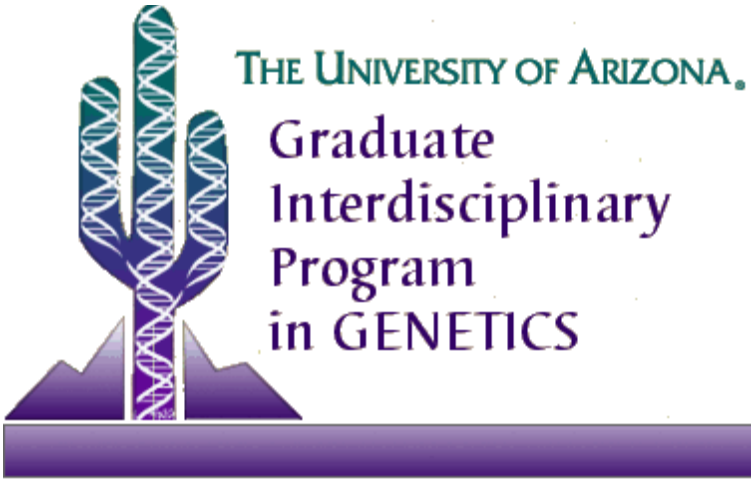

Genetics
Graduate Interdisciplinary Program (GIDP)
Student Handbook
2025-26

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APPENDICES

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1. Introduction

Welcome to the Graduate Interdisciplinary Program (GIDP) in Genetics at the University of Arizona, hereafter referred to as the Genetics Program. This handbook explains the organization of the program and provides a guide towards obtaining a Ph.D. or Master's degree in Genetics. The handbook outlines the policies and regulations of the Genetics Program.

A substantial portion of the policies of the of the Genetics Program are established by the Graduate College of the University of Arizona. These policies must be followed by all programs offering graduate degrees. Information about these policies can be found at Doctor of Philosophy | University of Arizona Graduate College, at Master's Degrees | University of Arizona Graduate College and at University of Arizona Calendar. Specific requirements were established by the Genetics Program to ensure the quality, portability, and usefulness of your training. These policies are reviewed annually and are subject to change. For each class of students, the policies that apply are the ones in the Handbook in effect upon matriculation into the Genetics Program. As questions arise, good sources of information are the Graduate Program Coordinator (GPC) and the leadership of the Genetics Program, that is, the Chair, Vice Chair, and the Executive Committee.

The most important component of your graduate training is the creation of new knowledge through scientific investigation. Courses in your curriculum will provide a valuable opportunity to learn and discuss the fundamentals of genetics with established investigators; they will also instruct you on how to critically analyze and evaluate the scientific literature. Working with your Major Advisor, you will learn about the process of creation of new scientific knowledge. Creation of new scientific knowledge is the central goal of the Ph.D. dissertation. Although creation of new scientific knowledge could be an important part of a Master's degree, it is not required. A central goal of the faculty is to teach you how to take responsibility for your own education. As a graduate student,

you must determine what you need to know, figure out how to learn it, and analyze the information rigorously—be it in the classroom, library, or laboratory.

2. Overview of Ph.D. and M.S. Programs in Genetics

The purpose of the Genetics Program is to train the next generation of geneticists. Our discipline integrates basic and applied life sciences, computational sciences, and physical sciences. Our faculty are homed in a wide variety of Departments, including Animal and Comparative Biomedical Sciences, Basic Medical Sciences (Phoenix), Cellular and Molecular Medicine, Chemistry and Biochemistry, Computer Science, Ecology and Evolutionary Biology, Entomology, Environmental Sciences, Epidemiology and Biostatistics, Hydrology and Atmospheric Sciences, Immunobiology, Mathematics, Medical Pharmacology, Molecular and Cellular Biology, Natural Resources and the Environment, Neurology, Neuroscience, Nutritional Science and Wellness, Pediatrics, Pharmacy Practice and Science, Pharmacology and Toxicology, Physiology, Plant Sciences, and Psychiatry, Surgery, and Translational Neuroscience. In addition to training the traditional biology student, the Genetics Program seeks to attract students from outside the life sciences and to train these students in genetics.

In keeping with the diverse nature of current approaches included within the realm of genetics, the Genetics Program at the University of Arizona transcends traditional departmental boundaries. We seek to prepare students for research, teaching, and other related careers in academia and research institutes, industry, and government, and we have had students graduate from the program and go into law, technology development, medicine, and public policy. The Genetics Program is designed to provide students with broad training in diverse areas of genetics and in-depth training in their chosen area of specialization. Students participate in designing an education program that is tailored to the needs of their research and to their long-term interests.

The unexamined life is not worth living. To create new knowledge, students must take ownership of their own education in their quest for intellectual independence. To prepare students for a fully examined life, the Program has four learning objectives: (i) to develop a comprehensive knowledge of genetics, including technical methods,

research approaches, specific analytics, bioinformatics and statistical procedures, fundamental mechanisms, and philosophical principles relevant to genetics and to biology as a whole; (ii) to develop the skills and capabilities necessary to carry out a research project; (iii) to develop the abilities necessary to communicate results and conclusions from research projects in oral presentations and in writing; and, (iv) to develop the self-examination needed to conduct research ethically and responsibly. These learning objectives are the basis of the expected learning outcomes by which the Program judges its own proficiency (see Appendix II).

As detailed below, the required courses for Ph.D. and M.S. students are kept to a minimum to give students the greatest flexibility and opportunity to create their own curriculum. The requirements for Ph.D. and M.S. are of course different, but they are closely aligned. All students are required to take the foundation course Fundamental Genetic Mechanisms. All students are required to take the graduate seminar Recent Advances in Genetics: for the Ph.D. students, eight semesters, and for the M.S. students, four semesters. Ph.D. students are also required to take a course in ethics. Ph.D. students must meet a distribution requirement of one course in each of two of three fields of study (Genetics, Biochemistry, and Genomics & Bioinformatics). M.S. students must take at least one course from the Genomics & Bioinformatics category (see below for more details). Outside of these course expectations, the student is free to choose their own curriculum.

All students need to identify a Major Advisor to assist them with their dissertation or thesis research and with planning their curriculum. This coursework consultation is formalized in the development of a Plan of Study (PoS), to be completed by the end of the third semester for PhD students and the end of the second semester for MS students. Ph.D. students need to identify a Major Advisor in their first year of study. For M.S. students, the ideal time to select an advisor is the end of the second semester. However, the timing for making this formal arrangement is more flexible, but it should be made prior to the fourth semester at the latest. Until a Major Advisor is identified, all students should rely on the Genetics Program Chair for curricular and research advice.

Ph.D. and M.S. Students enter the Genetics Program by various routes. Some are admitted through recruitment by the Program, some are admitted through the Arizona Biological and Biomedical Sciences (ABBS) Program, and some are admitted through transfer to or direct recruitment to study with a specific Genetics faculty member from within the University of Arizona or from another qualified academic institution. Most Ph.D. students complete three nine-week research rotations as part of their first year of study (see Section 5); students who are admitted to study with a specific Genetics faculty member are exempt from this expectation.

In summary, graduate students in the Genetics Program complete a series of courses, seminars and journal clubs, and research activities, to ultimately immerse themselves in the process that creates new knowledge. Ph.D. students ultimately pursue dissertation research that is intended to make an important and seminal contribution to the science of genetics in the laboratory of their Major Advisor, while M.S. students carry out a research project that addresses an important question in genetics with their Major Advisor. The faculty of the Genetics Program serve as these advisors—instructing, mentoring, and directing the students' education. For a list of faculty in the Genetics Program, please see Faculty Members | Genetics Graduate Interdisciplinary Program (GIDP).

3. Administration of the Program

The Genetics Program is governed and administered by an Executive Committee. The current Executive Committee consists of nine faculty members and a student representative. The faculty are chosen from across the Departments and represent the diverse constituency of the Program. The purpose of the Executive Committee is to set the policies of the graduate program, to oversee program administration to ensure its values are maintained and its goals are met, and to foster common interests, activities, and communication among researchers interested in genetics at the University of Arizona.

The Executive Committee establishes committees that execute the major functions of the Program, including the Curriculum Committee and the Recruitment Committee. The

Curriculum Committee is responsible for development of the Genetics curriculum. The Recruitment Committee recruits students. In addition, the Executive Committee manages faculty membership; initiates special seminars, retreats, and social events; oversees the budget and seeks to secure funding outside the University; prepares self-study reports to the Arizona Board of Regents in the form of the Academic Program Review, which takes place every seven years.

Among the nine faculty members, the Executive Committee includes a Chair and a Vice Chair. Broadly speaking, the Chair of the Genetics Program is responsible for the day-to-day well-functioning of the Program. These duties include advisement of students over the course of their careers in the Genetics Program; oversight of the recruitment of new students; orientation of new students; responsibility for execution of budgetary expenditures; management of the business agenda of Executive Committee meetings and execution of projects as directed by the Executive Committee; preparation of periodic reports to the Executive Committee and to the Dean of the Graduate College; execution and oversight of administrative needs and requirements of the Graduate College; oversight of special events, such as socials, retreats, and named lectures; oversight of content of the website; outcomes and assessment reporting; and, regular updating and revision of this Handbook. The Vice Chair is responsible for the management of the Curriculum Committee, which reviews and updates requirements, evaluates new courses for inclusion in the genetics curriculum, monitors the progress of new courses, and oversees interactions and overlaps with other degree-granting or certificate programs. The Vice Chair also takes on projects from the Executive Committee or as requested by the Chair.

The Executive Committee includes one student representative who is appointed for a one-year term and is a voting member on the Committee. The student representative must be a major in Genetics and is elected to the Executive Committee by a simple majority vote of the Genetics students. By tradition, the student representative comes from the class of rising fifth-year students.

The Executive Committee is assisted by the GPC. The GPC is the primary assistant to the students in their interaction with the Graduate College and University administration generally, and they work closely with the students, faculty, and the Executive Committee to ensure timely fulfillment of the policies of the University of Arizona and the Program. Duties include monitoring and facilitating student progress through the program; administration of special needs of students, for example, handling VISA requirements; execution of financial disbursements and hiring documents; facilitating enrollment in courses that require sections, such as independent study, thesis credits, and dissertation credits; scheduling genetics courses; administration and planning of the recruitment process; administration and planning of special events; scheduling meetings and taking minutes for the Executive Committee; collection of student, faculty, and alumni survey data and of outcomes and assessment data; and assisting the Chair and Vice Chair on projects directed by the Executive Committee. The GPC is there to assist students as needs arise.

4. Graduate College Support Services

In addition to support from our GPC, the Graduate College is dedicated to promoting and strengthening graduate student overall wellbeing. Many resources have been designed to help graduate students balance and manage family, work, and school. Please see the following link for an overview: New And Current Students | University of Arizona Graduate College.

In addition, each of the following bullets are clickable and take you to a page about the services available through the Graduate College.

1. **Graduate Assistant/Associate Parental Leave**
2. **Temporary Alternative Duty Assignments (TADA) for Teaching Assistants/Associates**
3. **Extension of Time to Degree Policy**
4. **Life & Work Connections** - Child and Elder Care Resources

Lastly, students should know about the Graduate College's resource center—the Graduate Center. The resources for direct support include Writing and Communication, Funding and Fellowship support, Career Services, Professional Development, and Community Engagement. For more information, please go to the link to the Graduate Center website Home | Graduate Center.

5. Program Requirements for the M.S. Student

Work leading to the M.S. in Genetics requires at minimum two years. Students must complete a total of 32 semester credits of coursework and research, specifically a minimum of 26 credits of coursework and six credits of research, including:

1. GENE 518 Fundamental Genetic Mechanisms (four credits; fall semester).

2. At least one course from the Genomics and Bioinformatics category published under the Course Requirements tab on the Genetics Program web-site.

3. Four semesters of GENE 670 Recent Advances in Genetics (two credits; fall and spring semester) for a total of eight credits. This is the Genetics graduate seminar.

4. Additional coursework credits from the student's specific areas of interest, as agreed upon by the student's Major Advisor or Chair of the Program, such that the total coursework credits sum to at least 26 credits.

5. Six units of GENE 910, which are the M.S. thesis credits.

Required coursework. As noted above, the Genetics Program has one required, foundational genetics course, GENE 518 Fundamental Genetic Mechanisms. This four-credit course held in the fall semester covers a broad range of topics in the science of heredity and genetics of DNA and chromosome transactions. Students learn to analyze and evaluate the primary literature, to solve complex problems in genetics, to present oral communications of findings in the literature, and to prepare written reports of their analysis of important concepts in genetics.

To ensure that students graduating with an M.S. in Genetics have some exposure to modern technologies in the realm of genomics and bioinformatics, students must take at least one Genomics and Bioinformatics course from that category, from a list the program maintains and updates annually, published on the Genetics web-site, under the Curriculum Requirements | Genetics Graduate Interdisciplinary Program (GIDP) tab.

Seminar. Students must attend and participate in the graduate seminar course, GENE 670 Recent Advances in Genetics, for a minimum of four semesters. In this course, students learn to present their own work and to analyze and report on the work of others to a broad audience of faculty and students on a regular basis. Students also have the opportunity to present their work at annual retreats of the Program, at the Graduate College's GIDP Showcase, and of course within the confines of the student's Major Advisor's lab.

Thesis. Students take a minimum of six credits of GENE 910 for the Master's thesis. The format for the thesis varies, depending on the student's needs and career trajectory, see "The Elements of the Master's Thesis, Master's Thesis Work," below.

Elective courses. Students choose from a wide range of genetics and other courses to fulfill their curricular needs. As noted above, the Program maintains a roster of potential elective courses in genetics, genomics and bioinformatics, and biochemistry on the Program website (Curriculum Requirements | Genetics Graduate Interdisciplinary Program (GIDP)).

Course	Description	Credits
GENE 518	Core requirement for Genetics GIDP	4
Genomics and Bioinformatics	Distribution requirement	3 or 4
GENE 670	Advances in Genetics, seminar	8

Course	Description	Credits
GENE 910	Thesis	6
Elective Courses	Decided upon by the student and through advisement	≥11 or 10

Other courses. Although a specific number of credits within the major has not been determined, the Program expects M.S. students to have a concentration of courses in genetics and genomics. The inclusion of a new course offered by the University on one of these lists can be achieved by email request to the Chair, the Vice-Chair, or the Genetics Curriculum Committee of the Genetics Program.

Teaching Assistantships. There is no specific requirement in the Genetics program for M.S. students to perform teaching assistantships. Students are enjoined and encouraged to learn the art of science communication, which is achieved in part by participation in the Seminar course, through coursework, and poster presentations as noted above.

Alterations to these requirements must be approved by the Executive Committee.

Grade requirements. The Graduate College expects students to maintain an overall grade-point average of at least 3.0 (B). One semester < 3.0 and the student is on probation. Two semesters < 3.0 and the Graduate College can remove the student from the program. The Genetics Program has a more stringent requirement that students must not have more than two grades of C in their coursework. Courses cannot be retaken for a better grade. Failure to achieve such a record can result in dismissal from the program, that is, the Program can ask the Graduate College to remove the student from the program.

Students who have transferred from another graduate-degree awarding program at a different institution may petition to have coursework credits transferred and applied to

their degree in Genetics. See Master's Degrees | University of Arizona Graduate College for policies and procedures established by the Graduate College. As stated in Graduate College rules, no credits can be transferred that were used for completion of an advanced degree at a different institution.

Other Elements of the Genetics Curriculum

Oral report on thesis work. Students are expected to present at least one oral report on their thesis research in GENE 670 Recent Advances in Genetics.

Genetics Retreat. MS students are encouraged to participate with a poster in the annual Genetics Retreat.

Leave. Students have the option to petition the Chair to take a leave-of-absence or withdraw voluntarily from the Program as guided by Graduate College rules.

The Elements of the Master's Thesis – Major Advisor

The Major Advisor is the single most important contact in the student's thesis work. The selection of the Major Advisor involves matching of student and advisor interests, the availability of funding for the research, should the thesis require experimental investigations, and the potential for a certain chemistry of interaction. The Major Advisor's responsibilities include:

1. Advise and supervise thesis research.
2. Advise on the selection of a Student Advisory Committee, which will also act as the student's Thesis Examination Committee.
3. Advise on coursework that would help the student with their thesis work and career goals.
4. Assist the student on advancement through an overall development of the student's graduate career.

The Elements of the Master's Thesis – Student Advisory Committee

Students should work with their Major Advisor to form their Student Advisory Committee. This Committee should provide expertise and scientific judgment needed to assist the student in their thesis research. The Committee should consist of at least

three (3) members, including at least two (2) members of the Genetics Program faculty (one of whom can be the Major Advisor). When expertise outside the University is essential and they are not a member of the UA Graduate Faculty, an outside advisor can serve as a Special Member on the committee in place of a faculty member. Please ask the GPC to submit the required paperwork to designate them as a Special Member prior to adding them to the GradPath Master's Committee Appointment Form. In the case of an internship Master's (see below), the internship supervisor can perform the duties of a major advisor and serve as a Special Member on the committee in place of a faculty member; the student would select a faculty member to serve as Major Advisor *Persona Ficta,* whose main role would be the same as the other non-Major-Advisor faculty on the Student Advisory Committee.

Although the Student Advisory Committee is generally a stable entity throughout the student's work, faculty members may be added or removed to serve the needs of the student's thesis work. The Student Advisory Committee can be formed as early as the end of the first year of study but must be formed well in advance to providing them the final thesis document for approval. As soon as the members of the Student Advisory Committee agree to serve, the student must inform the Program via the GPC of their names for approval. The Committee composition must be approved through GradPath.

In many cases, the expectations of the non-Major-Advisor faculty of the Student Advisory Committee are no more than reading and commenting on the thesis, with the first meeting of the committee at the student's Thesis Examination. However, the student can ask for more frequent and more direct involvement of these advisors according to their needs.

The Student Advisory Committee acts as the examining body for the final Thesis Examination. The Major Advisor serves as Chairperson of the Student Advisory Committee and presides over examinations and deliberations of the committee. During the Thesis Examination, the Major Advisor ensures the examination is run fairly and may ask questions but is not permitted to answer questions for the student.

<u>The Elements of the Master's Thesis – Master's Thesis Work</u>

A requirement for completion of the M.S. degree is the Master's Thesis. The Master's Thesis is a piece of scholarly writing that represents mastery of a topic within the field of genetics. The Master's Thesis requirement can be satisfied by submission of a document from one of the following three categories:

1. *Scientific Report*. A paper that describes dry or wet laboratory work, written in the style of an article that one would find in a scientific journal. The scientific report is the culmination of experiments carried out in the Major Advisor's lab. This work would emanate from a critical evaluation of the current scientific literature, the identification of a gap in knowledge, the formulation of a central hypothesis, and the performance of experiments to test this hypothesis. The Program does not necessarily expect this work to have reached the level of a publication, but the data should be reproducible and reliable, and the paper should have all the relevant elements that would appear in an published article including Title Page, Abstract, Introduction, Materials & Methods, Results, Discussion, References, and presentation items such as Tables and Figures with their legends. This option allows students who have conducted substantial laboratory work over the two-year MS period to gain mastery of this basic form of science communication. It is conceived that the research would meaningfully advance a strand of investigation within the Major Advisor's laboratory.
2. *Literature Review*. A substantial review of the literature, written in the style of a review that one might find, for example, in the journal *Trends in Genetics*. The student should select a topic that is relevant and important to current scientific thought, illustrate both deep knowledge of the literature and shrewd and discerning understanding of recent outstanding publications in the area, and the student should synthesize the literature to provide a critical perspective of that literature demonstrating mastery of that literature. Although the length is less important than the quality of the thinking, as a guide, the program expects that the review is over 30 double-spaced pages in length and cites at least 75 articles.
3. *Engineering Report*. A professional, technical report of an innovative method, bioinformatics pipeline, or computational approach that would provide a substantial advance to industry or academic research. This report could include

data and information gathered through research with a faculty member or through employment, apprenticeship, fellowship, etc. at a private/commercial or non-profit organization for which genetics research is a fundamental aspect; this employment may take the form of a job, outreach program, or volunteering in a genetics laboratory, genetic counseling program, etc. The technical report should contain substantial new findings, rigorous evaluation of the existing information and data, and critical thought.

Preparation and formatting of the written thesis shall follow the regulations of the Graduate College as set forth on their website (Dissertation and Thesis Formatting Guides | University of Arizona Graduate College). The Program acknowledges and accommodates written, scholarly works that take a different format, based on the type of thesis work having been completed. The student should prepare their written thesis – whether it be in the style of published research paper, a literature review, or an engineering report – in consultation with their Major Advisor, who is expected to provide advice on the content and clarity of the written document. After writing and revising a draft of the complete thesis, the candidate must submit the draft to each member of their Student Advisory Committee. The student should consult with their Student Advisory Committee on when they should schedule the final examination and how much time they need to review the document before the final examination, providing enough time for them to return comments in writing, and they should check with Graduate College calendar and Program GPC on submission deadlines, if they are submitting the thesis near the end of term.

A reasonable plan is to submit the final draft of the thesis to committee members three weeks before the final exam date, allowing them to make a detailed assessment and comments. Committee members will then provide the candidate with detailed suggestions or revisions before, or on the day of, the final exam. The GPC will assist the student in scheduling the final examination and with its public announcement.

Criteria for the Evaluation of the Thesis

The student's research proposal will be evaluated using the following criteria:

1. The rigor of the prior scientific work relevant to the specific research question under investigation is discussed.
2. Existing knowledge is critically evaluated to identify specific gaps in knowledge.
3. Laboratory and technical work is hypothesis-driven, discovery-based, or engineering-based. In all cases, the methods and approaches used are well justified and explained. For a literature review, the topic should be comprehensively covered without major omissions.
4. Experimental approaches are judged to have been feasible regardless of whether or not they worked, and they should take into account relevant biological variables. Results, technical limitations, problems in the approach, and alternative approaches are discussed.
5. Scientific results support the interpretation. Limitations of the study are discussed, and alternative explanations of the results are explored. Future directions are discussed.

Master's Thesis Oral Defense/Final Examination

Formal defense of the thesis constitutes the final examination. The defense comprises two parts:

1. A 60-minute public colloquium in which the candidate presents her/his research, explaining how it contributes to the advancement of genetics, and

2. An oral examination by the candidate's Student Advisory Committee and other qualified persons acceptable to the committee. There is no minimum time limit for the final examination, but the examination may not exceed two hours.

The Final Examination will be chaired by the Chair of the Student Advisory Committee, which will be the Major Advisor in most cases. The Committee can pass or fail a student after their oral defense. The student has one month to retake the oral exam. If the student fails to pass the oral exam, the Program will advise the Graduate College that the student has not satisfied the requirements of the M.S., and this outcome usually leads to dismissal from the program.

After successful completion of the final examination, the candidate should make any corrections required and format the document as required by the Graduate College. Approval pages, which must accompany these copies, are available on the Graduate College website (University of Arizona Graduate College). The signature page can be circulated via email using Adobe Acrobat or the student can take the approval page to the final examination for signatures. Then candidate will then submit the final version to the Graduate College.

Final Examination

STUDENTS MUST BE REGISTERED TO DEFEND DURING THE SEMESTERS THEY DEFEND! STUDENTS MUST ALSO BE REGISTERED DURING THE SEMESTER THEY SUBMIT THEIR DISSERTATION OR THESIS. SUMMER REGISTRATION IS NO LONGER REQUIRED.

To defend and/or submit the final copies of the thesis in the Fall or Spring semester students must be enrolled in the Program; the number of credits required is set by the Graduate College (See Enrollment | University of Arizona Catalog).

Criteria for the Evaluation of the Oral Defense

Students should be able to reason cogently and critically about their own work and the work of others, to understand the relative strengths and weaknesses of scientific methods, approaches, and previous research results. They should have a broad knowledge of genetic concepts and be able to explain these concepts without major difficulty.

All students leaving the Genetics Program, whether by graduation or by withdrawal, will be asked to complete an exit survey, which will be administered by the GPC, deidentified, and merged with other exit surveys so that the respondent is not identifiable and the respondent's views and opinions can be freely and confidentially given. Participation is voluntary but strongly encouraged as feedback will be used by the Program to evaluate the experience of students and to improve the function and performance of the Program.

6. Program Requirements for the Ph.D. Student

The majority of students who enroll in the Genetics Program work towards a doctoral degree with a major in Genetics and a minor either in another graduate program, depending upon the area of research focus, or in Genetics. According to the rules of the University of Arizona Graduate College, all students must complete both a major and a minor. Work leading to the Ph.D. in Genetics requires approximately five years. Students must complete a minimum of 45 credits of coursework in the major and minor subject areas and 18 dissertation credits (GENE 920) in order to complete the degree:

Major. At least 36 credits of coursework, combining credits from the core curriculum and credits from the student's specific area of interest.

Minor. No fewer than nine credits of coursework, but, in any case, as required by the graduate program in which the student is minoring.

Dissertation credits. At least 18 units of GENE 920 dissertation credit are taken after successful completion of the comprehensive examination.

The Genetics Program has one required foundational genetics course GENE 518 Fundamental Genetic Mechanisms. This four-credit course held each fall semester covers a broad range of topics in the science of heredity and genetics of DNA and chromosome transactions. Students learn to analyze and evaluate the primary literature, to solve complex problems in genetics, to present oral communications of findings in the literature, and to prepare written reports of their analysis of important concepts in genetics.

Genetics Program Ph.D. students must select additional courses to complete their PoS. Courses are generally at the will of the student and the student’s advisory committee. However, to assure sufficient focus in the science of heredity, students must choose one course from each of two of three lists, determined by the Genetics Curriculum

Committee and maintained under the Course Requirements tab on the Genetics Program web site (see here). The three lists are divided into three categories: Genetics; Biochemistry; Genomics and Bioinformatics. For example, students must take GENE 518, one course from the Genetics list, and one from the Biochemistry list, or they may take GENE 518 and one from Genetics and one from Genomics and Bioinformatics.

Inclusion of a new course offered by the University on one of the lists can be achieved by petitioning the Genetics Curriculum Committee by email to the Chair or Vice Chair.

Ph.D. students are required to take a federally mandated ethics course. To satisfy this requirement, students can take GENE 671 Genetical Ethics, which takes a philosophical approach. Other courses include MCB 695E Science Society and Ethics, SPH 649 Survival Skills and Ethics, or PHCL595B Scientific Writing Skills and Ethics. There are other ethics courses on campus that can satisfy the mandated requirement.

Required Course	Description	Credits
GENE 670	Advances in Genetics, seminar	16
GENE 518	Core requirement for Genetics Program	4
GENE 671 or alternate	Ethics	1
Genetics; Biochemistry; Genomics & Bioinformatics	Two courses, one from each of two categories, to fulfil distribution requirement	3 or 4 each 6-8 (total)
Elective Courses	Selected by the student and advisor	≥7-9
		Total 36
GENE 920	Dissertation	18
Courses for minor	As determined by the graduate program	≥9
		Total 63

Teaching assistantships

Although there is no specific requirement in the Genetics Program for students to perform teaching assistantships, students must master the art of science communication. As part of satisfaction of this requirement, Ph.D. students must attend and participate in the graduate seminar course GENE 670 Recent Advances in Genetics for a minimum of eight semesters. In this course, students learn to present their own work and the work of others to a broad audience of faculty and students on a regular basis. Students achieve skills in communication doing homework in courses and participating in class discussions. We expect students to present a poster or an oral report in annual retreats of the Program. Advanced students will be asked to present a poster in the Graduate College's annual GIDP showcase, and students should attend at least one national or international scientific conference in their area of study, taking advantage of travel funds offered through Graduate College followships. Funding may also be available from the student's Major Advisor or from the Program. Please ask the GPC for information.

The Genetics Program can guide students in obtaining teaching assistantships to meet their teaching or funding needs. Please consult the Chair of the Program and GPC for more information.

The Graduate College expects students to maintain an overall grade-point average of at least 3.0 (B). One semester < 3.0 and the student is on probation. Two semesters < 3.0 and the Graduate College may remove the student from the program. Courses cannot be retaken for a grade. The Genetics Program has a more stringent requirement that students must not have more than two (2) grades of C in their coursework. Failure to achieve such a record can result in dismissal from the Program. The Program may ask the Graduate College to remove the student. Students who are removed from the Program or College may apply for non-degree status. Students in non-degree status may be ineligible for continuing financial support, depending on the source of the funding.

Students who have transferred from another graduate-degree awarding program at a different institution may petition to have coursework credits transferred and applied to their degree in Genetics. See Doctor of Philosophy | UArizona Graduate College for policies and procedures established by the Graduate College.

Other Elements of the Genetics Curriculum

GENE 792A (Laboratory Research Rotations): In the first two semesters of the first year, depending on how they entered the program, Genetics Ph.D. students may take three 8-to 9-week lab rotations of at least two units each (six credit units total). Students are expected to present an oral report of one of their research rotations during either their first or second semester of GENE 670 Recent Advances in Genetics.

GENE 900 (Research): Prior to taking the Comprehensive Examination (see below), students can take two to nine credits of independent research study each semester.

Elective courses. Students choose from a wide range of genetics and other courses to fulfill their curricular needs. Program maintains a rostrum of potential elective courses in genetics, genomics and bioinformatics, and biochemistry on the Genetics website, but these course listings are not necessarily comprehensive.

Interim oral reports. Students are expected to present an interim oral report on their dissertation research annually in GENE 670 Recent Advances in Genetics.

7. The Elements of the Dissertation

Major Advisor

The Major Advisor is the single most important contact in the student's experimental research and dissertation work. The selection of the Major Advisor involves matching of student and advisor interests, the availability of funding for the research, and the potential for a certain chemistry of interaction. In general, students match with a faculty member who will be the Major Advisor by the midpoint of their second semester, sometimes earlier, but rarely more than two semesters, that is, by May of the first

academic year for students entering in the fall and by December for students entering in the spring. In unusual circumstances, a student may require the summer to match with a Major Advisor. However, a student who has not matched by the first semester of their second year is not making progress, and the Program can ask the Graduate College to remove the student. The relationship between student and Major Advisor is expected to last until the dissertation work is completed. Occasionally, a student may need to find a new Major Advisor (faculty leave, irreconcilable differences can develop, and so on). Under these circumstances, the student should work with Program leadership to develop a plan for switching labs and obtain bridge support as needed.

The Major Advisor's responsibilities include:

1. Advise and supervise dissertation research.
2. Advise on Plan of Study.
3. Advise on the selection of a Student Advisory Committee, which will also act as the student's Committee for the Comprehensive Examination for Advancement to Candidacy and the Student's Dissertation Examination Committee.
4. Assist the student on overall progress through the Program and in the overall development of the student's graduate career.
5. Ideally, assist the student in moving to the next stage of their career and supporting them as needed in the stages beyond.

Students should consult with their Major Advisor and Program leadership for help in their selection of elective courses. These choices should fill gaps in the student's academic background that are relevant to the specific needs of their research.

Plan of Study

All students are required to submit a PoS prior to their Comprehensive Examination for Advancement to Candidacy. The PoS is first developed in consultation with Program leadership, when the student enters the Program, and it is thereafter further developed by the student in consultation with their Major Advisor with input from the Student

Advisory Committee. The PoS contains (1) specific courses that satisfy the credit requirements of the graduate school for the major and the minor and (2) a timeline for the completion of the listed coursework and dissertation credits. Because the background education of each incoming student and the needs of their specific Ph.D. research varies, the Program allows maximum flexibility in constructing the specific curricula that will supplement each students' knowledge and complement their area of research. After students have selected their Major Advisor, they should work with the Major Advisor to fill out the plan that best fits the student's dissertation project. By the time of the Comprehensive Examination, the student should have completed most of the coursework for the PoS; it is expected the remaining work, for example, satisfaction of the requirement of eight semesters of the graduate seminar, is relatively minimal. The Chair of the program must approve the PoS and approve any changes that are made to the PoS. Submission of the PoS is done through GradPath, and the student should consult with the GPC for guidance on the process.

Student Advisory Committee

Upon matching with their Major Advisor, students should consult with faculty to form their Student Advisory Committee. This Committee should provide expertise and scientific judgment needed to assist the student in their dissertation research. The Committee should consist of at least four members, including at least three members of the Genetics Program Faculty (one of whom should be the Major Advisor) and one faculty member from the student's minor field. Note that since Genetics faculty may also be associated with the minor program, more than three members of the committee may belong to the Genetics Program. The Student Advisory Committee acts as the examining body for the Comprehensive Examination and the final Dissertation Examination. Although the Student Advisory Committee is generally a stable entity throughout the student's graduate career, faculty members may be added or removed to serve the needs of the student's dissertation work.

Students should form this Committee by the beginning of their second academic year, that is, by September for students who entered in the fall and by January for students

who entered in the spring. Students should notify the GPC when they have formed their committee.

The Chairperson of the Student Advisory Committee is tasked with presiding over student oral examinations, deliberations of the committee, and filling out reports and program paperwork. Prior to committee meetings, the student will appoint the Chairperson of the Student Advisory Committee; the Chair may be the same or a different person from previous meetings. **The student's Major Advisor is not permitted to serve as Chairperson of examinations and committee meetings**.

First Meeting of the Student Advisory Committee

After the student has formulated their Student Advisory Committee, the student should schedule their first committee meeting. The first meeting should be in October to November of the second academic year (February to March for students who entered in the spring semester). It is the responsibility of the student to inform the GPC of the date and time of the first meeting and all subsequent meetings. The GPC will send feedback surveys for the student and chair of the committee to fill out after the meeting.

For the first meeting, the student should prepare a one-page Specific Aims document that is a pre-proposal for the Comprehensive Examination (see below). The questions raised in the pre-proposal should allow the student to develop and address a working hypothesis regarding an unresolved issue in genetics. The pre-proposal should reflect an informed analysis of the problem and the relevant literature, and should be supported by key citations.

The standard protocol for running the Student Advisory Committee meeting in the first and all subsequent meetings is a follows. The student and committee meet at the appointed location at the scheduled time, and the Chair calls the meeting to order. First, the student leaves the room, and the Major Advisor updates the committee on the progress of the student, discussing the major strengths of the student and areas to be

improved. The student is then called back to the meeting and the Major Advisor leaves the room. The student then updates the committee on how things are going with the Major Advisor, discussing any points of conflict or deficiencies that should be addressed. When the Major Advisor returns to the room, the committee will summarize the feedback, and they can then discuss any issues that need to be resolved with both the student and the Major Advisor, if there are any issues.

After these discussions are completed, the student makes a brief presentation of the dissertation pre-proposal, in the general format of title, background and significance, hypothesis, preliminary data, results, discussion/interpretation, and future studies. These future studies provide the jumping off point for discussion by the group of the specific aims of the student's dissertation work. This discussion provides the student feedback on the development of their comprehensive exam proposal.

At the first committee meeting, the committee must evaluate whether the topic and the outlined questions of the proposal are appropriate for the development of a hypothesis-driven research proposal. A discussion of specific experiments that could be included in the research proposal as preliminary data is particularly relevant. The committee chair is charged with ensuring that these discussions are realized in the first committee meeting.

The student then has approximately six months to gather preliminary data and prepare the written proposal for the Comprehensive Examination.

Comprehensive Examination for Advancement to Candidacy

To advance to candidacy the student must satisfactory complete the majority of the coursework required for the degree and must pass the Comprehensive Examination – a two-part exam consisting of written and oral portions. Students should have taken this examination before completion of the summer quarter of their second year (or winter quarter for student who matriculated in the spring semester). Most of the coursework should be completed by the end of the second year and they can submit their PoS (see

the Graduate College degree requirements). However, the student can have credits that remain for completion, including dissertation credits, an elective, and graduate seminar credits.

The program asks students to develop a research proposal. A research proposal is built by a process of developing a central hypothesis, devising a research plan to test that hypothesis, and then organizing the information and creating a linear narrative that communicates what the student plans to do in their dissertation work. This process lies at the heart of scientific inquiry. Although the path to the final defense of the dissertation is almost never identical to the steps laid out in the proposal, a strong proposal sets the stage for research that will be important and significant, for creation of new knowledge that other people would care to know.

The Comprehensive Examination is thus designed to meet four main learning objectives: to evaluate (i) the proficiency of the student's general genetics knowledge, (ii) the likelihood that the student can carry out a substantial research project, (iii) the ability of the student to communicate results and conclusions from their experimental investigations orally and in writing, and (iv) the ability of the student to conduct research ethically. These are the main learning objectives of the program, the goal of which is for students to learn how to create new knowledge by engaging in the process of creating new knowledge. By this stage in the student's career, they are expected to be able to independently evaluate and critique relevant bodies of information in the scientific literature, to integrate the acquired information into broad conceptual schemes, to develop testable hypotheses based on rigorously established scientific facts, to devise experimental approaches and thereby to evaluate data, interpret results, and formally test hypotheses, and to demonstrate the communication skills required to present and defend scientific ideas in oral and written formats.

As the student develops their research proposal, they can get feedback from their Major Advisor, the members of their Student Advisory Committee, or other scientific advisors. The student can elicit detailed critiques of their research proposal from these mentors or other experts as needed. The feedback can be written or oral commentary; it can be on

specific experimental data generated by others or by the student; it can be about ideas that the student wants to discuss formally or informally; it can be experimental techniques, best practices or good approaches. Although the development of the research proposal simulates the preparation of a grant proposal for a grant funding entity, that simulation serves the purpose here of developing in students a set of skills in imagination and creativity in scientific enquiry that they will use throughout their careers. Importantly, the student is the sole author of their research proposal, including all the words, figures, and presentation items in it. The words and data of others can be used if appropriately cited.

Given the way projects develop in labs, a student may find overlap unavoidable between parts of a specific aim in the student's proposal and one or more aims in an active or submitted grant application by their advisor. The student should discuss with their committee to what degree such a "thematic" overlap is tolerable. If questions are raised about the overlap, the Major Advisor should provide copies of the respective grant application to the committee. The student bears the responsibility to consult with their committee for any gray areas that may border on plagiarism.

Proposal Development Process and Timeline

The student should discuss the process and timeline for proposal development at their first committee meeting. The student should plan on preparing a preliminary draft of the proposal by the beginning of the spring semester. They can then share this draft with their committee and solicit the first round of feedback, giving them two to three weeks to provide written critiques. The Major Advisor may need to remind and request these critiques to keep the process on course. With the critique in hand and checking in with their Major Advisor, the student can revise their preliminary draft and provide a penultimate draft to their committee in three to four weeks. The committee then provides their written feedback. They may ask for revisions again, but the program envisions that the process will reach an equilibrium of accord by the third and final submission. Thus, an example timeline is the following:

January 15 Student submits preliminary draft of proposal

February 15	Critiques returned; student meets with committee to discuss
March 15	Student submits second draft of proposal
April 15	Committee accepts second draft with or without minor revisions OR committee rejects proposal
May 1	Committee confers with program leadership; committee recommends a third round of revision or determines the written portion of exam is failed

If the student fails the written portion of the Comprehensive Examination, then the Genetics program will inform the Graduate College and recommend dismissal from the program. If the proposal is accepted, the student can schedule the oral part of the examination. It is the student's responsibility to submit the required on-line forms through GradPath at the link https://grad.arizona.edu/gsas/gradpath.

Style of Written Research Proposal

Students should develop a research proposal closely aligned to their dissertation research and written in the style of a grant application to a federal or a private funding agency (e.g., NASA, NSF, NIH, USFWS, BLM). The proposal format should include a single page consisting of Specific Aims, followed by a six page Research Plan. The page length is not mandatory; however, research plans over 12 pages are discouraged. The number of pages for references is not restricted. The Research Plan should contain three main sections (i) Significance and Background, (ii) Innovation, and (iii) Approach. The Significance and Background section should evaluate the rigor of the prior research, identify gaps and weaknesses, and develop the central hypothesis or goal of the proposal. The Innovation section should include a statement concerning the novelty of the proposed work. The Approach section should develop the methodologies or steps to be employed to test the central hypothesis or to achieve the goal of the work. It should include expected results and account for pitfalls and alternative approaches to achieve the aim of the work. This Research Plan section should include an evaluation of

all the relevant biological variables that need to be addressed to ensure scientific rigor. The proposal should have a face page with the title for the dissertation work.

Although other formats are acceptable, students who use the guidelines for the preparation of the F30 National Research Service Award (NRSA) grant application have the added benefit of being able to submit their research proposal to the NIH to compete for grant support, which is an ideal preparation for a career in academic science. The Program further recommends the student follow NIH guidelines regarding margins, fonts, font sizes and distance between lines. Brie~~l~~fly, the recommended font is Arial, font size 11 point, single-spaced, and margins no less than 0.5 inches all around.

It is assumed that the student and the Major Advisor will work together in discussion of the aims of the dissertation work and how these aims will be accomplished; however, the written proposal must be the product of the student not the Major Advisor. The Major Advisor may advise the student on the clarity and meaning of the written product and the student may revise their proposal on the basis of this advice, but neither the Major Advisor nor any other person other than the student may edit the proposal.

To submit the written comprehensive exam, the student should provide an electronic PDF file to his or her Advisory Committee members.

Criteria for evaluation of research proposal (written exam). The research proposal will be reviewed by the Comprehensive Examination Committee. Other than exceptional cases, this committee is identical to the Student Advisory Committee. The student's research proposal will be evaluated using the following criteria:

1. The rigor of the prior scientific work relevant to the specific research question under investigation is discussed.
2. Existing knowledge is critically evaluated to identify specific gaps in knowledge for which there is a compelling rationale to fill them.
3. The aims of the work are hypothesis-driven.
4. Feasible experimental approaches are proposed that take into account relevant biological variables. Outcomes, pitfalls, and alternative approaches are discussed.

The proposal is subjected to two rounds of revision. A third round is at the discretion of the Committee. The ultimate decision at the end of the revision rounds will be pass or fail.

1. PASS: Students who pass the written examination may proceed to schedule the oral exam.
2. FAIL: Students who fail the written exam will be asked to leave the Program.

Oral Examination

The oral exam is meant to assess the ability of the student to discuss ideas, think through scientific problem and pitfalls and defend the experimental design and rationale is an open discussion format. The oral examination is conducted by the Comprehensive Examination Committee. The Committee has considerable leeway in the conduct of the examination. The only hard and fast rules for the oral exam is that it can be no shorter than one hour and no longer than three hours. The usual protocol is the student starts the discussion by talking about their research proposal—background and significance, knowledge gaps and rationale, aims, approaches and expected outcomes. At the end of the first hour of the exam, the student will be asked to leave the room and the Committee deliberates on probing specific areas of the research proposal or asking general genetics knowledge questions. Students are encouraged to seek input from other students, postdocs, and faculty in preparing for the oral exam through practices, lab meetings, journal clubs, etc.

It is the responsibility of each student to schedule the oral exam with their Advisory Committee. The standard timeline is to complete the oral by July 15 of the second year. The latest the oral can be scheduled in December 15 of third year (or May 15 for students who entered in the spring semester). The oral exam shall not be scheduled until the student has filed a passing written exam.

Criteria and evaluation for the oral exam. The Program expect students are able to discuss their research project—providing strong grounds for the central and working

hypotheses, critically evaluating the prior research and knowledge base of the project, justifying approaches, exploring problems that are inherent in the experimental design, explaining why the project should be carried out—and to answer genetics and other general knowledge questions relevant to their project.

The result of the oral examination is determined by committee member vote at the end of the oral exam. Students will be given the grade of “PASS” or “FAIL.” According to Graduate College policy, “More than one negative or abstaining vote will result in failure of the exam.” A minimum of four committee members must be present for the exam. Failure of the oral examination could be grounds for dismissal from the graduate program. However, the student's Advisory Committee may allow the student to retake the oral exam. According to Graduate College policy, a student may take the oral exam only twice. The timing of the retake must be within six months following the first oral examination. Although in most cases the same committee will readminister the oral examination, under special circumstances (for example, the student petitions the Chair of the Program having good reasons) a new committee may be formed to administer the second oral exam. Failure in both attempts results in automatic dismissal from the Ph.D. program. Upon successful completion of the comprehensive examination, presuming the required coursework has been completed, the student will be notified by the Graduate College of their advancement to doctoral candidacy (and the fees assessed at that point for candidacy). After completion of formal courses and during the pursuit of the dissertation research, the candidate is expected to continue to participate actively in Genetics Program activities.

The Program expects that the entire process, written and oral parts of the Comprehensive Examination will be completed no later than December 15th of the third academic year (see timeline below). The student may be dismissed from the program if this requirement is not met. If there is a valid, exceptional reason why a student cannot make the deadline, he or she must contact the Chair of the Genetics Program and the full Advisory Committee as soon as the problem is known. The Chair of the Program and Advisory Committee will evaluate the validity/necessity of the situation, and work with the student to find a solution. The decision to recommend dismissal of a student is

made by the Executive Committee. It is the role of the Chair to discuss the situation with the student. Official notification of the Program's request for dismissal of the student will come from the Chair of the Program via mail and e-mail to the Senior Associate Dean of the Graduate College with a copy to the student.

Supervision and Evaluation after Completion of the Comprehensive Examination

The Major Advisor and the Student Advisory Committee monitor student progress after a student has passed the Comprehensive Examination and advanced to Candidacy. The Student Advisory Committee will monitor the progress of the student and provide critical advice at least annually. It is the responsibility of the student to inform the GPC of the date and time of their Committee meetings. The GPC will send feedback surveys for the student and chair of the committee to fill out after the meeting. The Student Advisory Committee should notify Program leadership if there are any problems with the student's progress towards completion of the dissertation research or with the Major Advisor's direction of the student.

Experimental investigations are notoriously frustrating and making progress is often challenging. Students may have differences of opinion with their Major Advisor, and these differences can lead to interpersonal conflicts. Students have many ways to ask for help. An initial approach to resolving differences would be to talk individually to one or more members of the Student Advisory Committee. If the problems continue, the students can reach out to another concerned faculty member, the Chair or Vice Chair of the Program, or to a member of the Executive Committee. If the differences are irreconcilable, depending on the situation, the student can (i) look for a new Major Advisor, change labs, and continue in the Program with a new dissertation project or (ii) they can ask the Program for a terminal MS degree and leave the Program. After the student's fifth year, the Program expects the student and their Major Advisor has a dissertation completion and graduation plan for the student. The Chair of the Program monitors student progress, and they will reach out to the student and Major Advisor to make sure the student is on course to graduate. The Graduate College has set limits on

the number of years a student can be a Candidate without retaking the Comprehensive Examination (see Doctor of Philosophy | University of Arizona Graduate College).

The Program expects that students will publish their dissertation work. The process of preparing a manuscript for publication and the process of getting a manuscript accepted by an impactful journal are central learning experiences for students. Whether students plan to continue in academia, go into a commercial biological outfit or pharmaceutical industry company, or travel a different course for their career, learning how peer review works and how to respond to external critique is an important and pervasive part of professional life. This process adds meaning to the words “rigor of the prior research” as the student attempts to enter their creative work into the research cannon. In addition to an invaluable scientific learning experience, the published manuscripts can comprise some of the essential chapters of the student’s dissertation. Given the vagaries of research, the Program does not require a specific number of publications for satisfaction of the requirements of the Ph.D., but in professional life a rule of thumb is one first-author (or senior-author) publication per year, from which an expectation of three publications would be the average. The Program recognizes the fact that expectations vary across different fields and the limitations imposed by journal review.

Dissertation

Preparation of the written dissertation shall follow the guidelines and regulations of the Graduate College (as set forth in the Student's Manual for the Preparation and Presentation of Theses for Advanced Degrees). The student should prepare their dissertation in consultation with their Major Advisor, who is expected to provide advice on the content and clarity of the written document. After writing and revising a draft of the complete dissertation, the candidate must submit the draft to each member of their Dissertation Committee. The Dissertation Committee usually has the same membership as the Student Advisory Committee. The exact timing of the submission is at the discretion of the Dissertation Committee, but candidates must file the "Announcement of Oral Defense Examination" form with the Graduate College no later than 10 business days before the date of the Oral Defense Examination. This form requires the signature

of the Chair of the Dissertation Committee, signifying their assessment that the dissertation is ready to defend - although revisions may still be required. Thus, it is suggested that the final draft of the dissertation be submitted to committee members at least six weeks before the exam date. This allows three weeks for them to make a general assessment. Committee members will then provide the candidate with detailed suggestions or requirements for revision before, or on the day of, the final exam.

For information regarding the preparation of the dissertation, see the guides at Dissertation and Thesis Formatting Guides | UArizona Graduate College.

Final Examination

Formal defense of the dissertation constitutes the final examination. The defense comprises two parts:

1. A one-hour public colloquium in which the candidate presents their research and explains how it contributes to the advancement of understanding of genetics, and

2. An oral examination by the candidate's Dissertation Committee and other qualified persons acceptable to the committee. There is no minimum time limit for the final examination, but the examination may not exceed three hours.

The Final Examination must be conducted according to the Graduate College's "Policies and Procedures for Final Oral Examinations for Doctoral Candidates". After successful completion of the final examination, the Major Advisor must confirm the dissertation is ready for submission. The candidate makes any corrections required and submits the final dissertation to the office of the Graduate Student Academic Services UA Theses and Dissertations. The approval pages, which must accompany these copies, are available on the Graduate College website (www.grad.arizona.edu) and it is recommended that the student take these approval pages to the final examination for signatures. Please contact the GPC prior to the defense if you have questions about the

correct form to bring physically to the defense, or need help drafting said form for electronic signatures. The dissertation is stored in an electronic archive that is publicly assessable online in the University of Arizona library.

Announcement of Final Examination

The final examination is your dissertation defense. The Announcement of final examination form must be submitted through GradPath at least ten (10) days prior to the date of your examination.

Final Copies of Dissertation Document

The final dissertation must be submitted via the electronic submission site at http://www.etdadmin.com/arizona.

and must meet all specifications of the manual. You can order your bound copies from this site. The dissertation must be submitted by about April 20 for May graduation, November 26 for December graduation and August 11 for August graduation. Check with the PS Program Office for exact dates. The last requirement is to clear all fees with the Bursar's office, failure to clear your account will postpone the posting of your degree.

STUDENTS MUST BE REGISTERED TO DEFEND DURING THE FALL AND SPRING SEMESTERS! THEY MUST ALSO BE REGISTERED DURING THE SEMESTER THEY SUBMIT THEIR DISSERTATION. SUMMER REGISTRATION IS NO LONGER REQUIRED

To defend and/or submit the final copies of the dissertation in the Fall or Spring semester you must register for a minimum of three credits, or one credit under certain circumstances, see here: Enrollment | University of Arizona Catalog.

All students leaving the Genetics Program, whether by graduation or by withdrawal, will be asked to complete an exit survey, which will be administered by the GPC,

deidentified, and merged with other exit surveys so that the respondent is not identifiable and the respondent's views and opinions can be freely and confidentially given. Participation is voluntary, but strongly encouraged as feedback will be used to evaluate the student's experience and improve the functioning of the Program.

8. Program Timeline for a Typical Student

The schematic figure below covers the period from entry into the Program to completion of the Comprehensive Examination. All times in the outline are based on student entry in the fall semester.

YEAR 1

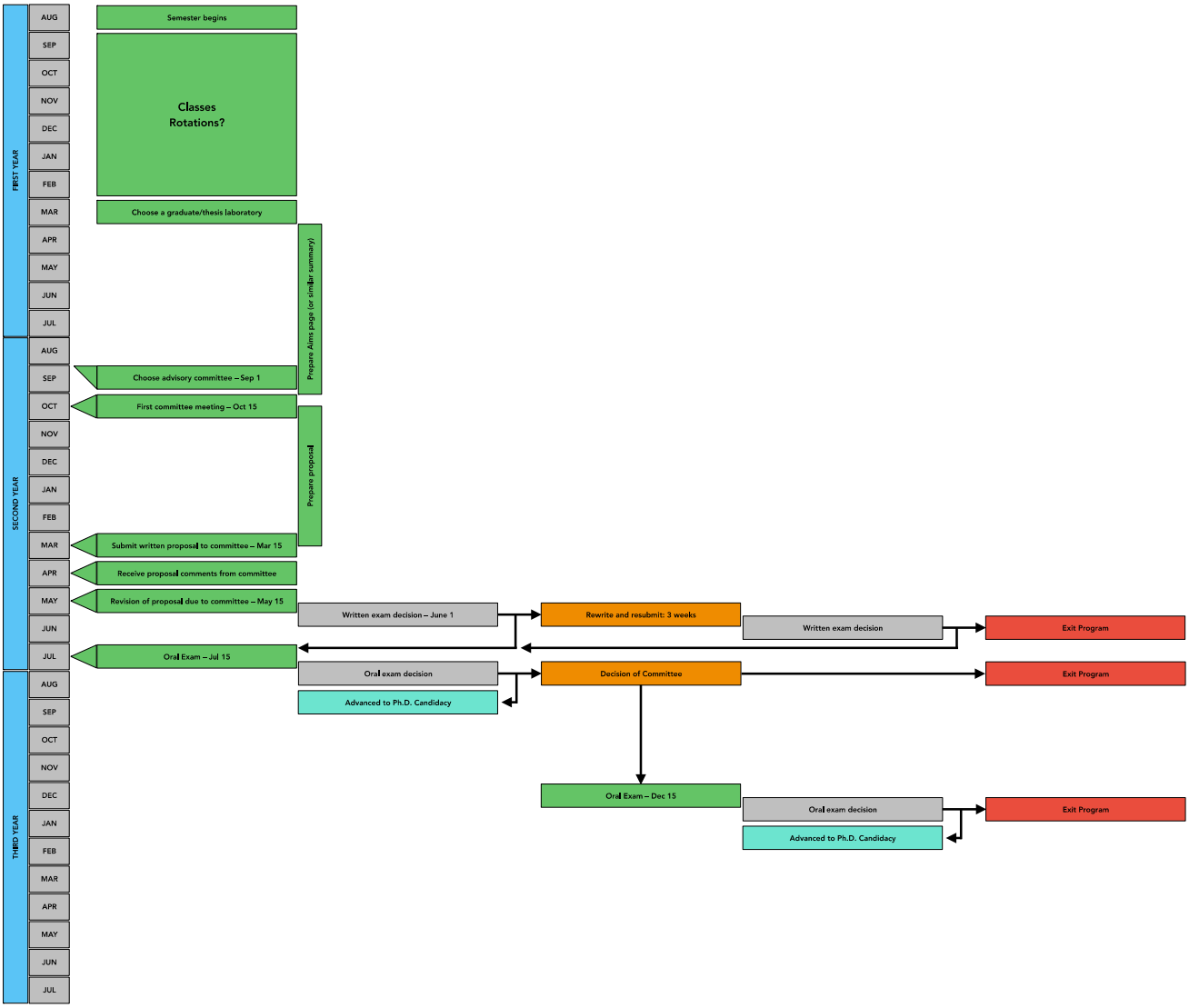
Take and satisfactorily pass two semesters of GENE 670 Recent Advances in Genetics and an ethics course. A grade of "B" or better is expected.

Take and satisfactorily pass elective coursework.

For some students, complete and pass three rotations in the laboratories of their choice. The GPC will send Lab Rotation Surveys to the student and the lab supervisor following each rotation. Please provide timely feedback.

By mid-March of the second semester, the student is expected to have chosen a Major Advisor from the Genetics faculty. To formalize this selection, the student must submit the GradPath Plan of Study Form identifying their Major Advisor (and selected minor).

Students should familiarize themselves with the online application GradPath, which they will use to initiate form submissions. Complete the Responsible Conduct of Research form and the Plan of Study form.



YEAR 2

Form the Student Advisory Committee at the beginning of the fall semester. Student prepares a Specific Aims page for their thesis work and submits it to their Student Advisory Committee.

Take and satisfactorily pass two semesters of GENE 670 Recent Advances in Genetics.

Complete and satisfactorily pass the elective coursework required for a major in Genetics.

Complete and satisfactorily pass the coursework required for their minor.

With advice from advisory committee and assistance from the GPC, prepare a completed PoS for submission on GradPath. The Chair of the Program must approve the submission.

Prepare a research proposal for the Comprehensive Examination and engage with the Student Advisory Committee to revise the proposal for the oral examination.

Students must submit the Comprehensive Examination Committee form via GradPath prior to scheduling Comprehensive Examination.

In most circumstances, the written and oral comprehensive examination will be completed by the end of the second year.

As noted above, additional information on the comprehensive examination is available at Doctor of Philosophy | UArizona Graduate College.

The various required Graduate College forms are available at GradPath | UArizona Graduate College.

Once the student has passed the written and oral examinations, the Chair of the Student Advisory Committee will report "Results of Oral Comprehensive Examination" via GradPath, and the student will be advanced to candidacy by the Graduate College.

YEARS 3, 4, and 5

Take and satisfactorily pass four semesters of GENE 670 Recent Advances in Genetics.

During the third year and following years, the student should perform the work that ultimately forms the basis of the dissertation. The student should meet with their Student Advisory Committee at least once each year to update the committee on the

progress of the research and to obtain feedback and guidance. The Chair of the committee submits reports to the GPC and leadership.

As the student nears completion of the dissertation research, they submit the “Doctoral Dissertation Committee Appointment” form in GradPath. This form establishes the examination committee for the dissertation and the final oral defense. The Student Advisory Committee generally assumes the role of the Dissertation Committee.

At the penultimate committee meeting, the Student Advisory Committee determines whether a student is ready to submit their dissertation work. When the student receives approval, they may prepare and finalize the dissertation and submit it to the Dissertation Committee. Students may not schedule their final oral defense until their dissertation has been approved by the Dissertation Committee.

FINAL SEMESTER

See the Graduate Colleges guidance for preparation of the dissertation at: Doctor of Philosophy | UArizona Graduate College

These guidelines contain the directions for formatting the dissertation; however, the overall organization of the dissertation should be determined by the student and their Major Advisor. It is the responsibility of the Major Advisor to proof the dissertation.

The “Announcement of Final Oral Defense” form must be submitted in GradPath at least 10 days prior to your defense. This form assumes that the dissertation manuscript has been accepted by all the Dissertation Committee members. Therefore, penultimate copies of the completed dissertation manuscript must be distributed to the Committee members with enough time to review before you submit this form.

After passing the final oral defense, the final dissertation must be submitted via the electronic submission site at http://www.etdadmin.com/arizona and must meet all specifications of the dissertation manual.

Questions regarding submitting forms and/or deadlines should be directed to the GPC.

9. Other Administrative Information.

Students should make every effort to complete all requirements for the Ph.D. degree in 4.5 to 5.5 years. International students must take at least nine credits of graduate course work in each of the fall and spring semesters. Students on a Graduate Research Assistantship in the Graduate College must take at least six credits per semester.

A checklist of requirements is maintained by the GPC and is reviewed at least annually by Program leadership. If a student falls behind the timeline laid out in the checklist, they will meet with the Chair, who will make recommendations to help resolve any problems. If a student fails to make progress in the program, at the recommendation of the Chair (in the case of students who have not yet matched with a Major Advisor) or of their Student Advisory Committee, and upon review and approval of the Executive Committee, they can be referred to the Graduate College for obtaining a terminal MS degree or dismissal from the Program.

Leave of absence. In certain circumstances, a student may apply for and be granted up to a one-year leave of absence. For example, in case of a long-term illness, pregnancy, or family emergency, a leave of absence allows the student to remain in good standing. Contact the Graduate Student Academic Services for more information. In addition, if a student has or develops a disability for which accommodation is possible, the student should contact the Disability Resource Center for more information about University policies and resources at https://drc.arizona.edu. In the event of unexcused interruption of graduate work for one semester (not including summers), the student must apply to be readmitted to both the Graduate College and the Genetics Program.

Doctoral Continuous Enrollment Policy. Unless excused by an official "*Leave of Absence*" (which may not exceed one year throughout the student's degree program), all graduate students are subject to the Continuous Enrollment Policy of the Graduate College in order to remain in the program. If the student fails to obtain a "*Leave of Absence*" or maintain continuous enrollment, he or she will be required to apply for re-admission. Tuition or registration waivers cannot be applied retroactively.

Vacation Policy. Graduate students are research trainees but can also be University employees, so interpretation of holidays can be complicated. First-year students should consult with the GPC for guidelines on how much vacation is considered appropriate. Once students are in the laboratory of a Major Advisor, they should negotiate with their Major Advisor when and how long they take vacations during semester breaks.

Students are required to notify the GPC or their Major Advisor when they make vacation plans. Attendance at scientific meetings or specialized courses is not considered vacation.

Student supervision and evaluation. It is important for GIDPs to foster student cohesiveness, since the range of courses and laboratories available may mean fewer chances than a traditional department for students to see and interact with each other. The Genetics program typically hosts gatherings for all students, incoming and returning, as well as all faculty members, at the beginning of the academic year in additional to other events during the course of the year.

The Program evaluates student progress annually, or more frequently, if necessary, based on letter grades, rotation reports, and reports from the Student Advisory Committees. The Chair of the Program and the student’s primary rotation mentors advise first-year students in the preparation of their curriculum and lab rotations. Going forward, at a minimum, students receive annual feedback.

In addition, the Chair of the Program reports to the Executive Committee, and they monitor student progress to ensure that course work is completed in a timely manner, that the Comprehensive Examination is completed on time, and that the student advances steadily towards completion of his/her dissertation work.

Evaluation during years 1 and 2. Each student undergoes an evaluation after each rotation in year 1 and is assigned a letter grade for each rotation. These evaluations involve review of the student's research and course performance and input from the student's rotation advisor(s). Program students are expected to maintain an overall

grade-point average of at least 3.00 (B) and to have no more than a total of two grades of C.

Policy for grievance and conflict resolution

All students have rights of academic freedom (right to pursue knowledge without interference from the government or University) and general human rights guaranteed by law (religion, speech, press, assembly, and appeal). Students have a right of confidentiality of academic records, and they have an expectation of fair evaluation of academic work. They have a right to due process and an expectation that they will not suffer retaliation for seeking redress of complaint.

In the events of disagreement or dispute on an academic issue, students should attempt to resolve the problem with the person with whom they have a dispute. If the dispute is not resolved, the student should provide a written description of the grievance to the Chair, Vice Chair, or a Member of the Executive Committee within thirty (30) working days from the time when the alleged grievous event(s) occurred. The written description should contain all matters of concern to the student. Issues not included in the written description may not be included in a grievance hearing on the dispute in question, should one be called. Proposed remedies may be included in the description. If the student fails to submit the written description in a timely manner, the student forfeits any further process under this policy.

If the grievance includes all the persons mentioned above, the student may submit the written description to the faculty director or chair of another program or to an Associate Dean of the Graduate College or the Dean of the Graduate College.

Once the written description is submitted, the applicable administrator will investigate and arrange a meeting with the graduate student to discuss and attempt to resolve issues. The administrator may discuss the issues and explore the potential resolution with relevant persons, including but not limited to the person(s) against whom the

grievance is made, faculty of the program or University that have specific knowledge of the event, or the Dean of the Graduate College.

Except under extenuating circumstances, if the process is contained with the Genetics Program, the applicable administrator will contact the student within five working days after receiving the written description of the grievance to schedule a meeting. A good faith effort should be made to hold the meeting in a timely manner. Within 15 working days after the meeting, the administrator will provide the student a written response. The written response should include the original date when the student submitted their grievance, the decision of the administrator, and the steps and rationale used to arrive at a decision. If additional time is needed, this document will include a timeline of when the final decision will be made.

Copies of the written response will be provided to the graduate student, the person(s) against whom the grievance is made, the Chair of the Genetics Program, and the academic Dean involved in the process. An official copy will be sent to the Graduate College to be retained in the student's file.

If this conflict resolution process is not successful, the student may appeal to the Graduate College. A description of the policy and procedure is provided at the link Grievance Policy | University of Arizona Graduate College.

Terminal Master's Degree Option for Ph.D. Students.

Students enrolled in the doctoral program who wish to obtain the Terminal M.S. degree in Genetics are expected to complete the following three requirements:

1. Contact Program Committee (copy Program Chair and GPC) in writing of intention/circumstances to obtain an MS.

2. Pass Ph.D. coursework with B grade or above.

3. Pass the Comprehensive Examination (written and oral).

(Please note, this option is not available for students who already have an M.S. degree in Genetics)

A student admitted to the Ph.D. program may petition the Chair of the Program to waive the requirements of the Comprehensive Examination explaining the circumstances of the change in career trajectory and providing a detailed plan for satisfying the requirements of the M.S. program. These plans must be reviewed and approved by the Executive Committee.

Financial Structure of the Doctoral Program

The funds utilized by the Program to support the doctoral student stipends can be derived from a number of different sources, including NIH Training Grants, Graduate College Fellowships, Teaching Assistantships, external fellowships or grants, philanthropic funds, and faculty contributions. The majority of students obtain support as Graduate Research Assistants in laboratories funded by federal or other types of grants. Because funding for the Genetics program is limited to what the Graduate College can provide, the Program can only guarantee financial support to students in their first year as detailed in their letters of offer. Outside the first year, because there are uncertainties in funding sources, support cannot be guaranteed to any student, but the Program will do what it can to support student in special circumstances.

Support from the Program may include stipend, health insurance, tuition fees and out of state tuition if applicable. Once a mentor is selected at the end of the first year, the student's Major Adviser covers the student's salary. Students should not expect support from the Program if they join a laboratory that does not have ongoing support.

Competitive Predoctoral Fellowships

The Program encourages individual students to seek supplementary funding. The advantages of seeking predoctoral fellowships are that it provides them with an opportunity to develop grant-writing skills, it brings prestige to them and the Program, it

enables the Program to recruit more students, and it can enable the student to supplement (increase) their stipend. The Program can provide guidance in this endeavor by identifying potential funding agencies. It is advised that the proposal be written in consultation with the Major Advisor.

Scientific Conferences.

Depending upon the availability of funds, the Program will defray the costs for students who are attending and presenting a “first author” poster or platform talk at a national/international meeting. Students can also ask their Major Advisor to send them to high-profile meetings. Costs associated going to a meeting include travel, lodging, meals, and registration fees. To apply for funding from the University of Arizona, students must be a first-author presenter. Travel Request Forms are available in the Program Office. Student can apply for funds that are available from the Program, the Graduate College (e.g., Carter Award Travel Grants are dispensed quarterly), and from the College’s Graduate Professional and Student Council (GPSC) at Welcome to Graduate and Professional Student Council | GPSC.

10. Minor in Genetics

The Genetics Program encourages students from other disciplines to minor in genetics. Nine credits in genetics are required. Students planning to minor in genetics must have at least one member of the Genetics Program on their Comprehensive Examination Committee, and must submit the appropriate form to the Executive Committee through the GPC for approval and signature. Successful completion of nine units of approved coursework in genetics is required prior to passage of the comprehensive exams. As part of the nine units, Genetics minors must complete two semesters (four credit units) of GENE 670 Recent Advances in Genetics. The remaining five units should be graded genetics or genomics courses as approved by student’s Committee and Genetics Program leadership and listed on the PoS.

One Comprehensive Examination Committee member must be a faculty member of the Genetics Program, and oral questions during the Comprehensive Examination must include material from the student's genetics coursework.

APPENDIX I

By-Laws of the Graduate Interdisciplinary Program in Genetics

Preamble

The Genetics Graduate Interdisciplinary Program (GIDP) is comprised of an integrated set of graduate-level educational activities, both classroom- and research-based, in the broad discipline of genetics. The Program awards Ph.D. and M.S. degrees in Genetics. For the conferral of a Ph.D. degree, graduate students must conduct research for a dissertation. For the conferral of a M.S. degree, graduate students must conduct research for a thesis. The criteria for preparation of these documents are stated in the Handbook of the Genetics Program. Faculty members in the Program have primary appointments across many Colleges at the University of Arizona. The Executive Committee of the Genetics Program serves as the executive, administrative, and policy-making board for the Program. The Executive Committee is appointed by and responsible to the Dean of the Graduate College with the consent of the Genetics faculty. The organization and structure of the Genetics GIDP conforms to Graduate College policies.

In addition to its other functions, the Executive Committee, with input from the faculty of the Program, provides the direction and leadership necessary to maintain and foster excellence in the Genetics GIDP's educational and research activities. In accordance with this mandate, the Executive Committee will regularly review and evaluate faculty membership, student progress, educational and mentoring activities of the program, recruitment, and any other activities that come under the purview of this GIDP. These By-Laws constitute the rules that govern the various functions of the Genetics GIDP.

Article I. Executive Committee of the Genetics GIDP

I.1. The Executive Committee is responsible for administering the Genetics graduate program, including (i) recruitment and admission of students into the Program, (ii) establishment of program curricula, (iii) establishment of requirements for advancing to candidacy and degree completion, (iv) periodic reviews, typically annually, of student progress, (v) promotion of an environment that facilitates scholarly activities in Genetics, (vi) organization of seminars, student colloquia, journal clubs, and other forums for communication of genetics research, (vii) strategic planning for the future development of the Program, (viii) raising and allocating funds for program activities, (ix) review of faculty membership and participation in the GIDP, and (x) reporting the Program's activities and functions to the faculty and to the Dean of the Graduate College.

I.2. The Executive Committee will consist of no fewer than eight faculty members. The Committee should reflect the variety of disciplines across the Genetics GIDP with a minimum of five different departments represented on the Committee. The Chair will seek nominations of new Committee members from the faculty; the nomination process will reflect the diversity required for the Committee as a whole. Candidates will be selected by Genetics faculty vote. Appointment to the Committee requires a plurality of the votes. A quorum shall constitute one-third of the Genetics faculty members. Faculty members of the Executive Committee will serve a three-year term, except for the Chair and Vice-Chair, who are appointed under Article II.2 and Article III, respectively. Terms will be staggered so that generally two or three members of the

Executive Committee rotate off the committee every one or two years. Faculty members of the Executive Committee may serve a maximum of three consecutive terms.

I.3. There is one Genetics GIDP student representative, preferably at the level of Candidacy. Student representatives serve a one-year term and will be elected by the students in the graduate program. The student representative is a voting member of the Committee.

I.4. The Executive Committee will sanction the establishment of Standing and Ad-hoc Subcommittees as needed for the administration of the Program as defined in Article I, subsection 1.

Article II. Chair of Graduate Studies of the Genetics GIDP

II.1. The Chair of the Genetics GIDP, with the advice of the Executive Committee and with the input of the faculty, is granted those powers and responsibilities necessary for a well-functioning program.

II.2. Election of the Chair of the Genetics GIDP. The Dean of the Graduate College will appoint the Chair of the Genetics GIDP. At the end of the term of the Chair, a non-Chair member of the Executive Committee will call for nominations for Chair of the program and organize a vote by the Genetics Faculty. Appointment of the Chair of the Genetics GIDP requires a majority of votes by Genetics Faculty. A quorum shall constitute one-third of the Genetics faculty members. If no individual candidate for Chair receives a majority of votes, there will be a run-off between the two candidates with the most votes. The Chair will serve a five-year term with the possibility of one additional term by re-election.

II.3. The duties of the Chair of the Genetics GIDP are as follows:

3a. With the advice of the Executive Committee, the Chair shall appoint Standing Subcommittees to oversee key functions of the GIDP, including student recruitment, student progress, educational curriculum, scholarly engagement (journal clubs, colloquia, etc.). These committees will appoint chairs to call and preside over their business meetings.

3b. With the advice of the Executive Committee, the Chair shall organize and submit appropriate competitive and non-competitive grants for the benefit of training students and advancing educational objectives of the program.

3c. The Chair shall call and preside over meetings of the GIDP, including

i. meetings of the Executive Committee to be held at least once a semester;

ii. meetings of the entire faculty of the Genetics GIDP to be held at least once per year.

3d. Administer the Genetics GIDP budget.

3e. Supervise the Program Coordinator.

3f. Advise the Dean of the Graduate College on issues pertinent to the Genetics GIDP.

3g. Report at minimum annually to the faculty members on the state of the Genetics GIDP.

Article III. Vice Chair of Graduate Studies of the Genetics GIDP

III.1. The Vice Chair of the Genetics GIDP will assist the Chair in the general well-functioning of the program and in those specific duties enumerated below.

III.2. The Vice Chair of the Genetics GIDP shall be appointed by the Chair with the advice and consent of the Executive Committee and faculty of the Genetics GIDP by a majority of votes with a quorum consisting of one third of the faculty members. The appointment as Vice Chair shall be made by the Dean of Graduate College. The Vice Chair shall serve on the Executive Committee. The Vice Chair's term will run contemporaneously with the Chair, and the Vice Chair may serve two terms.

III.3. The duties of the Vice Chair of the Genetics GIDP shall be as follows:

3a. Oversee the establishment of qualifying and dissertation committees.

3b. Administer curricular activities by serving as Chair of the Curriculum Committee and execute the educational directives of the Executive Committee.

3c. Administer student academic affairs.

3d. Undertake those additional tasks that can reasonably be assigned by the Chair.

3e. Report regularly to the Chair and Executive Committee on those matters relating to the Vice Chair's duties.

Article IV. Membership

IV.1. The Genetics GIDP faculty consist of tenured, tenure-eligible, Clinical-Series and Research-Series faculty at the University of Arizona who participate in research and education in genetics.

IV.2. Membership criteria.

2a. Faculty members will be nominated by submitting a request for membership, consisting of a cover letter and a current curriculum vitae, to the Executive Committee. Criteria for membership shall include interest in participation in graduate teaching and research and demonstrated current scholastic activity in the broad field of genetics. Therefore, the cover letter should include a statement of interest addressing these points.

2b. Upon evaluation of the request, the Executive Committee will vote on the nominee. If a nominee receives a two-thirds majority vote, the nomination will be forwarded to the Associate Director of the Graduate Interdisciplinary Programs Administration who authorizes membership. New members are required to present a research seminar in the Genetics Seminar Series within one year of joining the Genetics GIDP Program. Continuation of membership is contingent upon meeting the same criteria at periodic review by the Executive Committee.

2c. Faculty of the Genetics GIDP can be asked to leave the Program if they fail to participate in the activities of the Program. Participation in the Program includes service on a subcommittee, functioning as the major advisor of a graduate student in the program, serving on the dissertation or thesis committee of a graduate student in the program, teaching a graduate course or seminar in genetics, or continued scholarly productivity in genetics.

2d. Members dropped from membership may reapply for membership as outlined in Article III, section 2a.

IV.3. Membership responsibilities.

3a. Tenure-track faculty and career-track faculty who have been appointed as members of the Graduate Faculty and who are appointed in the Genetics GIDP by the Executive Committee may serve as major advisors of graduate students in the program.

3b. Faculty of the Genetics GIDP serve on subcommittees of the program, participate in teaching, function as major advisors to graduate students in the program, serve on dissertation or thesis committees, or participate in other scholarly activities of the program.

3c. Faculty serving as major advisors for Ph.D. students in the program are expected to share in the support of their graduate students.

IV.4. Voting. Each faculty member of the Genetics GIDP shall have one vote on matters brought to the Program by the Executive Committee. A quorum shall constitute one-third of the faculty membership.

IV.5. Regular surveys of Genetics GIDP members will be used to monitor the participation and enthusiasm of the faculty.

Article V. Amendments

These By-Laws will be reviewed and amended as needed by majority vote of the Executive Committee and approved by a two-thirds vote of the Genetics faculty. A quorum shall constitute one-third of the Genetics faculty.

Revised for EC review April 20, 2023, by Program Coordinator, Chair, and Vice Chair; reviewed by EC May 8, 2023; approved by faculty vote May 30, 2023.

APPENDIX II

Ph.D. Learning Outcomes

Learning outcome 1
The student develops a comprehensive knowledge of genetics[1].

Learning outcome 2
The student can develop and carry out a research project[2].

Learning outcome 3
The student is able to communicate results and conclusions from research projects in oral presentations and in writing.

Learning outcome 4
The student learns to conduct research ethically.

M.S. Learning Outcomes

Learning outcome 1
The student develops a comprehensive knowledge of genetics[1].

Learning outcome 2
The student can analyze new research and incorporate new knowledge into their understanding of genetics.

Learning outcome 3
The student is able to communicate results and conclusions from research projects in oral presentations and in writing.

[1]This knowledge includes technical methods; research approaches; analytic, bioinformatic, and statistical procedures; fundamental mechanisms; and philosophical principles relevant to genetics and to biology as a whole.

[2]Some of the facilities that go into this outcome include (i) definition of a biological question and construction of testable hypotheses that constitute a productive research direction; (ii) development of a research plan that applies conventional and innovative methods, constituting rigorous investigational approaches; (iii) ability to critically evaluate data from the literature and from the lab, using applicable and appropriate theoretical genetic and biological concepts; and, (iv) systematic and comprehensive integration of knowledge.