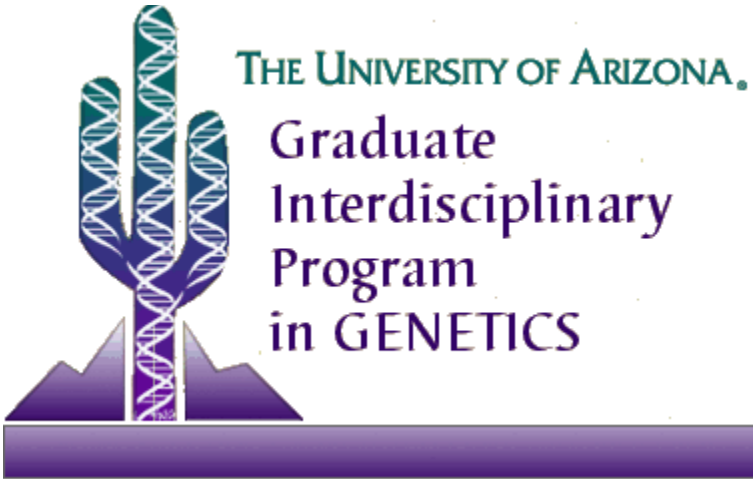

Genetics
Graduate Interdisciplinary Program (GIDP)
Student Handbook
2023

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APPENDICES

1. General

Welcome to the Graduate Interdisciplinary Program (GIDP) in Genetics at the University of Arizona. This handbook explains the organization of the program and provides a guide towards obtaining a Ph.D. or Masters degree in Genetics. The handbook outlines the rules and regulations of the graduate program.

Most of the basic rules are policies of the Graduate College of the University of Arizona and must be followed by all programs offering graduate degrees. Information about these policies can be found at https://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy, at https://grad.arizona.edu/gsas/degree-requirements/masters-degrees, and at http://catalog.arizona.edu/. More specialized requirements were established by the Genetics Program to ensure the quality of your training. As questions arise, good sources of information are the Graduate Program Coordinator 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 will provide a valuable opportunity to discuss the fundamentals of genetics with established investigators and to learn how to approach and evaluate the scientific literature. A central goal of the faculty will be 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 University of Arizona's *GIDP in Genetics* (hereafter, 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 and centers, including Agricultural and

Biosystems Engineering, Animal and Comparative Biomedical Sciences, Basic Medical Sciences (Phoenix), Cancer Biology, 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, Medicine, Molecular and Cellular Biology, Natural Sciences and the Environment, Neurology, Neuroscience, Pediatrics, Pharmacy Practice, Pharmacology and Toxicology, Physiology, Plant Sciences, and Psychiatry. 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, as well as in law, technology development, medicine, and public policy. The 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, bioinformatic and statistical procedures, fundamental mechanisms, and philosophical principles relevant to genetics and to biology as a whole; (ii) to develop the 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 6).

As detailed below, the required courses for Ph.D. and M.S. students are kept to a minimum to give students the greatest opportunity to create their own curriculum. The requirements include Fundamental Genetic Mechanisms; for the Ph.D. students, eight semesters of the graduate seminar Recent Advances in Genetics, and four semesters for the M.S. students. Ph.D. students are also required to take a course in ethics. All students need to identify a Major Advisor who will assist them with their research and the planning of their coursework. This coursework consultation is formalized in the development of a Plan of Study (PoS), generally to be completed in the first two years of the student's graduate career.

Ph.D. and M.S. Students can enter the Genetics Program through direct admission by the Program, through the Arizona Biological and Biomedical Sciences (ABBS) Program, or through transfer to or direct recruitment to study with a specific faculty member from within the University of Arizona or from another qualified academic institution. Ph.D. students who are admitted to Genetics directly are asked to complete three research rotations as part of their first year of study (see Section 5).

In summary, graduate students in the Genetics Program complete a series of courses, seminars and journal clubs, and research activities, to ultimately pursue their Ph.D. dissertation research in the laboratory of an advisor or, in the case of M.S. students, to complete a research project with the input of, and assistance by, an 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 https://genetics.arizona.edu/faculty-members.

3. Administration of the Program

The Genetics Program is governed and administered by an Executive Committee. The 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 policy 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, Recruitment Committee, and Student Progress. The Curriculum Committee is responsible for development of the Genetics curriculum. The Recruitment Committee recruits students. The Student Progress Committee oversees student progress. In addition, the Executive Committee manages faculty membership; organizes seminars, retreats, and social events; manages the budget and seeks to secure funding outside the University; prepares periodic reports to the Dean of the Graduate College, as well as 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, and the faculty on the committee represent the inclusive departmental participation in the program. Broadly speaking, the Chair of the Committee is responsible for the overall well-functioning of the Program (see the ByLaws in Appendix I for more information) and the Vice Chair is responsible for student progress.

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.

The Executive Committee is assisted by the Graduate Program Coordinator. The Graduate Program Coordinator works closely with the students, faculty, and the Executive Committee to ensure timely fulfillment of the policies of the University of Arizona and the Program. They are there to assist faculty and students as needs arise.

4. Graduate College Support Services

In addition to support from our Graduate Program Coordinator, 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: https://grad.arizona.edu/new-and-current-students.

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 resource areas include General Resources, Professional Development, Job Search and Preparation, Writing and Publishing, Research Resources, Teaching Resources, Mentoring, Community Engagement, Funding Sources and Preparation, and Financial Tools. For more information, please go to the link to the Graduate Center website https://gradcenter.arizona.edu/resources.

5. Coursework and 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 4.5 to 5 years. Students must complete a total of 63 semester units of coursework in the major and minor subject areas in order to complete the degree:

Major. 36 units of coursework, combining units from the core curriculum and units from the student's specific area of interest as detailed in the PoS.

Minor. No less than 9 units of coursework as required by the graduate program in which the student is minoring.

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

The Genetics Program has one required genetics course CMM 518 Fundamental Genetic Mechanisms. This three-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. The three lists are divided into three categories: Genetics; Biochemistry; Genomics and Bioinformatics. For example, students must pass CMM518, one course from the Genetics list, and one from the Biochemistry list, or they may pass CMM518 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, the Chair, or the Vice-Chair of the Program.

Ph.D. students are required to take an ethics course in their first year. To satisfy this requirement, students may take GENE 671 Genetical Ethics, MCB 695E Science Society and Ethics, SPH 649 Survival Skills and Ethics, or PHCL595B Scientific Writing Skills and Ethics.

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 are also required to present in annual retreats of the Program.

The Genetics Program will assist students in obtaining teaching assistantships to meet their teaching or funding needs and the Program will help students develop additional teaching opportunities. Please consult the Chair of the Program and Program Coordinator 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. 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 https://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy 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 have

to take three 8-to 9-week lab rotations of at least 2 units each (6 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 the taking the Comprehensive Examination (see below), students can take two to nine credits of independent research study each semester.

Elective courses. Students chose 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.

6. Program Requirements for the M.S. Student

General requirements

Work leading to the M.S. in Genetics requires approximately 2 to 3 years. Students must complete a total of 32 semester units of coursework and research, specifically 26 units of coursework and 6 of research, including:

1. CMM 518 Fundamental Genetic Mechanisms (3 credits; fall semester).

2. At least one (1) course from the Genomics and Bioinformatics category maintained under the Course Requirements tab on the Genetics Program web site.

3. Four (4) semesters of GENE 670 Recent Advances in Genetics (2 credits; fall and spring semester) for a total of 8 credits. This is the Genetics graduate seminar.

4. Six (6) units of GENE 910, which are the MS thesis credits.

5. And, additional coursework credits from the student's specific area of interest, as agreed upon by the student’s advisor or the Genetics Curriculum Committee, the Chair, or the Vice-Chair of the Program, such that the total coursework credits sum to 26 or more units.

Required coursework. As noted above, the Genetics Program has one required genetics course CMM 518 Fundamental Genetic Mechanisms. This three-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 Course Requirements 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 the work of others to a broad audience of faculty and students on a regular basis. Students are also required to present in annual retreats of the Program, in the form of an oral presentation or a poster presentation.

Thesis units. 6 units of GENE 910 MS thesis credit. The format for this may vary, depending on the student's needs and career trajectory, see "The Elements of the Masters Thesis, Masters Thesis Work," below.

Elective courses. Students chose 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 (https://genetics.arizona.edu/prospective-students/degree-requirements).

Course	Description	Units
CMM 518	Core requirement for Genetics GIDP	3
Genomics and Bioinformatics	Distribution requirement	3 or 4
GENE 670	Advances in Genetics, seminar	8
GENE 910	Thesis	6
Elective Courses	Decided upon by student and Program	≥12 or 11

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 achieving by petitioning the Genetics Curriculum Committee, the Chair, or the Vice-Chair of the Genetics Program.

Teaching Assistantships. Although there is no specific requirement in the Genetics program for M.S. students to perform teaching assistantships; students are required to learn the art of science communication. This is achieved in part by participation in the Seminar course and Poster presentations (see 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 will remove the student from the program. 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. In this case, the Program may ask the Graduate College to remove the student.

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 https://grad.arizona.edu/gsas/degree-requirements/masters-degrees 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

Interim oral report. Students are expected to present an interim oral report on their thesis research during either their second or third semester in the Program in GENE 670 Recent Advances in Genetics.

Genetics Retreat. MS students are expected to participate with a poster in at least one annual Genetics Retreat.

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 Masters 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, 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. —assist the student on advancement through and overall development of the student's graduate career.

Students should consult with their Major Advisor and Program leadership for help in their selection of elective courses.

The Elements of the Masters 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 Program Faculty (one of whom can be the Major Advisor) and one other faculty member who may or may not be a member of the Genetics Program; in the case of an internship masters (see below), a student's internship supervisor may serve as a Special Member on the committee in place of a faculty member. The Student Advisory Committee acts as the examining body for the final Thesis Examination.

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 should be formed by the end of the first year of study, but must be formed no fewer than two weeks prior 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 Graduate Program Coordinator) of their names for approval and the Committee composition must be approved through GradPath (see Appendix V). The student should meet with members of the Student Advisory Committee – individually or as a group – approximately every six (6) months.

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.

The Elements of the Masters Thesis – Masters Thesis Work

A requirement for completion of the M.S. degree is the Masters Thesis. The Masters Thesis is a piece of scholarly writing that represents mastery of a topic within the field of genetics. The Masters 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 would appear in a scientific journal. 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 article including Title Page, Abstract, Introduction, Materials & Methods, Results, Discussion, References, and presentation items such as Tables and Figures. 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 imagined 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 might appear 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 be over 30 double-spaced pages in length and cites at least 75 articles.
3. Engineering Report. A professional, technical report of an innovative method, bioinformatic 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 of the written thesis shall follow the regulations of the Graduate College (as set forth in the Student's Manual for the Preparation and Presentation of Theses for Advanced Degrees, although the Program acknowledges and accommodates written, scholarly works that may take a different form, based on the type of thesis work having been completed). The student should prepare their written theses – for example a published research paper, a completed manuscript in the format of a research article, a research report, or the like – 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 exact timing of the submission is at the discretion of the Student Advisory Committee, but should be within six (6) weeks (extensions are possible by a vote of the Executive Committee) of the Student Advisory Committee determining that the written document is acceptable. Candidates must file the "Announcement of Oral Defense Examination" form with the Graduate College through GradPath no later than seven (7) working days before the date of the Oral Defense Examination. This form requires the signatures of all members of the thesis committee, signifying their assessment that the thesis is ready to defend - although revisions may still be required. Thus, it is suggested that the final draft of the thesis be submitted to committee members at least six (6) weeks before the exam date. This allows three (3) 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 thesis, see the guidelines at https://grad.arizona.edu/gsas/dissertations-theses/dissertation-and-thesis-formatting-guides.

<u>Criteria for the Evaluation of the Thesis</u>

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 should either be 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 should be 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 or future directions are discussed.
5. Scientific results support the interpretation. Limitations of the study are discussed and alternative explanations of the results are explored.

Masters 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 (1) 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 must submit a final copy of the thesis to the Graduate Program Coordinator for a format review. The candidate must make any corrections required and provides two signed copies of the final thesis to Graduate Program Coordinator. Approval pages, which must accompany

these copies, are available on the Graduate College website (www.grad.arizona.edu). It is recommended that the student take these approval pages to the final examination for signatures. Then candidate will then submit the final version to the Graduate College, and will provide a final copy of the thesis to the Graduate Program Coordinator.

Announcement of Final Examination

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

STUDENTS MUST BE REGISTERED TO DEFEND DURING THE FALL AND SPRING SEMESTERS! 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 register for a minimum of three graduate units.

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 explains 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 Program Coordinator, 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 function and performance of the Program.

7. The Elements of the Dissertation

Student Progress Committee (SPC)

Students in the Program have many ways in which to signal that they need help. Before they have selected their Major Advisor, they can reach out to (i) the Chair or Vice Chair of the Program; (ii) any other member of the Executive Committee, including the graduate student representative; or (iii) to the Student Progress Committee (SPC). The SPC has two primary duties. The first is to monitor student progress throughout the stages of the program, ensuring that committee meetings take place and progress is recorded. The second is to follow up on indications that a student needs help. The SPC is required to have at least one meeting with each PhD student during their time in the Program.

1. The first meeting will take place after the student has been placed in his or her major advisor's lab for at least six months, early in the second academic year. The primary purpose of this meeting is to assess potential problems or conflicts between the major advisor and student, along with an assessment of the student's plan of study.

2. A second meeting will be required at the beginning of the sixth year, provided the dissertation defense is not already scheduled, to ensure that the student has a reasonable plan for graduating in a timely manner.

The SPC will also certify that all students have met at least annually with their Student Advisory Committee and that a report has been issued by the Committee for each meeting.

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, 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. This relationship is expected to last until the dissertation work is completed. There are infrequent circumstances in which a student will need to adopt a new Major Advisor (faculty leave, irreconcilable difference 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 advancement through and overall development of the student's graduate career.

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

Plan of Study

All students are required to submit a PoS prior to their Comprehensive Examination for Advancement to Candidacy. The PoS will be developed by the student and their major advisor in consultation with program leadership and ultimately in consultation with the Student Advisory Committee. The PoS lists (1) specific courses that satisfy the unit requirements of the graduate school for the major and the minor, and (2) a specific timeline for the completion of the listed coursework. 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 (8) semesters of the graduate seminar, is relatively minimal. The Student Advisory Committee members and the Chair of the program must approve changes to the PoS. Submission of the PoS is done through GradPath, and the student should consult with the Program Coordinator for guidance on the process.

Student Advisory Committee

Upon matching with 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 (4) members, including at least three (3) members of the Genetics Program Faculty (one of whom can be the Major Advisor) and one (1) faculty member from the student's minor field. Note that since Genetics faculty may also be associated with the minor program, more than three (3) 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 thesis work, faculty members may be added or removed to serve the needs of the student’s dissertation work.

Student 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.

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. The student’s Major Advisor may not answer questions for the student during examinations.

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 Program Coordinator of the date and time of the first meeting and all subsequent meetings, so that the student can bring the required paperwork to be filled out and signed by the committee at the meeting. There will also be assessment 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 Advised 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 thesis 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 required coursework for the degree and pass the Comprehensive Examination – a two-part exam consisting of written and oral portions. Students take this examination at the end of their second year or at the beginning of the third year. Most of the coursework should be completed by the end of the second year and they can submit their PoS (see the link https://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy#comprehensive-exam). However, the student can have left research units, an elective, and graduate seminar credits to complete.

The Comprehensive Examination consists of written and oral parts that are both designed to meet two main objectives: To evaluate the proficiency of the student's general Genetics knowledge. To evaluate the ability of the student to independently evaluate and critique a body of specific literature, to integrate the acquired information into broad conceptual schemes, to develop testable hypotheses, to devise experimental approaches and thereby evaluate 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 and the Student Advisory Committee. 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; or on ideas that the student wants to discuss formally or informally. In this way, the development of the research proposal simulates the process of preparation of a grant proposal for a grant funding entity. Importantly, the student is the sole author of all the words in their research proposal.

It is recognized that it may be unavoidable that parts of a specific aim of a student's proposal are similar to that of an active or submitted grant application by the advisor. The committee is asked to discuss to what degree such a "thematic" overlap is tolerable. If questions are raised about the overlap, the Major Advisor may 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.

A standard timeline for the Comprehensive Examination process is the student submits their proposal to the Committee mid-March to mid-April. In the usual case, the Committee asks for revisions and the student resubmits the proposal within three weeks. The Committee can engage in a second round of revisions for further improvement of the proposal if necessary. If the Committee accepts the proposal, the oral is scheduled for some time in May to July. If the proposal is not accepted, then the Program may recommend to the Graduate College that the student leave the program.

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. The Executive Committee determines whether dismissal is warranted and the Chair discusses 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 Graduate College with a copy to the student.

It is the student's responsibility to submit the required on-line forms through GradPath at the link https://grad.arizona.edu/gsas/gradpath.

Written Research Proposal

Students will develop a research proposal closely aligned to their dissertation research, written in the format 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 (6)-page Research Plan. The page length is not mandatory; however, research plans over twelve (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. This 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 facepage with the title for the dissertation work.

Although other formats are acceptable, the Program recommends that the student use the guidelines for the preparation of the F30 National Research Service Award (NRSA) grant application. The Program recommends the student follow NIH guidelines regarding margins, fonts, font sizes and distance between lines. Brielfly, 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 thesis 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 and a copy to the Program Coordinator. If there is some valid exceptional reason why a student cannot make the deadline, he or she must contact the Chair of 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.

Written exam evaluation. The written examination will be reviewed by the Comprehensive Examination Committee. In most 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 can be subjected to two rounds of revision. The ultimate decision at the end of the second round 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.

<u>Oral Examination</u>

The oral exam is meant to assess the ability of the student to discuss ideas, think

through scientific pitfalls and defend experimental design and rationale. The oral examination is conducted by the Comprehensive Examination Committee and is a two-part process. The first hour is devoted to a brief presentation by the student and to a defense of a Research Proposal. In the usual protocol, the student leaves the room at the end of the first hours and the Committee deliberates on whether the examiners should continue to probe the research proposal or progress to the general exam. The general exam consists of a broad examination covering any aspect of Genetics or other general biology knowledge. The Committee has considerable leeway in the conduct of the examination. The examination should be no shorter than two hours and no longer than three hours. 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.

Oral exam evaluation. 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 (6) 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.

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. This 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 Program Coordinator of the date and time of their Committee meetings, so that the student can bring the required paperwork to be filled out and signed by the committee at the meeting. A brief report of each meeting is submitted to the Program leadership by the Chairperson of the committee. 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.

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 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.

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 advise 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 the Dissertation 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 seven (7) working days before the date of the Oral Defense Examination. This form requires the signatures of all members 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 (6) weeks before the exam date. This allows three (3) 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 https://grad.arizona.edu/gsas/dissertations-theses/dissertation-and-thesis-formatting-guides.

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 and the candidate must submit a final copy of the dissertation to the Graduate Program Coordinator for a format review. The candidate makes any corrections required and provides two signed copies of the final dissertation to the office of the Graduate Student Academic Services. 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. The dissertation is stored in an electronic archive that is publically 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.

YOU MUST BE REGISTERED TO DEFEND DURING THE FALL AND SPRING SEMESTERS! YOU MUST ALSO BE REGISTERED DURING THE SEMESTER YOU SUBMIT YOUR 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 (3) graduate units.

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 Program Coordinator, 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 Time Line for a Typical Student

A Checklist is provided in Appendix II to help you keep track of major hurdles. The schematic below cover the period from entry into the Program to completion of the Comprehensive Examination. All times in the ouline are student entry in the fall semester.

YEAR 1

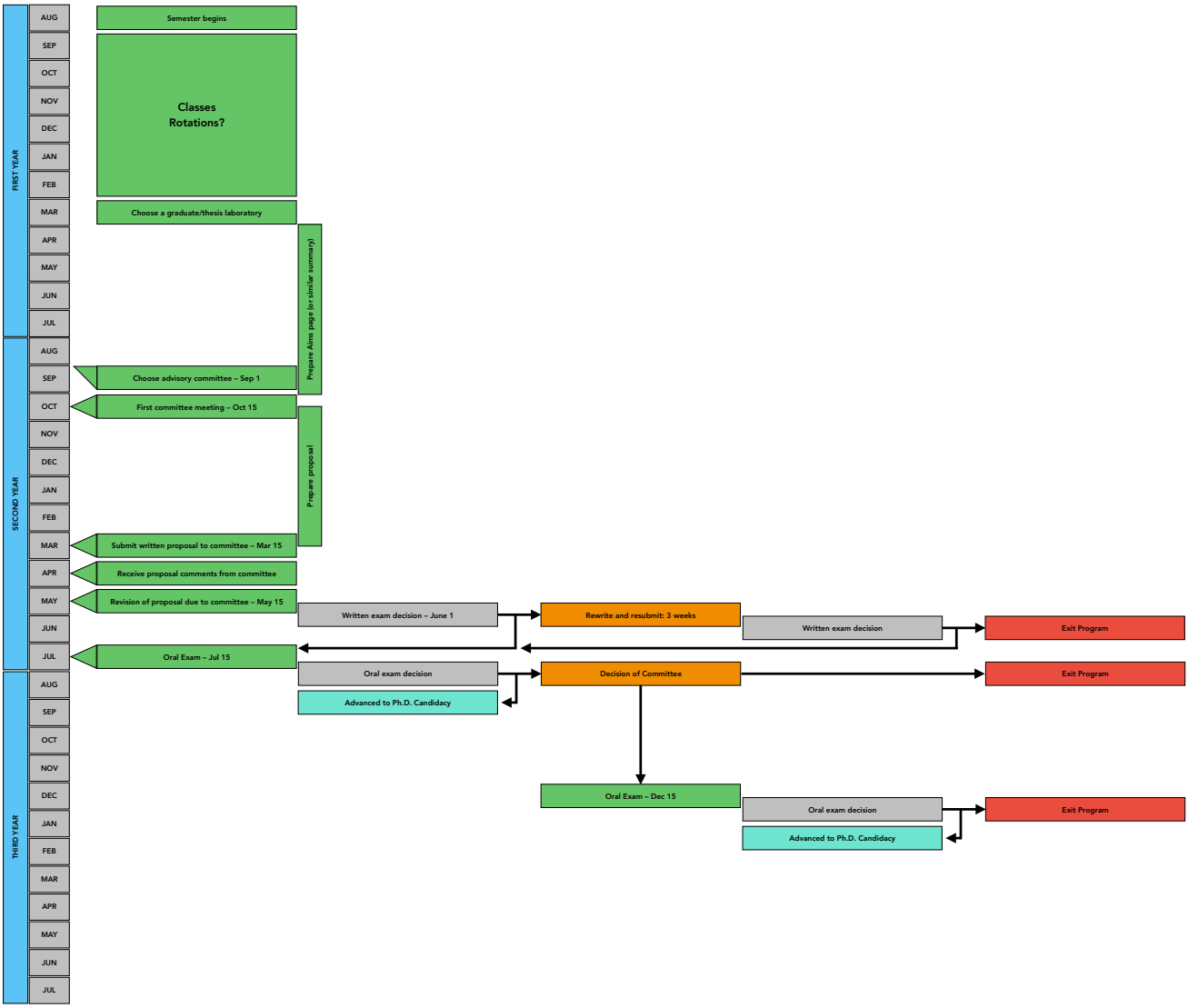
Take and satisfactorily pass two semesters of GENE 670 Recent Advances in Genetics and one of the three ethics courses offered. A grade of "B" or better is expected.

Take and satisfactorily pass elective coursework.

For some students, complete and pass three rotations in the laboratories of your choice. Submit completed lab rotation forms (Appendix III) at the beginning and end of each rotation.

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 “Major Advisor Selection Form” (Appendix IV) with the appropriate signatures.

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. Detailed instructions are in Appendix V.



YEAR 2

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

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

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

Complete and satisfactorily pass the coursework required for their minor.

With advice from advisory committee, prepare a completed PoS for submission on GradPath.

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

With advisement of the Major Advisor and Adviosry Committee complete and submit the PoS in GradPath.

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 or beginning of third year.

As noted above, additional information on the comprehensive examination is available at the link https://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy#comprehensive-exam.

The various required Graduate College forms are available at the link https://grad.arizona.edu/gsas/gradpath.

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 Program Coordinator and leadership.

As the student nears completion of the thesis 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.

Following Committee approval of the proposal, the student submits the “Dissertation Proposal Approval Form” to the Program Office and the “Prospectus/Proposal Confirmation” in GradPath.

FINAL SEMESTER

See the Graduate Colleges guidance for preparation of the thesis dissertation at: https://grad.arizona.edu/gsas/dissertations-theses/dissertation-and-thesis-formatting-guides.

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 ten (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 Program Office.

9. Other Administrative Information

Leave of absence. Students should make every effort to complete all requirements for the Ph.D. degree within 4.5 to 5.5 years. Students must take at least 12 units of graduate course work in each fall and spring semester in order to remain in good standing in the Program, or if they are on a graduate assistantship the Graduate College requires 6 units.

A checklist of requirements is maintained by the Graduate Program Coordinator and reviewed at least annually by Program leadership. If a student falls behind the timeline laid out in the checklist, they will meet with the program leadership, which will make recommendations to help resolve any problems. If a student fails to make progress in their dissertation research, at the recommendation of their Student Advisory Committee and with the approval of the Executive Committee, they may be referred to the Graduate College for removal in the absence of extenuating circumstances. Students will be notified by the beginning of the semester of each year of their satisfactory or unsatisfactory progress.

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 Program coordinator 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 Graduate Program Coordinator 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 timely completed, 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 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 (5) 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 fifteen (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 https://grad.arizona.edu/policies/academic-policies/summary-grievance-types-and-responsible-parties.

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 Program Coordinator) in writing of intention/circumstances to obtain a MS

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

3) Pass the Comprehensive Examination (written and oral)

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, tuitoion 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 is 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 (Zukowski Travel Award, see genetics website), the Graduate College (e.g., Carter Award Travel Grants are dispensed quarterly), and from the College’s Graduate Professional and Student Council (GPSC at https://gpsc.arizona.edu).

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 Graduate Program Coordinator 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

Official forms for most steps in the process outlined in this handbook can be found at GradPath at the link https://grad.arizona.edu/gsas/gradpath.

Program Forms

GENETICS DOCTORAL STUDENT CHECKLIST

Name: _____ First Enrollment:_____ Mentor: _____

Faculty Preceptor:_____

Program Forms

Lab Rotation Forms (Faculty/Term) _____ _____ _____

Mentor Selection Form ____/____/____ Minor Approval Form: ____/____/____

Comprehensive Exam Committee Form: ____/____/____ Dissertation Proposal Form: ____/____/____

Required Coursework (Term/Grade)

CMM 518 _____ GENE670_____ GENE795A_____

ETHICS_____

Formation of Student Advisory Committee: (names, affiliations, and contacts)

Graduate College GRADPATH forms:

Responsible Conduct of Research ___/___/___ Doctoral Plan of Study: ____/____/____

Comp Exam Committee Appointment ___/___/___ Announcement of Comprehensive Exam____/____/____

Written Completion Date: ____/____/____ Oral Completion Date: ____/____/____

Dissertation Committee Appointment____/____/____

Announcement of Final Oral Defense: ____/____/____

Student Advisory Committee Meetings: ____/____/____, ____/____/____,
____/____/____, ____/____/____, ____/____/____, ____/____/____, ___/____/____

Dissertation Committee:

Faculty Representing Major (Name & Dept) Faculty Representing Minor (Name & Dept)

Dissertation Title:

_____

_____

_____

Honors/Awards:_____

_____

Grants submitted/Grant awarded:_____

_____

GENETICS MASTERS STUDENT CHECKLIST

Name: _____ First Enrollment:_____ Mentor:

_____

Faculty Preceptor:_____ Student Preceptor:_____

Program Forms

Lab Rotation Forms (Faculty/Term) _____ _____

_____

Master's Committee Form ____/____/____

Student Forum (Term): 20 Minute Presentation: _____

Required Coursework (Term/Grade)

CMM 518 _____ GENE 670_____ Bioinformatics/Genomics coursework

_____

Graduate College GRADPATH forms:

Master's Plan of Study: ____/____/____

Committee Meetings: ____/____/____, ____/____/____, ____/____/____,

Project or Thesis Title

_____

_____

_____

Honors/Awards:_____

_____

APPENDIX III
Laboratory Rotation
Student Name: _____ Date: _____
Faculty Name: _____
Upon completion of the rotation the student and mentor should submit a one paragraph summary of the work and training accomplished.
The student and mentor each must also submit, on separate forms, a confidential evaluation of the rotation.
Outline or Evaluation:

_____
_____
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Signatures:
_____Student
_____Faculty

APPENDIX IV
Major Advisor Selection Form

I, _____ hereby agree to accept _____ into my laboratory and serve as mentor effective___/___/___. By accepting this student I understand that each year I am financially responsible for the current stipend amount to the program on behalf of this student. I further understand that this student may be supported via a training grant.

____ Should my funding become unavailable, my department head agrees to cover my portion of the above named student salary at the Genetics stipend rate for the duration of training, or until extramural funding is obtained

_____ _____
(Major Advisor Signature) (Date)

_____ _____
(Student Signature) (Date)

_____ _____
(Home Department Head Signature) (Date)

_____ _____
(Home Department Business Manager) (Date)

APPENDIX V
Gradpath Directions

PhD Students

Doctoral gradpath forms instructions. These forms are initiated during the 3rd semester.

3. Log in to UAccess Student
4. On the main page is a menu box “other academic”
5. Click on the drop down menu and select “gradpath forms” near the bottom of the list.
6. You must then click the “>>” to “go”
7. This will take you to the gradpath forms page
8. You must first fill out the “Responsible Conduct of Research Statement” by checking “I accept” and clicking “submit”
9. Once this form is complete the “Plan of Study” form becomes available. Fill in this form by selecting your courses to fill the form. You need 36 units total in the major and 9 units in the minor. You may need to select “future” courses. Dissertation units can NOT be included on this form. Once filled in click “submit”. It will be forwarded first to the Program Coordinator, then to your Mentor, then to the Minor, then to our Program Chair, then to the Graduate College. If there are mistakes it will be “denied” by the coordinator for you to correct and resubmit.
10. After the Plan of Study is approved (typically by the summer of year 2) you must submit the “Comp Exam Committee Appointment” form which lists your comprehensive exam committee, by selecting the faculty from the UAccess database. You must also assign each committee member a “role”. Remember the Chair of your comp committee can NOT be your mentor. All other faculty should be given the role of “member”. Remember to click “submit” If a member of your committee does not show up on the list contact the program coordinator right away so that member can be added by the Graduate College.
11. Once this form is available and prior to your oral exam you must complete the “Announcement of Doctoral Comprehensive Exam” form, including the date of your oral exam. After your exam an email will be sent to your committee chair to record the results of the exam in gradpath which will complete the “Results of Oral Exam” form.
12. During year 3 you should establish your dissertation committee and complete the “Doctoral Dissertation Committee Appointment” form; Same as above, you must assign each committee member a “role”; Your mentor is now the chair of your committee and the other faculty “members”. If a member of your committee does not show up on the list contact the program coordinator right away so that member can be added by the graduate college.
13. The next step is to have your dissertation proposal approved by your committee. Once this is done, submit the “Dissertation Proposal Form” to the program office and in grapath submit the “Prospectus/Proposal Confirmation”
14. You are all done with forms until it’s time for your defense. 2 weeks prior to your defense you must submit your “Announcement of Final Oral Defense” This form schedules your exam with the graduate college. After your defense your Mentor

is sent an email to record the results from your exam. This will complete the final form “Results of Final Oral Defense.”

Gradpath Directions

MS Students

Master’s gradpath forms instructions. These forms are initiated during the 3rd semester.

15. Log in to UAccess Student
16. On the main page is a menu box “other academic”
17. Click on the drop down menu and select “gradpath forms” near the bottom of the list.
18. You must then click the “>>” to “go”
19. This will take you to the gradpath forms page
20. You must first fill out the “Responsible Conduct of Research Statement” by checking “I accept” and clicking “submit”
21. Once this form is complete the “Plan of Study” form becomes available. Fill in this form by selecting your courses to fill the form. You need a minimum of 30 units total. If you click on the “Yes” I am doing a thesis button then you MUST register for at least 1 unit of 910 thesis units and these MUST be included on the Plan of Study. If you are doing the research summary option in the form of a manuscript you should click “No”. You will need to select “future” courses to fulfill the 30 unit requirement. Once filled in, click “submit”. It will be forwarded first to the Program Coordinator, then to your Mentor, then to our Program Chair, then to the Graduate College. If there are mistakes it will be “denied” by the coordinator for you to correct and resubmit.
22. Once you have established your committee you will complete the “Master's/Specialist Committee Appointment” form which lists your committee, by selecting the faculty from the UAccess database. You must also assign each committee member a “role”. Your mentor is the “chair” all other faculty should be given the role of “member”. Remember to click “submit” If a member of your committee does not show up on the list contact the program coordinator right away so that member can be added by the Graduate College
23. These are the only gradpath forms for you to complete. After your MS Defense, your mentor must contact the program office with the results and we will submit the “completion of requirements request” which will generate the “Master's/Specialist Completion Confirmation” form in gradpath.

APPENDIX SIX

Learning Outomes

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.

[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.