor and committee, and it also serves to document compliance with the appropriate institutional review boards for the use of human subjects and vertebrate animals for research.

An electronic copy of the dissertation is to be provided to the GGS Program Office. Each student should ask their major professor and members of the guidance committee if they wish to have bound copies.

C. Professional Development

1. Teaching Experience

Teaching experience is essential for scientific development of the student and is therefore an academic requirement of the GGS Program. This experience will involve the student in the intellectual aspects of assembling and teaching a course, as well as the problems and responsibilities of teaching. Students must be enrolled in GEN 810 (1 credit) in the semester during which they fulfill this requirement. The GEN 810 course is intended to educate and train in teaching methods in genetics and related areas. During the mentored teaching experience, course directors are expected to provide feedback and guidance to the GGS Program graduate student. The student will be evaluated with a course grade by the lead faculty member.

All GGS Program graduate students are required to assist in teaching the undergraduate genetics course, IBIO 341, Fundamental Genetics. On occasion, other undergraduate courses may be substituted for IBIO 341. Students enrolled in a dual degree program (DO/PhD, MD/PhD, DVM/PhD) may petition the Director to allow substitution of a teaching experience gained through clinical work or tutoring or another avenue that is part of the medical school curriculum or professional development plan. In general, the teaching requirement will be fulfilled during the fall or spring semester of each student's second year in graduate school. At the end of the first academic year, the Director will make the teaching assignments for the following year. If the semester that is assigned will cause a hardship for the student, they should immediately make this known so that other arrangements can be made. As soon as a teaching assignment is arranged, the GGS Program graduate student should notify the GGS Program Office and check with the instructor to learn what is expected. While teaching, the GGS Program graduate student is still expected to maintain their research activities in the laboratory.

When a student serves as a teaching assistant for IBIO 341, they will be paid a teaching assistant salary by general funds of the university that have been allocated to the GGS Program for this purpose. The teaching assistantship should require a commitment averaging approximately twenty hours per week, including all teaching responsibilities. Students who have teaching commitments are responsible to the instructors of the class in which they are assisting. The Teaching Assistant Professional Development Program (<https://grad.msu.edu/tap>) sponsored by the Graduate School offers various resources and workshops throughout the year, including an orientation session offered each August prior to fall semester. All GGS Program graduate students are required to attend this orientation prior to their teaching experience.

2. Optional Certification in College Teaching

GGS Program graduate students may elect to participate in the University Graduate Certification in College Teaching, an initiative of The Graduate School in partnership with departments and colleges. It is designed to help graduate students organize and develop their teaching experience in a systematic and thoughtful way, with assistance from faculty and campus offices and programs, in a manner similar to that already in place for research experience. As part of this program, participants will develop a teaching portfolio to highlight, organize and reflect upon their teaching experiences. To fulfill this requirement, the graduate student must design and execute a teaching plan that goes beyond standard expectations of a teaching assistantship. This will generally require a second teaching commitment. Upon completion of the program, the student will receive a Certificate in College Teaching from the appropriate department or college. A transcript notation will also be provided. More information regarding the University Graduate Certification in College Teaching Program may be found at the Graduate School's web site at <https://grad.msu.edu/CCTP>.

3. Genetics & Genome Sciences Writing Group

The GGS peer writing group was established primarily to provide constructive feedback regarding the research proposal component of students' comprehensive exams. The writing group has evolved into a more formal Genetics Writing Skills course, GEN 840, which retains the focus on assisting students as they undertake the writing of their research proposals. GGS students also host open writing sessions where students work on various writing projects and assist each other with peer reviewing and support.

III. Supplemental Activities for PhD and MS Students in GGS

A. GGS Program Symposium

The GGS Program organizes an annual Mini-Symposium, based on the topic of one of the GEN 800 courses offered that year. All GGS students are expected to attend the yearly symposia. A poster session is usually held in conjunction with the symposium, and student participation is strongly encouraged.

B. GGS Research Forum

The GGS Program organizes a weekly one-hour meeting that features GGS faculty and graduate students. Currently this forum is held in conjunction with the Cell and Molecular Biology Graduate Program. All GGS students are required to attend the CMB/GGS Research Forum. All students are expected to participate once a year in the “Research Rundowns”, through which each student is expected to provide a brief (2 min) presentation giving an overview of their research project. Presentations on scientific ethics and integrity and/or workshops intended to contribute to career development, as well as student meetings, are also scheduled for the time slot occupied by the CMB/GGS Research Forum.

C. GGS Career Panel

The GGS Program organizes an annual career panel where 6-8 PhD scientists representing a range of career options are invited to share their career path and provide advice to current GGS and other life science graduate students.

D. BioMolecular Science Retreat

The BioMolecular Science Gateway hosts an annual retreat prior to the beginning of the fall semester. All GGS students are encouraged to attend this retreat including the welcome picnic.

E. Dissertations, Seminars, Workshops and Journal Clubs

GGS Program graduate students are expected to attend the final oral dissertation defense seminars and the research proposal seminars of GGS Program graduate students, GGS Program Seminars/Workshops, and any other appropriate seminars or journal clubs. Announcements concerning the dates and locations will be emailed to all students and faculty.

F. Participation in National Meetings

Participation in professional meetings enhances the graduate student’s education and research experience and is encouraged by the GGS Program. The GGS Program has funds available to assist with support for graduate students’ travel to professional meetings. The Program offers \$250 per student per year to assist with travel when the student will be reporting their research results. Requests for funds should be submitted to the GGS Program Director in writing, indicating title and location of meeting. Students traveling on university business must submit a travel authorization request before the date of departure (see page 40).

G. Career and Professional Development Resources

The Graduate School offers a number of career planning resources and services (<https://grad.msu.edu/career-planning>), and GGS graduate students are encouraged to take advantage of these resources.

IV. Description of Masters (MS) Program in Genetics & Genome Sciences

A. Introduction

While the primary objective of the GGS Program is to provide training to candidates in the PhD program, students sometimes change their career goals and may wish to transfer to a Master of Science Program in Genetics & Genome Sciences. Students rarely are admitted directly into the MS program. Students in the MS program follow a Plan A structure, which is designed to provide students with fundamental knowledge and technical skills in the areas of genetics and genomics with the goal that they are qualified to carry out advanced laboratory research upon graduation. This research could be carried out in a variety of settings, including academic, industrial, or government laboratories.

B. Overview of Requirements for the MS Degree in Genetics & Genome Sciences

All students in the MS program in Genetics & Genome Sciences must earn a total of 30 credits, which must include core courses in Molecular Biology and Genetics listed in section IIA of the PhD program. One semester of teaching experience is one of the fundamental requirements of the program. A guidance committee should be established prior to the end of the first year of training and should meet at least one time to review the student's course work and research/report plan. The committee should be comprised of at least 3 tenure-track faculty members, two of which must be participating members of the GGS Program faculty. Students must complete a minimum of 4 and a maximum of 10 credits of GEN 899, Master's Research. Students must also prepare a written thesis, and complete a final public research seminar and oral examination. The written thesis should be distributed to committee members 2 weeks prior to the oral exam.

C. Requirements for the MS Degree in Genetics & Genome Sciences

In addition to fulfilling the requirements of the University and the College of Natural Science, all students in the GGS MS program must complete the following requirements.

- 1. Coursework:** Students in the MS program in Genetics & Genome Sciences must complete coursework as outlined in section IIA for the PhD program, with the exception that only two semesters of GEN 800 are required for the MS program.
- 2. Guidance Committee:** Students in the MS program will be directed by a Guidance Committee, which must contain at least 3 regular MSU faculty members. Two of these members must be members of the GGS Program faculty. This guidance committee must be formed by the end of the second semester in the MS program, and will meet at least annually. The guidance committee will also conduct the final oral examination.
- 3. Responsible Conduct of Research:** Students must complete training in the Responsible Conduct of Research (RCR) each year as noted in the following table. RCR training is documented in the Ability Learning Management System (<http://ora.msu.edu/train/>), and is recorded and compliance monitored in the student's GradPlan. Information for enrolling in online RCR modules through the CITI program can be found at <https://ora.msu.edu/CITI-RCR-registration>. The Graduate School sponsors a Responsible Conduct of Research and Scholarship Workshop Series, and workshops from this series may be used to fulfill

additional RCR training requirements. The schedule and registration information for this workshop series is available at <https://grad.msu.edu/rcr>. At least six hours of discussion-based training must be completed by the end of year 2. During subsequent years, three hours of RCR refresher training is required each year. Each semester, a session of the GGS Research Forum will be devoted to discussion of an RCR topic, and participation in these sessions will contribute toward the discussion-based training requirement, and toward fulfillment of annual refresher training. Students should record the topic, format and date of all RCR training activities on the annual guidance committee report form (see page 50).

Year 1	Year 2
Complete four required CITI online modules <ul style="list-style-type: none"> • Introduction to the Responsible Conduct of Research • Authorship • Plagiarism • Research Misconduct 	Complete three modules selected from list: <ul style="list-style-type: none"> • CITI Collaborative Research • CITI Conflicts of Interest • CITI Data Management • CITI Financial Responsibility • CITI Mentoring • CITI Peer Review By the end of year 2 have completed 6 hours of discussion-based training

4. **Teaching Experience:** All students in the MS Program must enroll in GEN 810 and gain one semester of experience in teaching genetics in at least one course, preferentially IBIO 341, Fundamental Genetics. The oversight and mentoring of this teaching experience is identical to that described in the PhD requirements.
5. **Preparation and Defense of MS Thesis:** MS students should follow the guidelines for the preparation and defense of the PhD thesis as provided in Description of the PhD Program of Study, Dissertation and Abstracts (see page 23) and the advice of their respective guidance committees for the preparation, presentation and defense of the required MS Thesis.
6. **Thesis Distribution:** When the Guidance Committee has reviewed and approved the thesis and the student has passed the final oral examination in its defense, the student should incorporate in the thesis recommended and agreed upon changes and corrections before submitting it to the Graduate School and to the GGS Program Office. Not later than the deadline date indicated by The Graduate School for the semester in which graduation is expected, the student must submit the Master's Thesis to the Graduate School following the instructions given on the Graduate School website for Thesis and Dissertation Electronic Submission at grad.msu.edu/etd/. The distribution of the thesis is: Graduate School, GGS Program Office (electronic), major professor, and members of the guidance committee, if they so desire.

V. Application for Graduation and Final Certification

The **Application for Graduation form** can be found at <https://reg.msu.edu/StuForms/GradApp/GradApp.aspx>. This application should be submitted on or before the end of the first week of the semester the student expects to complete their degree requirements. This will assure the listing of the student's name in the commencement program.

Students who expect to complete their degree requirements during summer semester should submit this application on or before the end of the first week of spring semester. This will assure the student's name will be listed in the Spring/Summer commencement program.

All course credits listed in GradPlan are considered as requirements for the degree program. The major professor and the GGS Program Director will verify completion of the requirements. Discrepancies may delay the student from receiving their degree. Before leaving Michigan State University, the GGS Program graduate student should check with the GGS Program Office to make certain that their credentials are in order and provide the office with a forwarding address.

VI. Financial Aid

A. Stipends for Graduate Assistants

All GGS Program graduate students are required to participate in research, academic course work and teaching as part of their degree requirements. In general, GGS Program graduate students are fully supported during their tenure at MSU from one or a combination of sources including graduate assistantships and fellowships. After the student completes their laboratory rotations and decides on a laboratory to pursue their doctoral research, the major professor will arrange financial support for the graduate student, which will also include a tuition waiver and health insurance. Usually, the major professor will use funds from their research grant to support a GGS Program graduate student. In some cases, students may be eligible for support from a training grant or a research center. On occasion, students may apply for supplemental support that is offered to encourage participation in various programs on campus. In some cases, teaching assistantships may be recommended after consideration of the program needs and consultation with the student's major professor. When the student is appointed to serve as a teaching assistant for IBIO 341, the salary will come from GGS Program funds, set aside for that purpose.

Most appointments will be processed by the GGS Program Office or the mentor's department, and the stipend checks will be disbursed bi-weekly or the stipend may be directly deposited into a student's account. Most graduate students are appointed on student payroll for the summer, since full-time student status with health coverage continues even if the student is not enrolled for the summer semester. In addition, a summer research only option is available for PhD students who have passed their comprehensive exams in which students appointed as graduate research assistants in the summer enroll for one credit, but no tuition is charged. For details visit: <https://www.hr.msu.edu/ua/hiring/graduate-assistants/no-fringe/index.html>. Stipends are adjusted annually and are competitive with those provided by departments and other programs at MSU and other prominent universities in the USA. See the Graduate School website for further details regarding graduate assistantships at <http://grad.msu.edu/assistantships/>.

MSU considers graduate stipends as payment for employment. Graduate assistantships are not exempt from US taxation (Tax Reform Act of 1986). Tax liabilities will vary for each student. Students should realize that much of their time is devoted to training and education upon which they will build their careers. An effort is made within the GGS Program to provide equal opportunity and to impose equal requirements on all graduate students.

Graduate students who receive graduate assistantships or fellowships must be enrolled full time. In order to be considered full time for academic purposes, students must carry the minimum number of credits per semester as defined below:

- Master's level 6 credits
- Doctoral level 3 credits

All graduate assistants are classified as full-time students during the semester (s) of their appointments as long as they are enrolled for the minimum required credits for the assistantship.

Full time status for doctoral students is defined as a minimum of 1 credit for those students who:

1. have successfully completed all comprehensive exams and are actively engaged in dissertation research; or
2. are doing department-approved off-campus fieldwork related to preparation of their dissertation.

Some sources of funding have different credit hour requirements, especially for international students. Dual degree students enrolled in one of the MSU medical colleges may also have different credit requirements. Therefore, students should confirm that they are enrolled for the appropriate number of credit hours.

Full time students may use University facilities, may obtain discounts on tickets to sporting and cultural events on campus, and are eligible for Michigan State University housing.

B. Office of Financial Aid

Recent information on scholarships and other financial aid can be obtained in the Office of Financial Aid, 259 Student Services Building, and at the web site <http://www.finaid.msu.edu/>. Short term low interest or interest free loans are also available through the Office of Financial Aid, ASMSU, and COGS. Information regarding short term loans can be found at <http://www.finaid.msu.edu/msuloans.asp>.

C. Externally Funded Fellowships

Receipt of externally funded fellowships by students who have written their own grant applications and worth at least \$20,000 (direct costs) makes the students eligible for the in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process and awarded by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international sources do not qualify the students for in-state tuition rates. For more information contact the GGS Director or Melissa Del Rio (mdelrio@msu.edu) in the Graduate School.

D. Travel Funding

Funds from The Graduate School are available for graduate students to travel to present their research at professional conferences. These funds are not available to support thesis/dissertation research projects or course work. This funding is only for graduate students pursuing a degree program. Requests for funding to travel to international meetings will be considered jointly by The Graduate School and the Office of International Studies and Programs, therefore, submission of only one form is needed for consideration by both offices.

Requests to the Graduate School are limited to \$600. Usually only one request per student will be considered during their degree program.

Requests should be accompanied by a summary of cost sharing with the student's department and college and, when appropriate, with International Studies and Programs. Whether or not these units provide funding, an endorsement of the request from both the department and the college is still required. Requests must be accompanied by an endorsement from the major professor/advisor stating that the student is making satisfactory progress in their graduate program.

Travel requests must be in the form of a brief letter from the student indicating the following (and accompany the completed request form available at <https://grad.msu.edu/travel>):

- Name of the conference or professional meeting
- The title of the research to be presented and a list of authors
- The date(s) and the location of the meeting
- A break-down of the costs of the trip

In addition to travel funding for professional conferences, the Graduate School also provides assistance to support other activities that enhance graduate students' research projects through Research Enhancement Awards. See the Graduate School website for information and application instructions (<https://grad.msu.edu/research-support>).

Students in the area of plant genetics may opt to pursue 1-2 semesters of research at the Heinrich Heine University of Düsseldorf, Germany. A proposed research plan should be outlined in cooperation with the student's advisor, approved by the student's committee, and submitted to the GGS Program Associate Director, who will request funds to support the research abroad from the Graduate School. A statement of cooperation from the cooperating laboratory in Germany should be provided.

VII. Genetics & Genome Sciences Program Policies

The following policies concerning the stages of progress toward a PhD degree are listed to serve as information for applicants and as a guide for graduate students in the GGS Program.

If the GGS Program academic policies should change during the course of a student's doctoral studies, the student will have the option of retaining the policies as stated at the time of the student entrance into the program or adopting the new policies.

A. Enrollment in the GGS Graduate Program

1. General Policy

Graduate students who have identified a faculty adviser who is a member of the GGS training faculty are eligible for enrollment in GGS. Faculty who are not affiliated with the GGS program can request membership. The choice of major from among the six BMS major units is up to the student. Students are also encouraged to consult with the faculty mentor and/or the GGS Director about their degree plan in order to confirm that the GGS Graduate Program offers the best training option for the student.

2. Readmission

Graduate students whose enrollment at Michigan State University is interrupted for any reason so that they are not enrolled for three consecutive semesters, including the summer session, must apply for readmission. The readmission process must be initiated in the GGS Program Office. Applications for readmission should be filed at least one month prior to the first day of class of the semester in which the student expects to resume studies.

B. Registration Procedures

GGS Program graduate students should discuss their proposed class schedule with their major professors and advisory committees. By the time students enter the GGS Program, they should have experience with course enrollment. Detailed instructions and dates for computer enrollment can be found on the Registrar's website at <http://www.reg.msu.edu/>. Students should be aware that late enrollment would result in a substantial additional fee. Students may consult the GGS Program Administrative Assistant for help. After obtaining a schedule of courses, a student will complete the registration process by paying fees indicated on the registration billing statement. Students are considered *enrolled* once they have enrolled in courses on line, and considered *registered* once the initial payment has been received. Students who have not paid the minimum amount of their bill by the due date will be dropped from the courses in which they have enrolled.

C. Academic Files

Students may access their academic files by request. Students have the right to review their academic file (with the exception of confidential admissions recommendation letters) and challenge the accuracy of its contents by writing a rebuttal that becomes part of their file.

D. Work Hours and Vacation Time

All students should be actively engaged in research, literature reviews, or some other phase of the doctoral program even during semester breaks. Keep in mind that GGS Program graduate study is a "full-time" program. Graduate assistants appointed for twelve months are expected to be on campus and actively pursuing graduate education for at least eleven months. Specific times in the lab and vacation schedules are to be arranged between the GGS Program graduate student and their major professor.

E. Electronic Mail

Each MSU student will be issued an account on the MSU email system. Much of the correspondence from the GGS Program office will be communicated via email to students' MSU UserIDs, including updates of seminars and events. Students will be expected to regularly check their MSU e-mailbox and they should be aware that official university communications will be sent there.

F. Genetics & Genome Sciences Program Committees

1. Genetics & Genome Sciences Program Executive Committee

The GGS Program Executive Committee (GGSPEC) provides input and advice to the Director regarding program activities and courses. At regular intervals, not to exceed 6 months, the GGSPEC will review operating procedures and implement changes. The GGSPEC acts as an occasional appeals body for students and maintains liaison with graduate committees of other departments and colleges. The GGSPEC will recommend changes affecting policy to the participating GGS Program faculty for approval. The GGSPEC consists of the GGS Program Director, the Associate Director, four faculty members and the President of the GGS Graduate Student Organization.

2. Genetics & Genome Sciences Graduate Student Organization

The GGS Program has an active GGS Graduate Student Organization (GSO) for GGS students. The responsibilities of the officers of the GGS GSO include 1) organizing student oriented activities, 2) communicating GGS activities and other information by email, twitter, and/or other means, 3) creating and maintaining resources for the benefit of the student body, 4) discussing various issues and concerns of the GGS students, and 5) serving as a liaison between the students and the GGS Program Executive Committee and other committees such as COGS and SAC.

The GSO officers are elected/appointed every year and are comprised of 1) the President, 2) the representative to the Council of Graduate Students (COGS), 3) the representative to the Dean's Student Advisory Council (SAC), 4) the representative to the CNS Diversity, Equity, and Inclusion Advisory Committee (DEIAC), 5) an outreach coordinator, 6) an events coordinator (responsible for GGS Research Forum and the annual GGS Career Panel), 7) a social coordinator, 8) class representatives for each year of the PhD program, from second through fifth+, 9) a representative for students in Grand Rapids labs, and 10) a first year PhD student representing the incoming class of BMS students. A secret ballot will be conducted in the spring to elect the President of the GSO. Other positions in the GSO are filled on a voluntary basis. To be eligible for election as president, a student should have passed the comprehensive exam. Individual students may hold more than one office simultaneously. The President, the COGS/SAC/DEIAC representatives, and the outreach, events and social coordinators, may also serve as class representatives. The GSO officers meet once every month in the fall and spring semesters, and student meetings for all GGS students are held once each fall and spring semester, with additional meetings scheduled as needed.

VIII. University Policies

Policies regarding graduate studies at Michigan State University are established at three levels of academic administration: University, College and Department or Program. This system tends to separate policies into three categories, and may result in no single reference from which a complete statement of policy can be found. This section is intended to bring all of these policies into focus and to clarify those that may appear to be contradictory.

In general, University policies override College policies, College policies override Department or Program policies, and Department policies override Committee policies. Program policies have been established to resolve issues not specifically covered by College or University policies.

A. Academic Policies

1. Academic Standards

Michigan State University is committed to high academic standards and expects all doctoral students to excel in their programs of study. A 3.0 cumulative grade point average must be maintained. The program of study cannot include more than three grades of less than a 3.0. If a grade point average is below a 3.0 after completion of half of the credits in the program of study, the Guidance Committee must decide whether or not the GGS Program graduate student will be permitted to continue. Credits will not be awarded for courses in which a grade below a 2.0 is earned. If the student receives a grade below a 2.0 in any course during their program of study, they will be required to repeat the course.

The required work for DF-Deferred grades must be completed and a grade reported within 6 months with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis (GEN 899) or dissertation work (GEN 999). GEN 999 and GEN 899 DF's will be changed to Pass when the dissertation/thesis has been accepted by the Graduate School. Research credits are not considered in determining the grade-point average.

A grade point average is one measure of academic standing. However, academic standards also include consideration of the student's suitability for conducting research, competency in their major field and rate of progress toward completion of the degree. The GGS Program faculty feels that it is a disservice to permit a student to continue toward the degree without the necessary qualifications for retention. Judgment regarding retention is made by the student's major professor and/or Guidance Committee members. If it is decided that a student lacks such standards, they may be asked to withdraw according to the procedures as defined in the **Graduate Student Rights and Responsibilities** (<http://splife.studentlife.msu.edu/graduate-student-rights-and-responsibilities>).

Justification for retention must be furnished to the Graduate School Office for any graduate student whose GPA is below a 3.0 for 14 or more credits. If a GGS Program graduate student's

grade point average is below a 3.0, exclusive of research, the major professor and Guidance Committee must decide whether or not the student will be permitted to continue. The results of their decision will be filed in writing with the GGS Program Director.

The Guidance Committee and academic unit are jointly responsible for evaluating the student's competence as indicated by grades in core and other courses, research performance and development of professional skills and rate of progress as indicated by the number of courses for which grades have been assigned or deferred. Written evaluations (see page 50) will be communicated to the graduate student at least once a year and a copy of such evaluations must be given to the GGS Program Office to be placed in the graduate student's file. A student whose performance does not meet the standards of quality, will not be permitted to continue to enroll in the degree program, and appropriate action will be taken by the GGS Program Director.

The GGS Program Office shall maintain an academic file on each graduate student. The file typically will contain the student's MSU application and supporting materials, financial support information, rotation and teaching evaluations, and committee reports. Students have the right to access their education records (with the exception of letters of references provided at the time of admission) and may contact the GGS Program Director to do so.

2. Ethical Standards

Ethical standards for mentoring and research are described in The Mentoring Task Force Report: Guidelines for Integrity in Research and Creative Activities found at <https://grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf>. The GGS Program strongly supports these recommendations and educates Program members about them as described in the handbook Responsibilities of the Graduate Student and of Major Professor (see page 14). Dishonesty in academics or unethical conduct on presentation of research are grounds for dismissal from the program. Should a decision to terminate a graduate student be made, the affected graduate student shall be notified in writing. All information regarding the decision is to be held in strict confidence between the student and faculty with responsibility for the student; release may only be with the written consent of the graduate student involved unless the decision becomes the substance for a grievance procedure, in which case such information shall be released to the grievance committee. The same privacy is to be accorded the reasons for a graduate student's temporary or permanent withdrawal from the University.

3. Time Limits

The comprehensive examination must be passed within five years and all remaining requirements for the degree must be completed within eight years from the time of a student's first enrollment as a doctoral student, 5 years if a masters student. The average time to completion of a PhD in the GGS Program is 5 and a half years. If excessive time passes without tangible progress, the GGS Program Director will consult with the student's Guidance Committee members to determine the circumstances. The committee may file a letter to the GGS Program Director justifying the continuation of the student. If no letter is filed, or if a majority of the committee decline to sign the letter, the GGS Program Director shall inform the student by letter that they are no longer eligible to register in the GGS Program. If the GGS Program Director approves the extension, application will be made to the CNS Dean and the Dean of the Graduate School for approval.

4. Research Involving Human or Animal Subjects or Hazardous Substances

Federal and University regulations require that all research projects involving human subjects and materials of human origin be reviewed and approved by an Institutional Review Board (IRB) **before initiation**. See the MSU Human Research Protection Program web site for more information (<https://hrpp.msu.edu/>). Under the regulations, a human subject of research is an individual (1) from whom an investigator obtains data by interaction or intervention or (2) about whom the researcher obtains confidential information.

Michigan State University policy requires that use within the institution of living vertebrate animals (includes laboratory rats and mice, farm animals, etc.) be reviewed for appropriateness by the Institutional Animal Care and Use Committee (IACUC) before use of these animals commences. This pertains to all university owned animals, client-owned animals used in research, and animals studied undisturbed in their natural habitat. For general reference, the publication that details the standards to which the university conforms is the *NIH Guide for the Care and Use of Laboratory Animals*. Departure from this published guideline requires written scientific justification in the animal use form. Principal investigators and course directors must obtain approval from the IACUC (<https://animalcare.msu.edu/>, phone 432-4151) before initiating any research, testing, or instructional project involving the use of vertebrate animals.

The Graduate School will not accept doctoral dissertations containing research on human subjects that have not been reviewed and approved previously by an IRB or research involving animal use without previous review and approval from IACUC. The Graduate School will verify IRB Log numbers and AUF numbers before granting degrees.

The University acts through its advisory committees and academic governance bodies to ensure that individual research and scholarly projects incorporate appropriate safeguards when dealing with radiation, biological and chemical hazards. Additional information regarding these guidelines is contained in the *Faculty Handbook for Research and Creative Endeavor* published by the Office of Vice President for Research and Graduate Studies. All individuals performing work with hazardous substances must accept a shared responsibility for operating in a safe manner once they have been informed about the extent of risk and safe procedures for their activities. Individuals are responsible for safely performing activities associated with hazardous substances.

All persons who handle hazardous substances are required to participate in yearly training sessions sponsored by the office of Environmental Health and Safety (EHS). Information regarding these sessions can be obtained at the EHS website <http://www.ehs.msu.edu/> or by contacting the EHS office at 355-0153.

If a GGS Program graduate student has a question regarding safety, they should ask the major professor. If the question of safety is not resolved, the student should contact EHS.

5. Residence

A year of residence is required to obtain a PhD degree from Michigan State University. A year of residence will be made up of two consecutive semesters, involving the completion of credits at the level of full-time status of graduate work each semester. Required residence for a master's degree is 6 credits at Michigan State University.

6. Transfer Credits

Graduate credits may be transferred from other accredited institutions or foreign institutions of similar quality if they are appropriate to a GGS Program graduate student's program, approved by the GGS Director, and provided they were completed within the time limits approved for the earning of the degree desired at Michigan State University. Only graduate-level courses in which at least a 3.0 (B) grade was received will be considered for transfer.

7. Graduate Assistant Illness/Injury/Pregnancy/Grief Leave Policy

A graduate assistant unable to fulfill the duties of their appointment because of illness or injury shall notify an administrator of their major unit as soon as circumstances permit. Similarly, a graduate assistant unable to fulfill the duties of their appointment because of pregnancy shall notify the administrator of their major unit as soon as circumstances permit.

During the illness, injury, or pregnancy the major unit shall adjust (reduce, waive, or reschedule) the graduate assistant's duties as those duties and the assistant's physical circumstances reasonably dictate. If total absence from duties becomes necessary, the major unit shall maintain the stipend of the appointment, provided the graduate assistant is still enrolled, for a period of two months, or to the end of the appointment period or of the semester, whichever should occur first.

The graduate assistant shall have the right to return to the assistantship, within the original terms of the appointment, at such time as they are able to reassume the duties of the position. Graduate teaching assistants (TAs) should refer to the employee leave time policy in the MSU GEU CBU Article 18. Students who believe their rights under this policy have been violated should contact the University Ombudsperson (<https://ombud.msu.edu>).

Grief Absence Policy: It is the responsibility of the student to: a) notify their advisor/major professor and faculty of the courses in which they are enrolled of the need for a grief absence in a timely manner, but no later than one week from the student's initial knowledge of the situation, b) provide appropriate verification of the grief absence as specified by the advisor/major professor and faculty, and c) complete all missed work as determined in consultation with the advisor/major professor and faculty. It is the responsibility of the advisor/major professor to: a) determine with the student the expected period of absence – it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) receive verification of the authenticity of a grief absence request upon the student's return, and c) make reasonable accommodations so that the student is not penalized due to a verified grief absence. Graduate teaching assistants (TAs) should refer to the bereavement policy in the MSU GEU CBU Article 18. Students who believe their rights under this policy have been violated should contact the University Ombudsperson (<https://ombud.msu.edu>).

8. Work in Absentia

Candidates for the doctoral degree may, with the approval of the major professor and Guidance Committee members, conduct some work in absentia. Arrangements for registration may be made by applying at the Office of the Dean, College of Natural Science.

9. Language Requirement

The GGS Graduate Program does not have a language requirement.

10. Student Travel Policy

Most of the questions about travel are centered on insurance and are compounded by confusion regarding three terms:

- 1) Authorization
- 2) Automobile Liability Insurance
- 3) Travel Accident Insurance

Authorization for travel needs to be completed before departure. This provides evidence that the traveler is on university business and it may be critical in the event of an insurance claim, worker's compensation claim or other litigation. The travel authorization process is completed on-line using the Concur system through the Travel at State website (travel.msu.edu). Travelers must first create a travel profile. To request approval for a specific trip, a Concur Request must be submitted. The GGS Program Administrative Assistant can assist with the request process, as well as with the post-travel procedures for requesting reimbursement of expenses.

Automobile Liability Insurance is essentially "public liability and property damage" insurance. It protects the driver and/or owner of an insured vehicle against charges filed by other persons, but it does not provide medical benefits for the driver or passengers. The university carries liability insurance on all university-owned vehicles when driven by authorized persons.

Travel Accident Insurance provides coverage for accidental death or dismemberment while traveling on authorized university business. Coverage is extended to employees excluding employees on leave, student employees and graduate assistants.

Given the above definitions, university policy and regulations regarding student travel may be summarized as follows (MSU Travel Regulations, July 1994): Graduate students may be authorized to travel on university business and may be reimbursed for such travel. In addition, they may be assigned and may drive university vehicles on authorized trips. When driving university vehicles, they are protected by liability insurance but not medical coverage. Many students already have hospitalization and accident insurance of some sort. Students who travel for the university and who have dependents should be sure they are adequately insured.

11. Foreign Travel

GGS Program students that plan to travel to a foreign country on Michigan State University activities should consider the following issues: (1) Contact the MSU Travel Clinic (<http://www.travelclinic.msu.edu>) at least three months in advance of your date of departure. Travel to particular countries may require one or more vaccinations or boosters. In addition, the

travel clinic nurse will review potential health hazards, travel problems and restrictions for each country. (If you are traveling for pleasure, you are welcome to use the MSU Travel Clinic) (2) Check the International Studies and Programs website for issues related to safety around the world. (3) If you intend to pursue a research project in another country you should have permission from the appropriate governmental agency in that country. For some countries it may take up to one year to obtain approval. (4) If you intend to bring plant or animal tissue samples or DNA/RNA back to the United States you are likely to need approval from the United States Department of Agriculture or from the Center for Disease Control. Be sure to obtain proper letters of authorization to bring biological samples back to the United States. (5) Submit a pre-travel request on-line through Travel at State (travel.msu.edu) to receive travel authorization, (6) Obtain the proper pharmaceuticals to take with you in case of an emergency. These might include, for example, small packets of dehydration salts if you have experienced excessive fluid loss, appropriate antibiotics in case of food-poisoning or an infected wound and anti-malarial/preventative medication. Be aware that in some countries possession of illegal drugs is a death sentence. The MSU Global Access website <http://msuglobalaccess.net/> has valuable information in preparation of your travel. Graduate students should also visit the Traveling Scholar website at <https://grad.msu.edu/traveling-scholar>.

It is also helpful to talk with other people who have spent time in the country you intend to visit to get a sense of the customs, of food related problems, of the medical care, of travel arrangements and of safe and unsafe personal activities.

Apply for assistance with travel funding via the Graduate School. If the Graduate School provides funding, they will also provide a MEDEX emergency card. Graduate students traveling internationally for MSU-related work (research data collection, international professional conferences, courses, or other academic business) are strongly encouraged to sign up using the International Travelers Database (even if they are not being reimbursed for travel). This is the best way for MSU to stay in touch with students if there is an emergency http://isp.web102.isp.msu.edu/travel/travelers_database.htm.

B. Special Information for International Students

Michigan State University is authorized under immigration regulations to enroll nonimmigrant alien students. The GGS Program welcomes international students.

1. Teaching Assignments for International Students

The MSU policy for English language proficiency for teaching assistants is available at: <https://grad.msu.edu/tap/speak>, and information for TA professional development for international students is available at: <https://grad.msu.edu/tap/first-time-tas-international>. Candidates for TA appointments who were required to demonstrate English proficiency as a condition for regular admission to Michigan State University must also demonstrate that they meet a minimum standard of proficiency in spoken English before they can be assigned teaching work that involves oral communication with undergraduate students. This requirement may be met in one of the following ways:

- Presenting a TOEFL iBT speaking section score of 27 or higher.
- Receiving a score of 50 or higher on the MSU Speaking Test administered by the English Language Center (<https://elc.msu.edu/tests/msu-speaking-test/>).
- Taking AAE 451 or AAE 452 (ITA language support courses) and receiving a score of 50 or higher on the ITA Oral Interaction Test (ITAOI).

All international GGS Program graduate students are required to attend a teaching assistant orientation at the beginning of their second year. The orientation will provide the international teaching assistant with instruction and practice in classroom teaching.

2. Office for International Students and Scholars (OISS)

The Office for International Students and Scholars (OISS) serves international students and foreign faculty. OISS is a resource center for information and consultation on matters related to the international student and faculty/scholars. The staff is prepared to help in any of the various areas of concern, including academic problems, immigration questions, social health, employment or financial matters. The office also organizes seminars and workshops on topics of interest to the broad university community. These have included immigration regulations, cross-cultural communication, pre-departure programs for graduating students and various training programs. The OISS is located in 105 International Center, MSU, East Lansing, MI, 48824-1035, (517) 353-1720, email: oiss@msu.edu. The OISS web site is located at <http://oiss.isp.msu.edu/>.

3. Health Insurance

All international students must be covered by health insurance for themselves and accompanying dependents. Proof of coverage must be provided before registration and enrollment.

All GGS Program graduate students receiving a graduate assistantship will be provided, at no charge, with health insurance. Those with a Fall Semester assistantship are provided six months of coverage, beginning August 16. A Spring Semester reappointment extends health insurance benefits for an additional six months. Spring Semester only appointments include health insurance coverage beginning January 1 through Summer Semester (August 15). A graduate assistant may also purchase health insurance partially sponsored by MSU for eligible spouse and dependent children. For a plan brochure and spouse/dependent enrollment form, contact MSU Human Resources/Benefits, 140 Nisbet Building, 517.353.4434, ext. 536 or the website at: <https://www.hr.msu.edu/benefits/students/health/>.

4. Support Services

The Office for International Students and Scholars has organized a group of nationality clubs that the international student may join. A list of the names and phone numbers of the officers of each club is available from the OISS.

IX. Graduate Student Academic Grievance Hearing Procedures for the Genetics & Genome Sciences Program

Documentation of the graduate student academic grievance hearing procedures for the GGS program is available on the program website (<https://ggs.natsci.msu.edu/>).

X. University Resources and Services for Graduate Students

The University provides a wide array of services to students to assist them in adjusting to the rigors and inevitable stresses that go with a rigorous academic life.

A. Academic Facilities

1. Student Services

Michigan State University provides extensive student personnel services to assist students and enhance the educational experience. Michigan State University recognizes that the total development of the individual -- personal, social, physical, as well as intellectual -- is of equal importance.

The Vice President for Student Affairs and Services has general administrative responsibility for all student personnel matters. The multiple services and responsibilities are carried out through the offices of Coordinated Minority Student Programs, Counseling, Financial Aids, Intramural Sports and Recreation Services, Placement Services (including Student Employment and the Career Information Center), Student Life, and University Housing Programs.

The Student Life area includes Campus Life Orientation, Health and Alcohol Education, Judicial Affairs, Off Campus Housing and Commuter Programs, Service Learning, Student Activities, Student and Leadership Development, and Student Withdrawals and Records.

2. Michigan State University Library

It is strongly suggested that you take advantage of the library tours in order to more thoroughly familiarize yourself with all the available resources. There are many branch libraries on campus, and on-line access can be gained to a huge number of journals. Consult Spartan Life at <http://splife.studentlife.msu.edu/>, or the MSU Libraries web site at <http://www.lib.msu.edu/>.

3. Computing Resources

a. Computing & Technology Resources

The website <https://tech.msu.edu/> outlines the various information technologies available and the policies governing use of the network.

b. IT Service Desk

The IT service desk offers computing assistance to students, faculty and staff at MSU. Support is available by telephone (432-6200), face-to-face, and email for general computing questions. There is no charge for basic services. The help desk also maintains an online knowledge base at <https://tech.msu.edu/support/>.

c. Computer Labs

There are a number of computer labs located throughout campus giving students access to the internet, popular software and printing services. Visit <https://tech.msu.edu/teaching/computer-labs-classrooms/> for the locations of computer labs on campus.

d. Other Computer Facilities

In order to better focus efforts in computational research, training and collaboration, MSU established the Institute for Cyber-Enabled Research (iCER; <https://icer.msu.edu/>). This Institute provides a common structure for researchers from across academia and industry to work on how computation can better their research, and iCER is the home for the High Performance Computing Center (HPCC) which provides hardware and software support for analysis and storage of large datasets (e.g., DNA sequence data).

4. Bookstore

The MSU Bookstore is located in the International Center on Shaw Lane. Off-campus bookstores are located in the East Lansing area. Check out the website at <http://www.spartanbook.com>.

5. Center for Service-Learning and Civic Engagement

The Center for Service-Learning and Civic Engagement (Student Services Bldg., 353-4400; <http://www.servicelearning.msu.edu>) is a volunteer program that provides students the opportunity to learn more about different work environments while providing community service. Staff is available to assist students in choosing a placement that meets their interests.

6. The Writing Center

The Writing Center offers writing consultation to graduate as well as undergraduate students. One-on-one consultations are best for small papers or projects like vitas, abstracts and cover letters, while peer response writing groups offer help developing drafts of larger projects like research and conference papers, and even theses and dissertations. The center also has a library with books on resumes, vitas and cover letters, and examples of all of the above. Call 432-3610 to make an appointment, or email writing@msu.edu for grammatical questions. You can also see their web site (<http://writing.msu.edu/>) for more information.

7. Career Services Network

The Career Services Network (<http://careernetwork.msu.edu/>) provides resources on career choice, planning and strategy, and assists students in career advising and seeking employment upon graduation. Their office is located in 113 Student Services Building and can be contacted at 355-9510. Their staff does workshops, classes and individual advising on topics such as how to interview successfully and steps to creating a well-written resume.

8. Big Ten Academic Alliance Traveling Scholar Program

The Big Ten Academic Alliance Traveling Scholar Program (<https://grad.msu.edu/btaa>) enables doctoral-level students at any Big Ten Academic Alliance university to take advantage of educational opportunities at any other Big Ten Academic Alliance university without change in registration or increase in tuition. Instructions and an application for the Big Ten Academic Alliance Traveling Scholar Program may be obtained by contacting The Graduate School.

B. Health Facilities

1. Health Insurance

Michigan State University provides "student only" health insurance coverage at no cost to graduate students supported by graduate assistantships. Students receive a full twelve months of coverage if a student's appointment is at least nine months. Those with a fall semester assistantship are provided six months of coverage, beginning August 16. A spring semester reappointment extends health insurance benefits for an additional six months. Spring semester only appointments include health insurance coverage beginning January 1 through summer semester (August 15). Students supported by fellowships typically receive a supplemental stipend to allow them to purchase graduate student health insurance. If a student wishes to enroll a legal spouse and/or dependent children, they should contact the MSU Benefits office. Questions regarding enrollment, premium payment and coverage should be directed to the MSU Benefits office at 1407 South Harrison Road, Room 140 Nisbet Building at 517-353-4434, ext. 536. Information is also available on the web at <https://www.hr.msu.edu/benefits/graduate-assistants/health/index.html>.

2. The Resource Center for Persons with Disabilities (RCPD)

The Resource Center for Persons with Disabilities (RCPD) is located in 120 Bessey Hall (353-9642; <https://www.rcpd.msu.edu/>). Staff specialists are available to respond to mobility, visual, hearing, alternative learner, and other disability populations to enable their involvement in university activities. Other resources are available to students with special needs.

3. Counseling & Psychiatric Services

Students should feel free to contact Counseling & Psychiatric Services (<http://caps.msu.edu/>) for personal concerns and crises. Professional counseling and psychological services are offered to assist with personal, as well as career concerns. All services are confidential. Initial consultations are free of charge. In addition to professional counseling, a self-management laboratory and workshops are offered.

4. Olin Health Center

Olin Health Center (355-4510; <http://olin.msu.edu/>) provides medical and dental care for students and their spouses during their enrollment at Michigan State University. A travel clinic is located at Olin Health Center and is available for consultation and vaccinations before travel abroad.

5. Women's Resource Center

The Women's Resource Center (332 Union Building, 353-1635; <http://wrc.msu.edu>) serves as a referral service and advocate of women's issues for women faculty, staff and students. They sponsor many campus programs and workshops on women's issues.

6. Intramural Sports Facilities

Students have access to equipment and facilities in the intramural facilities located in the IM-West, IM-East, and IM-Circle (<http://www.imsports.msu.edu/>). Students must present a current MSU student ID and a picture ID in order to be admitted to these facilities and borrow the equipment. Use of most of the facilities is free to currently enrolled students, although there are a few exceptions, such as a small charge for the use of the weight room in the IM-East.

7. Office of the University Ombudsperson

Conflicts, disagreements, and issues sometimes arise during the course of a graduate program. If a student finds themselves in this situation and has exhausted the internal resources for resolving the issue, they may contact the Office of the University Ombudsperson.

The Office of the University Ombudsperson provides assistance to students, faculty, and staff in resolving University-related concerns. Such concerns include: student-faculty conflicts; communication problems; concerns about the university climate; and questions about what options are available for handling a problem according to Michigan State University policy. The University Ombudsperson also provides information about available resources and student/faculty rights and responsibilities. The office operates as a confidential, independent, and neutral resource. It does not provide notice to the University - that is, it does not speak or hear for the University.

Contact the Ombudsperson at any point during an issue when a confidential conversation or source of information may be needed. The Ombudsperson will listen to concerns, give information about university policies, help evaluate the situation, and assist in making plans to resolve the conflict. Contact information for the Office of the University Ombudsperson is 129 N. Kedzie Hall, (517) 353-8830, ombud@msu.edu, <https://ombud.msu.edu/>.

C. Transportation and Parking on Campus

1. Parking on Campus

Any vehicle you bring on campus must be registered through the MSU Parking Office (<https://police.msu.edu/parking-services/permits/>). Generally, students with assistantships are eligible to obtain parking permits which allow parking at several lots throughout the campus. Graduate students without assistantships have permits allowing them to park in commuter lots on the outer edge of the campus. To obtain a parking permit the applicant must present their vehicle registration, student ID, and driver's license.

If you do not have a graduate assistantship, you may, under special circumstances, qualify for a parking permit. For example, if your vehicle is necessary in performing the duties for a job you hold on campus, you may wish to apply for a parking permit. You will need to contact the parking office and fill out a Special Request form for a parking permit. If your request is approved you will have an opportunity to purchase a permit.

2. Buses

MSU buses serve all parts of the campus and connect with CATA routes serving the Lansing and East Lansing area. Route information can be found at the CATA web site at <http://www.cata.org/>

3. Bikes

The University maintains bicycle racks throughout the campus. Bikes should be locked to these racks when parked. Bikes are not permitted in campus buildings. Improperly parked bikes are subject to impoundment by the MSU Police department. Bicycle registration through the MSU Parking Office or the cities of East Lansing or Lansing is required. Information is available at <https://police.msu.edu/parking-services/permits/>.

MSU Bikes is a service of the MSU Transportation Services division of the MSU Physical Plant. Dedicated to promoting bicycling as a safe, fun, economical, efficient, environmentally friendly and healthy transportation alternative for the MSU campus community, MSU Bikes operates the MSU Bikes Service Center, a full-service bike repair and rental facility. The MSU Bikes Service Center is located under the Bessey Hall auditorium right on the river trail just 300 ft. northwest of the Farm Lane bridge.

D. Graduate Student Organizations

1. MSU Graduate Employees Union (GEU)

The Graduate Employees Union website is <http://geuatmsu.org/>. The MSU-GEU contract can be found at <http://geuatmsu.org/about/geu-contract/>.

2. Council of Graduate Students (COGS)

COGS is the official graduate student organization at Michigan State University. Officers and departmental representatives (one representative per department for the entire University) are voting members. The primary objective is improvement of the academic, social, and economic

position of graduate students at MSU. The organization has official delegates to the Graduate Council, the Academic Council and standing committees thereof, and several all-university and presidential committees. Through membership in these and other bodies, COGS participates in decisions on such matters as tuition and fees, the grading system, traffic regulations, academic and extracurricular programs of the university, graduate assistant stipends, improvements in on- and off-campus student living conditions, academic freedom and responsibilities, student representation in university government, and the selection of principal administrative officers. Meetings are open to all graduate students. For further information, contact the GGS Program Office for the name of the GGS program representative. Check out the COGS web site at <http://cogs.msu.edu/>.

COGS offers a wide range of services and programs to graduate level students including the following:

a. MSU Student Food Bank

COGS and ASMSU jointly established a Student Food Bank (<http://foodbank.msu.edu/>) to address the problems of students and their families with financial hardship. The SFB is located at Olin Health Center, and hours are 5:30 to 7:30 p.m. on Wednesday evenings. Students may visit bi-monthly. To volunteer, register on-line at <http://foodbank.msu.edu/volunteer/overview>.

b. Student Legal Services

COGS and ASMSU have joined together to provide a wide range of legal services to MSU students. This service is free to all graduate-level students. Student Legal Services (<http://cogs.msu.edu/resources/legal-services/>) is located in 329 Student Services Building. These services are funded through student taxes and activity fees. This plan enables students to consult a staff attorney on most legal matters such as landlord/tenant problems, small claims, traffic offenses including speeding and drunk driving, and minor criminal/civil matters. For more specialized needs, students are referred to area attorneys. The Student Defender Division of legal services provides students with advice regarding university regulations, judiciary programs, and any other type of para-legal help necessary to resolve intra-university problems. Due to the large number of phone calls and potential problems, no legal advice of any kind will be given over the phone. An appointment can be made by calling 353-3716 or in person at the office during the hours of 8:00 am-12:00 noon and 1:00 pm-5:00 pm.

c. Short-Term Loans

COGS offers short term loans which are administered through ASMSU and the Office of Financial Aid (<https://finaid.msu.edu/msuloans.asp>). The loans are interest free for up to 60 days.

E. University Guides and References

1. Graduate Student Rights and Responsibilities

The Graduate Student Rights and Responsibilities document, which contains University policies concerning graduate education, is published in Spartan Life, and can be accessed at <https://grad.msu.edu/gsrr/>.

2. Funding Resources

The Graduate School has compiled resources for graduate students, graduate professional students and postdoctoral fellows to assist students in identifying funding sources such as grants, fellowships, scholarships and awards (<http://grad.msu.edu/funding/>).

3. Career and Professional Development

The Graduate School offers a variety of workshops and other resources that can assist students in their career and professional development. See <https://grad.msu.edu/professional-development> for a list of workshops and other activities.

4. Spartan Life

The Office of Student Affairs and Services produces the Spartan Life Student Handbook and Resource Guide. It is available at <http://splife.studentlife.msu.edu/>.

5. The Schedule of Courses and Academic Programs Catalog

The schedule of courses is available at: student.msu.edu/search/, and the Academic Programs Catalog is available at <https://reg.msu.edu/AcademicPrograms/>.

6. The Faculty and Staff Directory

The Faculty and Staff Directory is published by the Office of the Registrar. The directory can be searched through the MSU website.

7. The Graduate School Electronic Thesis and Dissertation Guide

The Graduate School Electronic Thesis and Dissertation Guide describes the final procedures for degree completion and submission requirements for theses and dissertations. It is available at <http://grad.msu.edu/etd/>.

8. MSU Today

MSU Today (<http://msutoday.msu.edu/>) is a collection of official MSU news releases organized by category (arts, science and technology, sports, etc.) on the website. A weekly MSUToday Weekly Update of highlighted stories is distributed by e-mail.

9. The State News

The State News (<http://statenews.com/>) is the MSU daily newspaper that contains news and a listing of events of interest.

XI. Administrative Forms

The following administrative forms will be used by each GGS Program graduate student during their graduate program. These forms have been mentioned throughout this handbook, and they are available at the GGS Program website (<https://ggs.natsci.msu.edu/>) under the “Current Students” tab.

A. Genetics & Genome Sciences Program Guidance Committee Report

B. Record of Comprehensive Examination

C. Record of Dissertation and Oral Examination