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XII. BIOLOGICAL SCIENCES GRADUATE STUDENT AFFAIR CENTER
I. Introduction and Contact Information

A. Graduate Program in Genetics, Genomics and Bioinformatics

The Graduate Program in Genetics, Genomics and Bioinformatics (known as the GGB Program) was formed to encourage broad-based study of genetics and to foster communication between geneticists, bioinformaticians and genomics researchers within different departments on the University of California Riverside campus. The GGB is thus interdepartmental and includes over 70 faculty members from the departments of Biochemistry, Biology, Botany and Plant Sciences, Cell Biology and Neurosciences, Computer Science, Entomology, Environmental Science, Nematology, Plant Pathology, and Statistics as well as the Division of Biomedical Sciences. The program's primary objective is to train scientists who are capable of teaching and conducting research in three major fields of specialization: Molecular Genetics, Evolution and Population Genetics, and Genomics and Bioinformatics.

Given the diversity in the GGB Program, graduate students have the opportunity to incorporate a wide range of disciplines into their training experience. Programs of study are tailored to the interests and goals of individual students.

This handbook is designed to aid GGB students to adapt to their new academic environment and to design a personalized and stimulating program of study. Because the practices of different graduate programs at UC Riverside often vary, the GGB students should carefully read this manual and consult with their student mentor and Graduate Advisor when questions arise. It is also recommended that graduate students refer to the UCR Graduate Students Handbook, available on the Graduate Division website for general policies at: http://graduate.ucr.edu/forms/GSHandbook.pdf.

Additional information can be found on the GGB website: http://ggb.ucr.edu/. Refer to the Graduate Division website (http://graduate.ucr.edu/) for the Graduate Advisor's Manual, Policies and Procedures Governing Graduate Student Employment, and the Graduate Division Calendar.

B. Program Contact Information

Program Director:

Dr. Shizhong Xu, Department of Botany and Plant Sciences, 3134 Batchelor Hall, (951)-827-5898, shizhong.xu@ucr.edu

The Program Director is involved with administrative and academic decisions for the GGB Program. All final decisions on curriculum, financial aid, recruitment, and student affairs may be made by the Program Director. The Director also chairs the GGB Executive Committee.

Graduate Advisor for Continuing Students:

Dr. Thomas Girke, Department of Botany and Plant Sciences, 1207F Genomics Building, (951) 905-5232, thomas.girke@ucr.edu

The Graduate Advisor for continuing students is responsible for overseeing the academic progress of all GGB students and chairs the GGB Curriculum Committee. The Advisor approves Course Programs, Guidance Committees, Qualifying Exam Committees, and Dissertation Committees. The Advisor chairs the Curriculum Committee of the GGB Program. The Advisor is also actively involved with students having academic problems (i.e., academic probation), and acts as a mediator to find solutions to nonproductive student-faculty interactions.

Graduate Advisor for Recruitment:

TBA
The Graduate Advisor for recruitment is responsible for overseeing the processing of graduate student applications, recruitment of admitted students, and chairs the Recruitment and Admissions Committee.

**GGB Student Affairs Officer:**
Deidra Kornfeld, Biological Sciences Graduate Student Affairs Center, 1140 Batchelor Hall, 2-7378, deidra.kornfeld@ucr.edu

The GGB Student Affairs Officer oversees the day-to-day administration and management of the GGB program. This includes assisting students with enrollment and registration, financial issues, and academic progress.

**GGB Graduate Student Association Representatives** (elected each year by the students)
- President: Keira Lucas
- Vice President: Meenakshi Kagda
- Secretary: Eric Smith
- GSA-Rep: Carly Sjogren

**Graduate Division:** Location: 140 University Office Building
- Dean: Joseph Childers, 2-4302
- Director of Student Affairs and Employment: Linda Scott, 2-3315
- Student Progress & Degree Information: Kara Oswood, 2-3315
- Fellowships & Employment: Karen Smith, 2-3315
II. The Academic Program

A. Guidance Committee
Immediately upon arrival at the UC Riverside campus, a Guidance Committee should be chosen with the aid of the Graduate Advisor. If a student has chosen a major professor, he/she should be the Guidance Committee chairperson. Otherwise the chairperson for this Committee should be in a field that is closely allied with the student's research interests. The committee is composed of the chairperson and two additional GGB faculty members. The student must ask each faculty member to serve on their committee to ensure participation. The Guidance Committee Approval Form (Form DD) must be filled out (a form is included in this manual) and submitted to the GGB Student Affairs Officer. The final Guidance Committee selection will be subject to approval by the Graduate Advisor.

During the first quarter of residency, this committee advises the student on a course program. In addition, it will evaluate research productivity on an annual basis. The committee serves this guidance role until the student passes the Written and Oral Qualifying Exams. The Guidance Committee does not serve as the Qualifying Exam Committee (see below). After the qualifying exam, the Dissertation Committee will serve a guidance role for the dissertation research.

Upon choosing a laboratory for Ph.D. research, it may be appropriate for the Guidance Committee Chairperson and members to be changed. These changes must be recorded promptly on an updated Guidance Committee Approval Form (Form DD) and approved by the Graduate Advisor.

B. Course Program
The Graduate Advisor will review each student's previous academic records and offer recommendations to the Guidance Committee; this will ensure that the student has fulfilled all Entry Requirements. If remedial classes are necessary, they will be accommodated in the Course Program.

Evolution and Population Genetics Track
The Course Program will include the Entry Requirements, one course in Population Genetics, one course in Evolutionary Biology, one course in Statistics, and one additional graduate level course. See Course Program for a Ph.D. in GGB: Evolution and Population Genetics Track (Section IV) for details.

Genomics and Bioinformatics Track
The course program will include the Entry Requirements, one course in Computer Science, two courses in Statistics, and two courses in Bioinformatics and Genomics. See Course Program for a Ph.D. in GGB: Genomics and Bioinformatics Track (Section V) for details.

Molecular Genetics Track
The Course Program will include the Entry Requirements, two Core Classes, and two additional courses. See Course Program for a Ph.D. in GGB: Molecular Genetics Track (Section VI) for details.

It is essential that the student meets with the Guidance Committee in the first quarter of residence to ensure that the student is taking the appropriate courses. Many of the core classes are offered on an alternate year basis so it is important to carefully design the course program to ensure all required classes are taken within the first two years of study.

The student, in consultation with his/her Guidance Committee, will plan a Course Program consisting of Entry Requirements, Core Classes and Supplemental Classes. The Course Requirements Check List (Form AA) in the student’s individual track should be used to indicate which courses have been completed. The Course Plan Form (Form BB) should be used for planning purposes. The student may also wish to fill out the Other Courses Form (Form CC) to indicate additional relevant courses taken prior to entry into the GGB Program.
The Course Program (Forms AA, BB, and CC) should be submitted to the GGB Student Affairs Officer for approval by the Graduate Advisor. The Chair of the Guidance Committee may also need to include a letter to explain any unusual features of the file. Each student should submit a Course Program before the end of the 1st quarter of residence. Each student is responsible for updating their Course Program Forms on an annual basis.

C. Laboratory Rotations and Choice of the Major Professor

Laboratory rotations are not mandatory but are strongly encouraged. This is a good opportunity for a student to determine if his/her interests match the faculty members of choice. If a student has already chosen a laboratory for his/her thesis work, rotations are not required. The rotations do provide an excellent opportunity for the student not only to find the optimal “fit” in a lab but also to make more scientific connections on campus.

Rotations are to be five-weeks in length. Under certain circumstances, rotations may be one-quarter in length. The first two laboratory rotations should be selected by the first week of the quarter of entry at UC Riverside. The Graduate Advisor will help the student in the selection of up to four five-week rotations or two one-quarter locations (or a combination of five-week and one-quarter rotations, totaling no more than two quarters). The student must discuss the possibility of a laboratory rotation with the chosen GGB faculty member and design a short-term training project (usually five-weeks in length).

It is important to plan ahead. Some laboratories are in high demand. It is hoped that the rotations will give each GGB student a feeling for the diversity of the UCR GGB Program. Once the student has selected a major professor, the Program Director and Graduate Advisor should be notified, and the Guidance Committee may be altered, if necessary.

If circumstances arise that necessitate a change in major professor later, the GGB Graduate Advisor should be consulted early. These matters can often be resolved quickly and confidentially with the approval of both the student and the faculty member. When necessary, the Graduate Advisor will seek the aid of the Guidance or Dissertation Committee.

D. GGB Seminar

The GEN 261 seminar (Seminar in Genetics, Genomics, and Bioinformatics) must be taken at least one quarter per year. It is strongly recommended that students enroll in an invited seminar series during the other quarters in residence as well. Other potential seminar series offered by interdepartmental training programs or departments include BIOL 252, BIOL 265, BMSC 252, BCH 252, BPSC 250, CMDB 257, CS 287, ENTM 250, ENTX 270, PLPA 260 and STAT 251.

E. Teaching Requirement

All GGB students are required to teach one quarter in a genetics-related course during their tenure in the GGB Program. This is a minimum requirement and students are encouraged to teach additional quarters to gain valuable experience. This requirement is usually fulfilled by appointment as a Teaching Assistant (TA). (It is unlikely that you will be assigned a TA in the first year.) This involves teaching of laboratory and/or discussion sections in courses with a substantive genetic component. This is accomplished under the supervision of the faculty in charge of the assigned course. A GPA of 3.00 is required to be a Teaching Assistant. No TA may have more than 7 units of incomplete grades. TAs must be making acceptable progress to the degree and be enrolled in 12 units per quarter.

Before entering the classroom as a teaching assistant, the University of California requires that all graduate students complete some form of instructional training. At UCR, students receive this formal training through the Teaching Assistant Development Program (TADP) run by the Graduate Division.

All new TAs must attend one full training day before beginning a TAship. You may register and find the schedule for TA orientation at http://www.tadp.ucr.edu/.

Upon entry to UCR, all non-native speakers of English are required to pass the SPEAK exam (test of spoken English). This test is given by UCR Extension, and is used to determine if English as a Second
Language (ESL) courses are required. You can sign up for this test at the front desk of the UCR Extension Center and the test fee is $50. If a student receives a clear pass on the exam, he/she will be allowed to serve as TA without additional ESL classes. If the student receives a provisional pass on the exam, she or he must take ESL classes while serving as a TA. The test is offered prior to Fall, Winter and Spring quarters each year, but the beginning of the Fall quarter is the best time to take the SPEAK test.

All TAs will be evaluated by the students in the course and may also be evaluated by the professor or academic coordinator administering the course. GGB students who do not receive acceptable evaluations from the students will be required to take additional TADP training if they want to be eligible to TA in the future. GGB students are to act in a professional manner at all times. They must interact with moral and ethical integrity with all students, faculty and associate TAs. TA duty varies between courses and instructors. Instructors and TAs must develop an effective mean of frequent communication and must abide by University rules and standards.

F. Grades and Academic Probation

Graduate Division Fellowship recipients must maintain a minimum GPA of 3.00. If a fellowship recipient’s GPA falls below a 3.00, the student is likely to lose funding from the fellowship. All Ph.D. students must maintain a GPA of 3.00 or better. A minimum GPA of 3.00 in all upper division and graduate courses related to the degree is required for graduation. If a student's quarterly GPA is lower than 3.0, the student will be placed on Academic Probation and could be dismissed from the program. This is a UCR policy. Retention of a student in the GGB with poor academic standing requires compelling reasons. Any student on Academic Probation should meet quarterly with the Guidance Committee. Students should not underestimate the importance of maintaining a good academic standing. Students on academic probation do NOT qualify for any financial aid, including Teaching Assistantships, whether supplied by the University or by extramural grants. Students must also make satisfactory progress in the laboratory.

G. Academic Dishonesty and Scientific Misconduct*

Academic Dishonesty

The faculty of the University of California, Riverside, believe that the vast majority of our students maintain high standards of academic honesty. However, occasional incidents of academic dishonesty do occur. Many such acts are committed through ignorance. Often, a student accused of cheating will vehemently deny the charge, claiming that he/she did not know the act violated established policy. The following statement is intended to clarify what constitutes academic dishonesty and to describe the procedures and consequences if a student is accused of and found guilty of breaking the rules that apply to all UC Riverside students. At UCR, academic dishonesty is a serious offense and will not be tolerated. See UC Policies and Regulations that are published every year in the online General Catalog.

Definition of academic dishonesty

**Cheating:** It is cheating to copy from another student's examination, quiz, laboratory work, or homework assignment. The use of pre-prepared notes or other resources, in any form, during an examination, unless the instructor expressly authorizes such use, also constitutes cheating. If a student knowingly allows someone else to copy from their homework, laboratory work, or examination, they are in violation of section 102.01. Revising a work after its final evaluation and representing the revised version as being the original work is cheating. Forging or otherwise unauthorized changing of an earned grade is also academically dishonest. Arranging for someone else to take an examination under your identification also constitutes an act of cheating. In this last instance, both parties are liable.

**Plagiarism:** According to Webster's Dictionary, plagiarism is the act of stealing and passing off as one's own ideas or words of another--without properly referencing the original source. Please note that the faculty will pay attention not to whether you meant to plagiarize, but whether you did plagiarize. Additionally, submitting the same paper twice or fulfilling the requirements of two
subjects with one paper is academically dishonest. In short, one can plagiarize oneself and be sanctioned for the violation. You may use ideas from other sources, but you must paraphrase and document their use with citations, usually in the form of attributed quotations, literature cited, etc.

**Unauthorized Collaboration:** Collaboration occurs when a student works with other students to study, do lab work, review books or develop a presentation or report. Students must receive very clear permission from the instructor to participate in collaborations. What one instructor may view as collaboration may be seen as cheating by another. The important thing to note is that if the limits of collaboration are not clear, it is the student's responsibility to ask the instructor for very clear and specific direction.

**Manufacture of Data:** It is academically dishonest to manufacture or deliberately alter data submitted in connection with laboratory reports, term papers, thesis research, publications, other written material, etc.

**Scientific Misconduct**

Integrity in research and scholarly activities is the responsibility of the entire academic community. Scholars work in an environment in which there is an important sense of trust. Published material is assumed to have been obtained during the author's investigations. Falsification or fabrication of such data is intolerable. Each scientist, and the University, is responsible for promoting practices that discourage scientific misconduct.

**Definition of scientific misconduct**

In general terms, scientific misconduct can be recognized to cover two broad categories, the distinction being in terms of the focus of the dishonesty. Thus the first arises where there is fabrication or falsification of the research results; the second arises where there is plagiarism, misquoting or other misappropriation of the work of other researchers. Colluding in or concealing the misconduct of others is also misconduct. Honest errors do not constitute scientific misconduct. Here are examples of scientific misconduct:

**Falsification of Data:** Ranging from fabrication to deceptive selective reporting of findings and omission of conflicting data, or willful suppression and/or distortion of data.

**Plagiarism:** The appropriation of the language, ideas, or thoughts of another and representation of them as one's own original work.

**Violation of Generally Accepted Research Practices:** Serious deviation from accepted practices in proposing or carrying out research, improper manipulation of experiments to obtain biased results, deceptive statistical or analytical manipulations, or improper reporting of results.

**Other Miscellaneous Inappropriate Behavior:** These include: inappropriate accusation of misconduct; withholding or destruction of information relevant to a claim of misconduct, or retaliation against persons involved in the allegation or investigation; and misappropriation of funds or resources for personal gain.

*Portions adapted from the policy statements of the UCR Plant Pathology Graduate Program Handbook, University of Maryland, United Kingdom Research Councils, and "Misconduct in Science" by V. Hammer.

**H. Annual Progress Evaluation**

In late spring or early summer, GGB students are required to meet with his/her Guidance Committee or Dissertation Committee to ensure that adequate progress toward the degree has been made. This meeting is essential for completion of the *Annual Review of Graduate Student Progress* (Form HH). It also ensures that Committee members are aware of the advances and problems encountered by the student over the year. The Graduate Advisor will review all evaluations and specific recommendations concerning the student's progress will be made to the Graduate Division. Justification for retention of
students that have exceeded normative time (15 quarters) or on academic probation will be based on this annual evaluation.

Students will fill out the first two portions of the annual progress report (Form HH) and prepare a detailed summary of their research progress (2-5 pages only; figures may be included). These documents will be submitted to the Committee one week before the annual meeting. At the meeting, the student will give a 15 minute oral presentation on his/her progress, starting with what his/her goals were for the past year and ending with his/her goals for the next year. The Committee will complete the Evaluation Form (bottom portion) and the student and the Committee members will sign it. The completed Evaluation Form, along with the Research Summary, will be submitted to the Graduate Student Affairs Officer who will obtain the signature of the Graduate Advisor.

The system of holding regular committee meetings allows the student to gain input from Committee members and ensure that the student is on the track to success. These meetings provide the student an opportunity to present any extenuating circumstances that may have adversely impacted productivity in the past year (i.e., health-related matters, unusual personal circumstances, financial difficulties, or student-faculty relationships). If the student-faculty relationship has been difficult, the student should discuss the issues with the Graduate Advisor prior to the Committee meeting and the student will be given an opportunity to voice a grievance to the Committee in the absence of the major professor.

Year One: The student shall meet with the Guidance Committee to discuss the student's progress in the Ph.D. program. The student will have nearly completed the three quarters of classes and laboratory rotations. A major professor should have been chosen; short-term and long-term research goals should be discussed to orient the Guidance Committee to the nature of the research project.

Year Two: The student should have completed all or a majority of classes for the PhD program in GGB. The student will give a short oral presentation of research progress to the Committee. Short-term and long-term goals should be discussed. The time for the Written and Oral Qualifying Exams should be established. Most students will have completed their Qualifying Exams by the start of the fall quarter in the third year of residence.

Year Three: The student should have completed the Qualifying Exams and advanced to candidacy. The student will present a detailed description of research progress to the Dissertation Committee.

Year Four: The student should have made major strides to the completion of the dissertation research. It is anticipated that the student will be able to relate a probable date of completion of the Dissertation requirements.

Year Five: The student should complete their Dissertation requirements. It is strongly advised that during their final year of study, GGB students meet frequently with their Dissertation Committee (once per quarter). This will ensure that the student will have met all of the research directives required for completion of the Ph.D. and that there is complete agreement on the nature and extent of the dissertation research. When the quarter for the thesis defense is approaching, a student may elect to register for “Filing Fee Status.” This status allows for a one-time reduction in fees but imposes many limitations in student employment, laboratory use and student/faculty contact.

I. Qualifying Exam
The Qualifying Exam is generally taken between the fourth and seventh quarter of residence in the GGB Program. The timing is dependent on completion of the student's course program. The student must have completed ALL course work requirements prior to the written and oral qualifying exams.

The Qualifying Committee consists of five members. Four of the members should be GGB Program faculty and one member from outside the program.

To aid students in the Qualifying Exam process, three documents have been assembled. The Student Guideline for the Qualifying Exam (Section III) will inform the student about Qualifying Committee nominations, Dissertation Research Proposal requirements, and the nature of the written and oral exams. The Recommended Procedures for Chairs of GGB Qualifying Exams (Section III) will inform the
students and exam chairs of the logistics of the written and oral exams. The *Guidelines for Studying for the Qualifying Exams* outlines the breadth and depth requirements for the oral and written exams for each Track (Sections IV, V, and VI). These guidelines are meant to be useful but cannot substitute for discussions with the faculty of the Qualifying Exam Committee.

J. Dissertation Committee

The Dissertation Committee should be composed of the student's major professor and two other members of the GGB. When considered necessary, a fourth Dissertation Committee member may be added. The committee members should be chosen carefully to ensure maximal guidance. Under unique circumstances, a faculty member outside of the GGB or a professor from another institution might be included as a member. This is subject to approval by the Graduate Advisor and Graduate Division.

The Chair of the Dissertation Committee must be nominated at time of Oral Qualifying Exam. Balance of committee must be nominated within one quarter after passing the Qualifying Exam. The nominated Dissertation Committee is reported on the form that reports the student's performance on the qualifying exam. This committee is approved by the Graduate Dean from nominations of the student and the student's major professor. Registration will be blocked until the Dissertation Committee is established.

The Dissertation Committee assumes the responsibilities of the Guidance Committee after the student has advanced to candidacy. The Dissertation Committee will meet at least once each year to evaluate the student's research progress. A dissertation acceptable to all committee members must be submitted based upon independent and original research. Before approval of the dissertation, the student is expected to present her/his research at an announced Defense Seminar.

To avoid conflicts of interest or the appearance of a conflict of interest, when domesticate partners or spouses are a majority of the faculty overseeing the dissertation, another faculty member will be added to the dissertation committee.

K. Normative Time

Students are expected to complete their degree requirements within normative time. At UC Riverside, normative time is the period of full-time registration required to earn the degree. Assuming that the student enters GGB with no course deficiencies or other remedial work, normative time for the Ph.D. is 15 quarters. Students that exceed normative time will be carefully monitored by the Graduate Division, Graduate Advisor, and Dissertation Committee, to ensure adequate progress toward the degree is made. Justification for retention in GGB must be made on an annual or quarterly basis. Graduate Division has the option to block the registration of any student who exceeds normative time.

L. Dissertation Preparation and Defense

A dissertation acceptable to all committee members must be submitted based upon independent and original research. It is therefore advisable to meet frequently with the Dissertation Committee during the final year of research. The committee may request that the student use the format of a specific journal, within the guidelines of the Graduate Division. The writing process will frequently take three to six months to complete. The schedules of the Dissertation Committee Members and Graduate Division deadlines must be taken into consideration.

1. The Graduate Division has strict guidelines for the formatting of the Ph.D. thesis; students should acquire the Graduate Division handbook for preparation of the dissertation before writing their thesis. (for details see: http://www.graduate.ucr.edu/Dissertation.html)

2. The deadlines for review of the dissertation format and deadlines for degree conferral vary with each quarter. These dates are inflexible. Consult with the Graduate Division.
3. Committee members are expected to examine the dissertation during the drafting as well as the final version. The student is expected to provide each committee member with a bound copy of the dissertation.

4. The student is required to submit his/her dissertation to the Graduate Division via electronic submission. Please go to [http://graduate.ucr.edu/dissertation.html](http://graduate.ucr.edu/dissertation.html) for details.

5. The costs of figure production, copying and binding of the dissertation are incurred by the student, not the major professor or GGB.

Before approval of the dissertation, the student is expected to present her/his research at a publicly announced Defense Seminar. The seminar can be presented in the GGB Seminar series. Contact the Graduate Affairs Officer well in advance for this arrangement.

M. Career Guidance

Students are encouraged to consider their next career move in advance of graduation. In most cases the decision will be in consultation with the major professor and other faculty. In many cases students arrange for postdoctoral positions six months to one year prior to graduation. UCR hosts a Careers Service Center for graduate students. An online website ([www.careers.ucr.edu](http://www.careers.ucr.edu)) provides current information on job opportunities.

III. The Qualifying Exam

A. Student Guidelines for the Qualifying Exam

1. When are you ready for your qualifying exam?

The exams are generally taken at the end of the student's sixth quarter (second year), although this timing is dependent on the course work essential for the student's program. The student must have completed ALL course work requirements prior to the written and oral qualifying exams. The Graduate Advisor and the Chair of the Qualifying Exam Committee will check the student's file to ensure that he/she can proceed to the next step. The student should meet individually with each examination committee member to discuss the materials that the student is responsible for during the written and oral qualifying exams. The document "Guidelines for Studying for the Qualifying Exams" is located in the specific GGB track sections of this handbook (Sections IV, V, and VI).

2. Composition of the Qualifying Exam Committee

The Qualifying Committee consists of five members. Four of the members should be GGB Program faculty. The student should select the members of the Qualifying Exam Committee with the aid of the major professor and the Graduate Advisor. Once an Exam Chair is identified, the Exam Chair should ensure that the committee has the required balance of faculty expertise. The selection is subject to approval by the GGB Graduate Advisor and Graduate Division. All committee members must be members of the Academic Senate. The composition of the committee is described below for the three tracks. The student's major professor is not permitted to serve on this committee. Any Academic Senate member may be present at the oral exam.

Qualifying Exam Committees for the Evolution and Population Genetics Track and the Molecular Genetics Track

One member should have expertise in the field of population/evolutionary genetics.
One member should have expertise in the field of molecular genetics.
One member should have expertise in the field of classical genetics.
One member should have expertise in the area of the student's specialization. This will be the Committee Chair.
One member is the outside member. This committee member must not be associated with GGB but may be in the student's resident department. This member may or may not submit written or oral questions; this is the outside member's decision. This person represents the faculty at large and acts most importantly to ensure fairness in the exam. Under unique circumstances, a faculty member from another institution might be included as a committee member. This is subject to approval by the Graduate Advisor and the Graduate Division.

Qualifying Exam Committee for the Genomics and Bioinformatics Track

- One member should have expertise in the field of molecular genetics.
- One member should have expertise in the field of statistics.
- One member should have expertise in the field of computational biology.
- One member should have expertise in the area of the student's specialization. This will be the Committee Chair.
- One member is the outside member. This committee member must not be associated with GGB but may be in the student's resident department. This member may or may not submit written or oral questions; this is the outside member's decision. This person represents the faculty at large and acts most importantly to ensure fairness in the exam. Under unique circumstances, a faculty member from another institution might be included as a committee member. This is subject to approval by the Graduate Advisor and the Graduate Division.

To avoid conflicts of interest or the appearance of a conflict of interest, when domesticate partners or spouses are a majority of the faculty overseeing the qualifying exam, another faculty member will be added to the qualifying exam committee.

3. Scheduling of the Qualifying Exam

The student should contact each committee member to ensure that they are willing to serve on the qualifying exam and to establish a tentative date and time for the written and oral exams. It is suggested that this be accomplished at least two months prior to the oral examination date. At this time the Committee nominations should be placed on the Qualifying Exam Committee Nomination Form. This form is given to the GGB Student Affairs Officer and the nominated committee is subject to approval by the GGB Graduate Advisor and the Dean of Graduate Division. Graduate Division must approve this form two weeks before the exam.

After the committee is approved, the student should formalize the written and oral exam dates. Allow sufficient time; the schedules of five faculty members must be accommodated. It is particularly important that the student plan ahead; especially if the student plans to take the oral and written exams during the summer months. It is recommended that the written and oral exams be separated by one week; a minimum of two days must separate the written and oral exams to allow faculty members adequate time to correct and discuss the written examination with the student.

Inform the GGB Student Affairs Officer of the finalized dates for the written and oral exams. S/he will send a notice confirming dates and times prior to the exams.

One week prior to the written exam it is wise for the student to reconfirm the dates, times, and locations of the written and oral exams with each committee member. This can be accomplished by email or phone call.

4. Dissertation Research Proposal

Because of the recommended timing of the written and oral exams, it is essential that the student submit the Dissertation Proposal to all members of the Qualifying Exam Committee two weeks prior to the written exams. The proposal should be typed and double-spaced. The proposal should include the following:

1. A concise summary of relevant background information. (2-3 pages)
2. Full justification for the dissertation research, including the hypotheses and research objectives that will guide the project. (1-2 pages)

3. Current research progress. (2-3 pages)

4. Future research directions, including an overview of the methods and expected results. (4-5 pages)

5. Bibliography that demonstrates a command of the relevant literature. (1-2 pages)

6. Tables, Figures, Algorithms and other data may be included in the proposal but will not contribute to the page count.

The length of the proposal is variable; suggested page limits are merely guidelines. It is important for the student to demonstrate understanding of the current and proposed research. **It is strongly suggested that a draft of the proposal be reviewed by the committee Chair prior to distribution to the Qualifying Exam Committee.**

Because the student's research directly reflects the major professor's research program and interests, the major professor should have a guidance role for the proposed research directions. However, the major professor MUST NOT participate in the writing or editing of the Dissertation Proposal. Furthermore, NO other faculty member, regardless of their affiliation to GGB or to the student, can participate in the writing or editing of the Dissertation Proposal.

The student should understand that this does NOT determine the research requirements for the Ph.D.; the dissertation proposal is a vehicle for the student to introduce the Qualifying Exam Committee to the student's accomplishments and research strategies.

5. Written Examination

The written exam will be designed to test the student's ability to synthesize and integrate basic concepts in genetics. Students in the Evolution and Population Genetics Track and the Molecular Genetics Track are expected to have a basic understanding of three main areas of genetics: classical, molecular, and population/evolutionary genetics. Students in the Genetics and Bioinformatics Track are expected to have a basic understanding of molecular genetics, statistics and computational sciences. Since each student's training is considered unique, the level of knowledge in the general areas varies between students. Accordingly, the committee will expect the student to have a substantive knowledge in the student's area of specialization. Guidelines for these general areas are outlined in the section entitled "Guidelines for Studying for the Qualifying Exams" in each Track description (Sections IV, V, and VI).

The written exam will be held over a period of two days. The exam will consist of questions submitted from each committee member. The outside member has the option to submit questions. The time allotted for each set of questions will be determined by whether or not the outside member submits questions. The Chair will indicate the length of each question set. The student may choose the order of question sets during the two-day exam period.

The exam is closed book, unless a committee member indicates otherwise for their portion of the exam. The student will take the exam in a designated room, for designated lengths of time. Each portion of the written exam, written by one committee member, should last two to three hours. The student will pick up and drop off questions from the committee Chair. A break between question sets is permissible. Student promptness and honesty is essential.

Each committee member will grade the answers to his or her questions and relay the results to the committee Chair. The grading is usually done within a few days of the exam. The student may view the written exam after grading and is encouraged to discuss difficulties with committee members prior to the oral exam. The written exam must be returned to the committee Chair. Upon successful completion of the written exam, the student proceeds to the oral examination.

If the student fails two or more sections of the written examination, he/she will not proceed to the oral exam. The Qualifying Exam Committee will recommend one of the following options: (1) additional coursework or independent study in the specific area(s) of weakness and then the student will have one
opportunity to repeat those sections of the exam or (2) dismissal from GGB. The timing of the repeat written examination, if offered by the committee, will depend on the extent of the recommended remedial work; it is expected that the written exam will be re-administered within three months.

6. **Oral Examination**

The committee Chair will describe the standard set of events of an oral exam. During the oral exam, the student should be prepared to briefly describe his/her academic history (2-3 min), long-term scientific career goals (2 min), and research project proposal (15-20 min). The student must adhere to these time limits - otherwise the exam exceeds the normal three hour period. Upon successful completion of the oral qualifying exam, the student will be advanced to candidacy.

Prior to the oral exam the student and major professor should choose a Dissertation Committee (see below). A list with the members of this committee must be filed immediately upon successful completion of the oral qualifying exam.

If two or more of the examiners do not agree to pass the student at the end of the oral examination, the student will have failed. If the student fails the oral examination, the Qualifying Exam Committee will recommend one of the following options: (1) additional coursework or intensive independent study in the specific area(s) of weakness and then retake the oral exam, OR (2) dismissal from GGB. The oral exam can be repeated only once, at the discretion of the exam committee, and must be passed for a student to continue in the GGB Program. The timing of the oral re-examination will depend on the remedial work recommended by the Qualifying Exam Committee. Graduate Division requires that the Oral Examination be re-taken after three months have elapsed; it is expected that the exam will be re-administered within six months.

7. **Review of the candidacy exams**

The GGB Program shall make every effort to review the results of candidacy exams when formally requested by the students. Requests for review should be made within one month.

**B. Recommended Procedures for Chairs of GGB Qualifying Exams**

This is intended only as a guide. The Chair must be acquainted with and follow the current regulations of the Graduate Division.

**Ph.D. QUALIFYING EXAMINATION**

The Ph.D. Qualifying Exam is designed to test the student's ability to synthesize and integrate fundamental concepts. Molecular Genetics and Evolutionary/Population Genetics Track students are examined in three basic areas of genetics: molecular, classical, and evolutionary/population genetics. Genomics/Bioinformatics Track students are examined in the areas of molecular genetics, statistics, computer science and computational biology. The student is expected to defend a Dissertation Proposal.

1. **Written Examination**

The Chair of the Qualifying Committee should advise the candidate on setting up the date of the written and oral examinations. The entire exam, both written and oral, must be scheduled within a two-week period. The dates/exam members must be approved by Graduate Division at least 2 weeks prior to the exam. It is strongly recommended that the Chair consult with the Graduate Advisor to confirm that all of the courses on the students Course Program have been completed.

The Qualifying Committee consists of five members. Four of the members should be GGB Program faculty. Questions should be collected from these members approximately one week in advance of the written exam date. The Graduate Student Affairs Officer should facilitate notifying exam committee members of the dates the questions are due, the date of the written and oral exams.

The outside member is not required to submit written questions; this decision is to be made by the outside member.
Two weeks (14 days) prior to the Qualifying Examination, the student must provide each exam committee member with a Dissertation Research Proposal. Guidelines for the proposal are provided to the student in their GGB Program Handbook. The proposal is not to be organized or written in conjunction with the Major Professor, but written by the student alone. The proposal does not define the research requirements for the Ph.D.; it is to act as a vehicle for the student to introduce the Qualifying Committee to the student’s accomplishments and research strategies. It is also to provide a foundation for the initial questioning of the candidate in the oral exam.

The Chair should review all written questions for clarity, fairness, duplications and length. The total written exam should take ten to twelve hours and is normally administered over two consecutive days. This is approximately two to three hours per set of questions.

The candidate should be allowed to choose the order of the written exam questions, and he/she should be given one set of questions at a time.

The candidate must work on the questions alone and without outside references unless otherwise specified by the member of the committee who gives the exam. Please be sure the student understands that s/he is assumed to be in the examination room without outside resources for the duration of the exam. Trips to the restroom and to pick-up and return the exam are the only permissible activities. Any student found in violation of these rules will be dealt with in accordance to University regulations.

The Chair should collect the questions and answers, make a copy of each, and return the originals to the committee members for grading. Each committee member should grade his/her exam questions within two days and provide the Chair with his/her opinion of the candidate's performance and return the original exam and answers to the committee chair.

Upon successful completion of the exam, the student proceeds to the oral examination.

If a committee member has questions and concerns about the performance, these should be communicated to the Chair. If the student fails two sections or more of the written examination, s/he will not proceed to the oral exam. The committee must meet to decide a course of action. The Qualifying Exam Committee will recommend one of the following options: (1) additional coursework or independent study in the specific area(s) of weakness or (2) withdrawal from the program. The written exam can be repeated once; the second written exam must be passed for a student to continue in the program. Only the portions of the exam that were failed will need to be re-taken. The timing of the repeat written examination will depend on the remedial work recommended by the Qualifying Exam Committee; it is expected that the exam will be re-administered within six months to one year. If the oral exam is to be cancelled or postponed, the Graduate Advisor must be notified immediately, who will then notify the Graduate Division. If no more than one person is dissatisfied with the written exam, the oral exam will be conducted as scheduled. The Chair will communicate the results of the written exam to the student.

The student can review the exam in the presence of the Chair. The exam questions and answers MAY NOT be copied for or by the student. The student should be encouraged to discuss his performance with the committee members if he/she has questions. In this case, the committee chair can give the original copy of the exam to the committee member, who must not let the student take the exam questions or answers out of their presence or allow the student to make or have a copy of either. The committee member must return the original exam questions and answers to the committee chair after meeting with the student. The original exam questions and answers should be filed in the Biological Sciences Graduate Student Affairs Center.

2. Oral Examination

The oral examination should be scheduled within two weeks of the written exam.

Prior to the oral exam, the committee Chair will describe the standard set of events of an oral exam to the student.

Prior to the oral exam the student and the major professor should choose a Dissertation Committee. A
list with the members of this committee must be filed immediately upon successful completion of the oral qualifying exam.

The Chair should bring to the oral exam the candidate's file, the original written exam questions and answers, and Form (3) from the Graduate Division entitled "Report of the Qualifying Exam," which can be obtained from the Student Affairs Officer.

On the exam date, after all committee members have convened, the Chair should excuse the candidate from the room so that the committee can discuss the candidate's record and performance on the written exam. The order of questioning should be decided at this time. Other issues regarding the candidate may be discussed. If this is a re-take of the oral exam, expectations for the retake should be discussed.

The exam will begin with the student’s presentation. The student should be prepared to briefly describe his/her academic history (2-3 min), long-term scientific career goals (2 min), and research project proposal (15 to 20 min). The student is strongly advised to adhere to these time limits - otherwise the exam exceeds the normal three hour period. Upon successful completion of the oral qualifying exam, the student will be advanced to candidacy.

Each committee member should be allocated at least 20 minutes for questioning. Generally, this questioning can address broad areas as well as area of the proposed research. The Chair should keep track of the time and advise committee members about the time available for their questions. The candidate should be offered the opportunity to take a ten-minute break after the second or third questioner. The Chair should be the last questioner. After all committee members have had the opportunity to question the candidate, the Chair should provide the opportunity for committee members to ask additional questions. When all members are satisfied that they have finished questioning, the candidate should be excused for the final decision-making discussion. The candidate may be asked to return for additional questioning after the committee’s deliberations. In normal circumstances, the oral exam should not exceed three hours to this point. After the committee’s deliberations, the candidate will be invited back into the room and the result of the exam will be announced. The candidate may be asked to consult with individual committee members about any concerns at a later date.

Once an oral exam has started the committee must report a decision to the Graduate Division within 24 hours.

If two or more of the examiners do not agree to pass the student at the end of the oral examination, the student will have failed. If the student fails the oral examination, the Qualifying Exam Committee will recommend one of the following options: additional coursework or intensive independent study in the specific area(s) of weakness or dismissal from the program. The Qualifying Examination Committee cannot recommend a "Qualified Pass" in which, for example, they require the student to take or serve as teaching assistant for additional courses. The oral exam can be repeated once and must be passed for a student to continue in the program. The timing of the oral re-examination will depend on the remedial work recommended by the Qualifying Exam Committee. Graduate Division requires that exam be re-taken after three months have elapsed. The Chair of the Qualifying Committee must report the decision and advice of the committee to the candidate. The Graduate Division is to be informed promptly of the results of the examinations.

The Chair should consult the document from the Graduate Division entitled "Instructions for Chair of Doctoral Qualifying Committees," which defines the function of the Qualifying Committee and describes how the final decision should be made. It should be noted that a 3-Yes to 2-No vote is considered a failure. However, if a member of the committee wished to petition the Graduate Council to consider a reversal of this judgment due to unfair or improper procedures during the exam, the student should be informed that a final decision has not been made.


Because five faculty members have read and evaluated the Dissertation Proposal, the committee often has suggestions for the student to consider when executing his/her thesis research. Because the major professor does not participate in the exam process, the Chair will provide to the student and to the major professor a short written summary of the committee’s suggestions. This summary is to point to the
strengths and weaknesses of the proposal as perceived by the Qualifying Exam Committee. These comments are suggestions intended to aid the student and perhaps to give novel insights or alternative strategies for the student’s future research initiatives. This critique will summarize the many different ideas discussed about the proposal during the exam. It is hoped that this will allow the student to digest and evaluate the thoughts of the committee.

Genetics, Genomics and Bioinformatics Academic Appeals – Qualifying Exams

Appeals will consist of either (1) a procedural error and/or (2) use of non-academic criteria to evaluate academic work. The non-academic criteria could include personal bias and violations of the campus nondiscrimination policy.

If a member of the qualifying exam committee or the graduate student believes that unfair or improper procedures were followed, the student should contact the Genetics, Genomics and Bioinformatics Graduate Advisor for Continuing Students to initiate an appeal. This process must be initiated within seven days of the academic decision. A written document outlining the grounds for the appeal and any supporting documentation should be provided at this first meeting.

The Graduate Advisor will determine whether the appeal has valid grounds, referring to the two possible criteria stated above. If the Graduate Advisor determines that there are valid reasons for an appeal, then the student will be informed. The Graduate Advisor and the Executive Committee will then conduct a hearing by consulting with the student and, separately, with one or more qualifying exam committee members regarding the issues raised in the appeal. After due deliberation, the Graduate Advisor and the Executive Committee will make a final decision. There are two possible outcomes. The Graduate Advisor and the Executive Committee will decide if the appeal was or was not upheld. If the Graduate Advisor and the Executive Committee determine that the appeal was upheld by the hearing process, then the exam under contention shall be declared null and void. However, the pass/fail decision cannot be overturned (i.e. a “fail” shall not be overturned to a “pass”, nor a “pass” overturned to a “fail”). The Graduate Advisor and the Executive Committee will set an appropriate timeline for a replacement qualifying exam and make recommendations regarding committee composition.

The Graduate Advisor will report the results of the appeal in the form of a memo. The Graduate Advisor will make every effort to consider the appeal and render a recommendation promptly. Whenever possible, the appellant will be informed of the outcome of the appeal within two weeks. The Graduate Division will be informed promptly of the results of the examinations. The appellant has the right to appeal academic decisions made at the program level to the Graduate Dean (http://graduate.ucr.edu/dispute_resolution.html).
IV. Evolution and Population Genetics Track

A. Pathway to the Ph.D. Degree

Set up laboratory rotations (3-4 five-week rotations) no later than the first week of the 1st quarter in residence

Nominate a Guidance Committee (no later than the 1st quarter in residence). The committee is composed of a chairperson and two additional GGB faculty. If a student has chosen a major professor, the major professor should be the chair of the committee.

Meet with Guidance Committee by the end of the 1st quarter of residence to plan a course program.
Submit Prerequisite-Breadth Requirement Checklist and Course Plan Program forms.

Reach an agreement with the Major Professor (by the end of the 2nd quarter in residence).

Meet with the Guidance Committee (and later with the Dissertation Committee) at least once / year to discuss research and progress.
Submit Annual Progress Report.

Complete Course Work

Nominate Qualifying Exam Committee (at least 2 weeks prior to the date of qualifying exams).
(Refer to Section III for committee membership requirements for specific tracks)

At least two weeks prior to the written Qualifying Exam, the student is required to provide a Dissertation Research Proposal that includes progress thus far to the Qualifying Exam Committee. The proposal should be developed in consultation with the Major Professor, but written by the student alone.

Qualifying Exam. Two full days of written exam questions followed by a three-hour oral exam (~ one week later). Qualifying Exam needs to be completed as soon as possible after finishing formal coursework (no later than the 7th quarter in residence).
If coursework is completed and Exam is passed, you are Advanced to Candidacy (normative time = 7 quarters).

Nominate a Dissertation Committee (at least three faculty members, Major Professor is the Chair). The Chair of the Dissertation Committee must be nominated at time of Oral Qualifying Exam. Balance of committee must be nominated within one quarter after passing the Qualifying Exam.

Oral Defense of the Dissertation

File Dissertation with Graduate Division

Ph.D. Awarded (normative time is 15 quarters)
B. Course Program for a Ph.D. in GGB: Evolution and Population Genetics Track  
*(An additional copy of form AA-EPG is located in Section X.)*

Use the following outline as a check list to be sure that **ALL** coursework requirements have been met. The form version of this list (Form AA-EPG) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

<table>
<thead>
<tr>
<th><strong>Entry Requirements:</strong></th>
<th><strong>Equivalent Class/Year/Institution/Grade</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>____BCH 100</td>
<td>Elementary Biochemistry</td>
</tr>
<tr>
<td>____BIOL 5A-B-C</td>
<td>General Biology</td>
</tr>
<tr>
<td>____BIOL 102</td>
<td>Introductory Genetics</td>
</tr>
<tr>
<td>____BIOL 108</td>
<td>Introduction to Population Genetics</td>
</tr>
<tr>
<td>____CHEM 1A-B-C</td>
<td>General Chemistry</td>
</tr>
<tr>
<td>____CHEM 112A-B</td>
<td>Organic Chemistry</td>
</tr>
<tr>
<td>____MATH 9A-B</td>
<td>Calculus</td>
</tr>
<tr>
<td>____STAT 100A</td>
<td>Introduction to Statistics</td>
</tr>
</tbody>
</table>

**Core Classes:**

**Evolutionary Biology Requirement:**

____ EEOB 216 Theory of Evolution

**Population Genetics Requirement:**

____ EEOB 214 Advanced Population Genetics

**Statistics Requirement:**

Complete at least one course from among the following:

____MATH 149A Probability and Mathematical Statistics

____PSYC 211 Statistical Inference

____PSYC 212 Multiple Regression and Correlation Analysis

____PSYC 213 Experimental Design and Analysis of Variance

____STAT 110 Biostatistical Methods in Life Sciences

____STAT 155 Probability and Statistics for Science and Engineering

____STAT 160A Elements of Probability and Statistical Theory
Additional Course Requirements:

Complete at least one course from among the following:

   ___ EEOB 215  Advanced Methods for Data Analysis
   ___ EEOB 219  Theory of Systematics
   ___ BPSC 223  Applied Evolutionary Genetics
   ___ GEN 240A  Advances in Bioinformatics and Genomics
   ___ or a graduate level course approved by the Guidance Committee and Graduate Advisor

Seminars:

The GEN 261 seminar (Seminar in Genetics, Genomics, and Bioinformatics) must be taken at least one quarter per year. It is strongly recommended that students enroll in an invited seminar series during the other quarters in residence as well. Other potential seminar series offered by interdepartmental training programs or departments include BIOL 252, EEOB 265, BMSC 252, BCH 252, BPSC 260, CMDB 257, CS 287, ENTM 250, ENTX 270, PLPA 260 and STAT 251.

Supplemental Courses:

Students may wish to take additional courses to supplement their graduate training. These courses will be tailored to the specific student’s needs and decided upon in consultation with their major professors.

Classes that emphasize genetics, genomics, bioinformatics and other related areas are given in the List of Potential Courses for GGB Students (Section VII). The class times, instructors, and course content may change. Refer to the online UCR Schedule of Classes (http://classes.ucr.edu) for current information.

Students should consider some training in the ethics of use of genetically modified organisms, impact of patents on application of bioinformatics/genomics data, and/or use of databases with bioinformatics/genomics information in a clinical setting.

Additional Units taken to maintain 12-unit course load:

Graduate students will register for 12 units per quarter to maintain full-time status. These units will include any lecture and seminar courses taken for the quarter. Typically students will also register for Directed Research (GEN 297) prior to advancement to candidacy or Research for Dissertation (GEN 299) after passing the Qualifying Exam.
C. Guidelines for Studying for the Qualifying Exam: Evolution and Population Genetics Track

Preparation for the Qualifying Exam:

1. Students must have successfully completed all classes in the Entry Requirement Category.
2. Students must have successfully completed four Core Classes as outlined under Course Requirements.
3. Prior to the qualifying exams, it is recommended that students enroll in a seminar class that requires an oral presentation.
4. At the time of the written and oral qualifying exams, students are required to display an understanding of the basic concepts of classical, molecular and population/evolutionary genetics.
5. Students are encouraged to take any additional courses that are essential for the development of an in depth understanding in their area of specialization. These will be determined by the student’s Guidance Committee and approved by the GGB Graduate Advisor.
6. The Qualifying Exam Committee will be composed of four GGB faculty members and one outside member, representing each of the following five areas:
   - Student’s Emphasis Area (Committee Chair)
   - Classical Genetics
   - Molecular Genetics
   - Evolution/Population Genetics
   - Outside Member (non-GGB faculty)

Breadth Requirements:

The exams are designed to test the student's ability to synthesize and integrate fundamental concepts in three basic areas of genetics: classical, molecular and evolutionary and population genetics. In addition to the entry requirements and the core classes, knowledge equivalent to material covered in the following courses at UC Riverside will be assumed:

<table>
<thead>
<tr>
<th>Area of Genetics</th>
<th>Course at UCR</th>
<th>Equivalent Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Biology</td>
<td>107A (and 107B)</td>
<td>Biochemistry 110C, CMDB 201</td>
</tr>
</tbody>
</table>

Students may choose to prepare for molecular genetics by independent study. Texts that supply the essential information are listed below.

It is the student's responsibility to inform all members of the committee what classes or texts have been used for exam preparation. This will ensure that the student's exam questions are drawn from appropriate sources; this is important since each student's program is tailored to the student's individual research needs and interests.

Text books that are appropriate for molecular genetics/molecular biology are:

Molecular Genetics:
- Lewin. Genes VII.
- Brown. Genomes.
- Freifelder. Molecular Biology.
- Weaver. Molecular Biology, Current Edition

**Molecular Cell Biology:**
- Alberts et al. Molecular Biology of the Cell (most recent edition)
- Lodish et al. Molecular Cell Biology (most recent edition)

**Evolution and Population Genetics:**
- Futuyma. Evolutionary Biology. (Chap. 1-10)
- Falconer. Introduction to Quantitative Genetics. (omit Chap. 16-18)

Other textbooks that might be of use in studying for the Qualifying Exam:

**Genomics:**
- Griffiths et al, Modern Genetic Analysis: Integrating Genes and genomes (2nd ed., 2002 - or latest)
- Benfey and Protopapas. Genomics (2005)

**Classical Genetics:**
- Stanfield. Theory and Problems in Genetics (Chap. 1-6)
- Griffiths and McPherson. 100+ Principles of Genetics
- Griffiths et al. Introduction to Genetic Analysis. (Chap. 1-8, 18)

**Depth Requirements:**
In addition to a general understanding of the three areas of genetics, the students are expected to attain advanced knowledge of an area of genetics related to their research problem. This will be tailored to the track of study in the GGB Program and the student's research program. **The best guidance for the exam will come from discussions with each committee member.**

The student will be expected to display knowledge of:


2. The topics covered in the Entry Requirements and Core Requirements.

3. The topics covered in other courses taken in the student’s Course Program. These classes will obviously vary from student to student. It is the student's responsibility to inform all committee members of the classes taken while at UC Riverside.


5. Specific areas of focus considered by committee members to be relevant to the Dissertation Proposal.
6. All aspects of the dissertation proposal. Topics often discussed in the exam are alternative strategies, methodology, statistics, cell structure, function, biochemistry, physiology, biology of the organism chosen for study, implications of research to current status of field, and basic or applied value. The topics are determined by the student’s research emphasis.

7. Knowledge of the landmark experiments and discoveries in genetics.

8. Research seminars, such as GEN 261 and EEOB 265. The students are expected to be generally informed on current topics in their area.
V. Genomics and Bioinformatics Track

A. Pathway to the Ph.D. Degree

Set up laboratory rotations (3-4 five-week rotations) no later than the first week of the 1st quarter in residence

Nominate a Guidance Committee (no later than the 1st quarter in residence). The committee is composed of a chairperson and two additional GGB faculty. If a student has chosen a major professor, the major professor should be the chair of the committee.

Meet with Guidance Committee by the end of the 1st quarter of residence to plan course program.

Submit Prerequisite-Breadth Requirement Checklist and Course Plan Program forms.

Reach an agreement with a Major Professor (by end of 2nd quarter in residence).

Meet with the Guidance Committee (and later with the Dissertation Committee) at least once per year to discuss research progress.

Submit Annual Progress Report.

Complete Course Work

Nominate Qualifying Exam Committee (at least 2 weeks prior to the date of qualifying exams).

(Refer to Section III for committee membership requirements for specific tracks)

At least two weeks prior to the written Qualifying Exam, the student is required to provide a Dissertation Research Proposal that includes progress thus far to the Qualifying Exam Committee. The proposal should be developed in consultation with the Major Professor, but written by the student alone.

Qualifying Exam. Two full days of written exam questions followed by a three-hour oral exam (~ one week later). Qualifying Exam needs to be completed as soon as possible after finishing formal coursework (no later than the 7th quarter in residence). If coursework is completed and Exam is passed, you are Advanced to Candidacy (normative time = 7 quarters).

Nominate a Dissertation Committee (at least three faculty members, Major Professor is the Chair). The Chair of the Dissertation Committee must be nominated at the time of Oral Qualifying Exam. Balance of committee must be nominated within one quarter after passing the Qualifying Exam.

Oral Defense of the Dissertation

File Dissertation with Graduate Division

Ph.D. Awarded (normative time is 15 quarters)
B. Course Program for a Ph.D. in GGB: Genomics and Bioinformatics Track

(An additional copy of form AA-GB is located in Section X.)

Use the following outline as a check list to be sure that **ALL** coursework requirements have been met. The form version of this list (Form AA-GB) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

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<td>General Chemistry</td>
<td></td>
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<tr>
<td>___ CS 014</td>
<td>Data Structures and Algorithms</td>
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<tr>
<td>___ STAT 100A</td>
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**Core Classes:**

Students will take the following classes at UCR that provide requisite training in statistics and bioinformatics/genomics.

**Bioinformatics and Genomics Requirement:**

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>___ GEN 240A</td>
<td>Advances in Bioinformatics and Genomics</td>
</tr>
<tr>
<td>___ GEN 240B</td>
<td>Advances in Bioinformatics and Genomics</td>
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</table>

**Computer Science Requirement:**

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<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ CS 141</td>
<td>Intermediate Data Structures and Algorithms</td>
</tr>
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</table>

**Statistics Requirement:**

Complete two courses from among the following:

<table>
<thead>
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<th>Course Code</th>
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<tbody>
<tr>
<td>___ STAT 110</td>
<td>Biostatistical Methods in Life Sciences</td>
</tr>
<tr>
<td>___ STAT 160B</td>
<td>Elements of Probability and Statistical Theory</td>
</tr>
<tr>
<td>___ STAT 161</td>
<td>Introduction to Probability Models</td>
</tr>
</tbody>
</table>

___ Only one can be from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>___ STAT 160A</td>
<td>Elements of Probability and Statistical Theory</td>
</tr>
<tr>
<td>___STAT 155</td>
<td>Probability and Statistics</td>
</tr>
</tbody>
</table>
Seminars:

The GEN 261 seminar (Seminar in Genetics, Genomics, and Bioinformatics) must be taken at least one quarter per year. It is strongly recommended that students enroll in an invited seminar series during the other quarters in residence as well. Other potential seminar series offered by interdepartmental training programs or departments include BIOL 252, EEOB 265, BMSC 252, BCH 252, BPSC 260, CMDB 257, CS 287, ENTM 250, ENTX 270, PLPA 260 and STAT 251.

Supplemental Courses:

Students may wish to take additional courses to supplement their graduate training. These courses will be tailored to the specific student’s needs and decided upon in consultation with their major professors.

Classes that emphasize genetics, genomics, bioinformatics and other related areas are given in the List of Potential Courses for GGB Students (Section VII). The class times, instructors, and course content may change. Refer to the online UCR Schedule of Classes (http://classes.ucr.edu) for current information.

Students should consider some training in the ethics of use of genetically modified organisms, impact of patents on application of bioinformatics/genomics data, and/or use of databases with bioinformatics/genomics information in a clinical setting.

Additional Units taken to maintain 12-unit course load:

Graduate students will register for 12 units per quarter to maintain full-time status. These units will include any lecture and seminar courses taken for the quarter. Typically students will also register for Directed Research (GEN 297) prior to advancement to candidacy or Research for Dissertation (GEN 299) after passing the Qualifying Exam.

C. Guidelines for Studying for the Qualifying Exam: Genomics and Bioinformatics Track

Preparation for the Qualifying Exam:

1. Students must have successfully completed all classes in the Entry Requirement Category.

2. Students must have successfully completed five Core Classes as outlined under Course Requirements.

3. Prior to the qualifying exams, it is recommended that students enroll in a seminar class that requires an oral presentation.

4. At the time of the written and oral qualifying exams, students are required to display an understanding of the basic concepts of molecular genetics, computational biology, and statistics.

5. Students are encouraged to take any additional courses that are essential for the development of an in depth understanding in their areas of specialization. These will be determined by the student’s Guidance Committee and approved by the GGB Graduate Advisor.

6. The Qualifying Exam Committee will be composed of four GGB faculty members and one outside member, representing each of the following five areas:
   - Student’s emphasis area (Committee Chair)
   - Molecular Genetics
   - Computational Biology
   - Statistics
   - Outside Member (non-GGB faculty)
Breadth Requirements:
The exams are designed to test the student's ability to synthesize and integrate fundamental concepts in genetics, statistics and computer science. Students are expected to gain expertise that will allow them to address research problems that involve genomics and bioinformatics. In addition to the entry requirements and the core classes, knowledge equivalent to material covered in the following courses at UC Riverside will be assumed:

<table>
<thead>
<tr>
<th>Genetics Areas</th>
<th>Course at UCR</th>
<th>Equivalent Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Biology</td>
<td>Biology 107A</td>
<td>Biochemistry 110C, CMDB 201</td>
</tr>
</tbody>
</table>

It is the student's responsibility to inform all members of the committee what classes or texts have been used for exam preparation. This will ensure that the student's exam questions are drawn from appropriate sources; this is important since each student's program is tailored to the student's individual research needs and interests.

Text books that are appropriate for molecular genetics/molecular biology are:

**Molecular Genetics:**
- Lewin. Genes VII.
- Brown. Genomes.
- Freifelder. Molecular Biology.
- Weaver. Molecular Biology, Current Edition

**Molecular Cell Biology:**
- Alberts et al. Molecular Biology of the Cell (most recent edition)
- Lodish et al. Molecular Cell Biology (most recent edition)

Other textbooks that might be of use in studying for the Qualifying Exam:

**Genomics:**
- Griffiths et al. Modern Genetic Analysis: Integrating Genes and genomes (2nd ed., 2002 - or latest)
- Benfey and Protopapas. Genomics (2005)

Depth Requirements:
In addition to a general understanding of genetics, computer science and statistics, the students are expected to attain advanced knowledge of an area of genomics/bioinformatics related to their research problem. This will be tailored to the track of study in the GGB Program and the student's research program. **The best guidance for the exam will come from discussions with each committee member.**

The student will be expected to display knowledge of:

1. Current trends in genomics, bioinformatics, database mining, data manipulation, biological data management and/or computational biology. Reading journals will keep the student current. Some recommended journals in this area are: *Science, Nature, Nucleic Acids Research, Bioinformatics, Genome Research, Intelligent Systems for Molecular Biology (ISMB), Genomics and Journal of Computational Biology*. For additional journals in their specific research area, students should consult with their major professor.
2. The topics covered in the Entry Requirements and Core Requirements.

3. The topics covered in other courses taken in the student’s Course Program. These classes will obviously vary from student to student. It is the student's responsibility to inform all committee members of the classes taken while at UC Riverside.

4. A general understanding of molecular biology and genetics. It is anticipated that students in this track will vary in the level of understanding of molecular biology, due to variations in undergraduate studies.

5. Specific areas of focus considered by committee members to be relevant to the Dissertation Proposal.

6. All aspects of the dissertation proposal. Topics often discussed in the exam are alternative strategies, methodology, statistics, implications of research to current status of field, and basic or applied value. The topics are determined by the student’s research emphasis.

7. Knowledge of the landmark experiments related to the research project.

8. Research seminars such as GEN 261. The students are expected to be generally informed on current topics in their area.
VI. Molecular Genetics Track

A. Pathway to the Ph.D. Degree

Set up laboratory rotations (3-4 five-week rotations) no later than the first week of the 1st quarter in residence

Nominate a Guidance Committee (no later than the 1st quarter in residence). The committee is composed of a chairperson and two additional GGB faculty. If the student has chosen a major professor, the major professor should be the chair of the committee.

Meet with Guidance Committee by the end of the 1st quarter of residence to plan course program.

Submit Prerequisite-Breadth Requirement Checklist and Course Plan Program forms.

Reach an agreement with a Major Professor (by the end of the 2nd quarter in residence).

Meet with Guidance Committee (and later with Dissertation Committee) at least once per year to discuss research and progress.

Submit Annual Progress Report.

Complete Course Work

Nominate Qualifying Exam Committee (at least 2 weeks prior to date of qualifying exams).

(Refer to Section III for committee membership requirements for specific tracks)

At least two weeks prior to the written Qualifying Exam, the student is required to provide a Dissertation Research Proposal that includes progress thus far to the Qualifying Exam Committee. The proposal should be developed in consultation with the Major Professor, but written by the student alone.

Qualifying Exam. Two full days of written exam questions followed by a three-hour oral exam (~ one week later). Qualifying Exam needs to be completed as soon as possible after finishing formal coursework (no later than the 7th quarter in residence). If coursework is completed and Exam is passed, you are Advanced to Candidacy (normative time = 7 quarters).

Nominate a Dissertation Committee (at least three faculty members, Major Professor is the Chair). The Chair of the Dissertation Committee must be nominated at the time of Oral Qualifying Exam. Balance of committee must be nominated within one quarter after passing the Qualifying Exam.

Oral Defense of the Dissertation

File Dissertation with Graduate Division

Ph.D. Awarded (normative time is 15 quarters)
B. Course Program for a Ph.D. in GGB: Molecular Genetics Track
(An additional copy of form AA-MG is located in Section X.)

Use the following outline as a check list to be sure that ALL coursework requirements have been met. The form version of this list (Form AA-MG) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

**Entry Requirements:**

<table>
<thead>
<tr>
<th>Entry Requirement</th>
<th>Equivalent class/Year/Institution/Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>_  BCH 100 Elementary Biochemistry</td>
<td></td>
</tr>
<tr>
<td>_  BCH 102 Introductory Biochemistry Lab</td>
<td></td>
</tr>
<tr>
<td>_  BIOL 5A-B-C General Biology</td>
<td></td>
</tr>
<tr>
<td>_  BIOL 102 Introductory Genetics</td>
<td></td>
</tr>
<tr>
<td>_  BIOL 107A or BCH 110C Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>_  CHEM 1A-B-C General Chemistry</td>
<td></td>
</tr>
<tr>
<td>_  CHEM 112A-B Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>_  MATH 9A-B Calculus</td>
<td></td>
</tr>
<tr>
<td>_  STAT 100A Introduction to Statistics</td>
<td></td>
</tr>
</tbody>
</table>

**Core Classes:**

Students must also take two core classes from the list below:

<table>
<thead>
<tr>
<th>Core Class</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>_  CMDB 201 or BCH 211 Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>_  BPSC/BCH 231 Plant Genome</td>
<td></td>
</tr>
<tr>
<td>_  BIOL 221 Microbial Genetics</td>
<td></td>
</tr>
<tr>
<td>_  ENT 232 Molecular Biology of Insects</td>
<td></td>
</tr>
<tr>
<td>_  ENTX 204 Genome Maintenance and Stability</td>
<td></td>
</tr>
<tr>
<td>_  GEN 240A Advances in Bioinformatics and Genomics</td>
<td></td>
</tr>
</tbody>
</table>
**Additional Course Requirements:**

Students must take two additional courses which can be from the core list above, or other appropriate graduate level courses in any department and approved by the Guidance Committee and Graduate Advisor

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**Seminars:**

The GEN 261 seminar (Seminar in Genetics, Genomics, and Bioinformatics) must be taken at least one quarter per year. It is strongly recommended that students enroll in an invited seminar series during the other quarters in residence as well. Other potential seminar series offered by interdepartmental training programs or departments include BIOL 252, EEOB 265, BMSC 252, BCH 252, BPSC 260, CMDB 257, CS 287, ENTM 250, ENTX 270, PLPA 260 and STAT 251.

**Supplemental Courses:**

Students may wish to take additional courses to supplement their graduate training. These courses will be tailored to the student’s specific needs and decided upon in consultation with their major professors.

Classes that emphasize genetics, genomics, bioinformatics and other related areas are given in the List of Potential Courses for GGB Students (Section VII). The class times, instructors, and course content may change. Refer to the online UCR Schedule of Classes (http://classes.ucr.edu) for current information.

Students should consider some training in the ethics of use of genetically modified organisms, impact of patents on application of bioinformatics/genomics data, and/or use of databases with bioinformatics/genomics information in a clinical setting.

**Additional Units taken to maintain 12-unit course load:**

Graduate students will register for 12 units per quarter to maintain full-time status. These units will include any lecture and seminar courses taken for the quarter. Typically students will also register for Directed Research (GEN 297) prior to advancement to candidacy or Research for Dissertation (GEN 299) after passing the Qualifying Exam.
C. Guidelines for Studying for the Qualifying Exam: Molecular Genetics Track

Preparation for the Qualifying Exam:

1. Students must have successfully completed all classes in the Entry Requirement Category.

2. Students must have successfully completed four Core Classes as outlined under Course Requirements.

3. Prior to the qualifying exams, it is recommended that students enroll in a seminar class that requires an oral presentation.

4. At the time of the written and oral qualifying exams, the students are required to display an understanding of the basic concepts of classical, molecular and population/evolutionary genetics.

5. Students are encouraged to take any additional courses that are essential for the development of an in depth understanding in their area of specialization. These will be determined by the student’s Guidance Committee and approved by the GGB Graduate Advisor.

6. The Qualifying Exam Committee will be composed of four GGB faculty members and one outside member, representing each of the following five areas:
   - Student’s Emphasis Area (Committee Chair)
   - Classical Genetics
   - Molecular Genetics
   - Evolution/Population Genetics
   - Outside Member (non-GGB faculty)

Breadth Requirements:

The exams are designed to test the student's ability to synthesize and integrate fundamental concepts in three basic areas of genetics: classical, molecular, and evolutionary genetics. In addition to the entry requirements and the core classes, knowledge equivalent to material covered in the following courses at UC Riverside will be assumed:

<table>
<thead>
<tr>
<th>Area of Genetics</th>
<th>Course at UCR</th>
<th>Equivalent Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population/Evolutionary Genetics</td>
<td>Biology 108</td>
<td>Biology 105; BPSC 148 or 150</td>
</tr>
</tbody>
</table>

Students may choose to prepare for population/evolutionary genetics by independent study. Texts that supply the essential information are listed below.

It is the student's responsibility to inform all members of the committee what classes or texts have been used for exam preparation. This will ensure that the student's exam questions are drawn from appropriate sources; this is important since each student's program is tailored to the student's individual research needs and interests.

Text books that are appropriate for population/evolutionary genetics are:

Evolution and Population Genetics:

- Hartl and Clark. Principles of Population Genetics
- Futuyma. Evolutionary Biology. (Chap. 1-10)
- Falconer. Introduction to Quantitative Genetics. (omit Chap. 16-18)
Classical Genetics:
- Stanfield. Theory and Problems in Genetics (Chap. 1-6)
- Griffiths and McPherson. 100+ Principles of Genetics
- Griffiths et al. Introduction to Genetic Analysis. (Chap. 1-8, 18)

Other textbooks that might be of use in studying for the Qualifying Exam:

Genomics:
- Griffiths et al. Modern Genetic Analysis: Integrating Genes and genomes (2nd ed., 2002 - or latest)
- Benfey and Protopapas. Genomics (2005)

Molecular Genetics:
- Lewin. Genes VII.
- Brown. Genomes.
- Freifelder. Molecular Biology.
- Weaver. Molecular Biology, Current Edition

Molecular Cell Biology:
- Alberts et al. Molecular Biology of the Cell (most recent edition)
- Lodish et al. Molecular Cell Biology (most recent edition)

Depth Requirements:
In addition to a general understanding of the three areas of genetics, the students are expected to attain advanced knowledge of an area of genetics related to their research problem. This will be tailored to the track of study in the GGB program and the student's research program. The best guidance for the exam will come from discussions with each committee member.

The student will be expected to display knowledge of:

1. Current trends in research. Reading journals will keep the student current. Some suggestions are Nature, Science, MolecularCell, Cell Genetics, Trends in Genetics, the Current Opinions series, and Annual Reviews in Genetics. For additional journals in their specific research area, students should consult with their major professors.

2. The topics covered in the Entry Requirements and Core Requirements.

3. The topics covered in other courses taken in the student’s Course Program. These classes will obviously vary from student to student. It is the student's responsibility to inform all committee members of the classes taken while at UC Riverside.

4. Classical and current genetic model systems (Drosophila, yeast, mouse, C. elegans, human, maize, Arabidopsis)

5. Specific areas of focus considered by committee members to be relevant to the Dissertation Proposal.

6. All aspects of the dissertation proposal. Topics often discussed in the exam are alternative strategies, methodology, statistics, cell structure, function, biochemistry, physiology, biology of the organism chosen for study, implications of research to current status of field, and basic or applied value. The topics are determined by the student’s research emphasis.
7. Knowledge of the landmark experiments and discoveries in genetics.

8. Research seminars such as GEN 261. The students are expected to be generally informed on current topics in their area.
VII. List of Potential Courses for GGB Students

**Genetics Courses:**
- ANTH 150 Human Microevolution
- BIOL 102 Introductory Genetics
- BIOL 108 Introductory Population Genetics
- BIOL 115 Human Genetics
- BIOL 215 Advanced Methods of Data Analysis in Evolution, Ecology, and Behavior
- BIOL 216 The Theory of Evolution
- BIOL 221 Microbial Genetics *(Cross-listed with MCBL 221)*
- EEOB 282 Seminar in Genetics and Evolution
- BPSC 148 Quantitative Genetics *(Cross-listed with BIOL 148)*
- BPSC 150 Principles of Plant Breeding
- BPSC 153 Plant Genomics and Biotechnology Laboratory
- BPSC 155 Chromosomes *(Cross-listed with BIOL 155.)*
- BPSC 221 Advanced Plant Breeding
- BPSC 222 Origins of Agriculture and Crop Evolution
- BPSC 234 Statistical Genomics
- ENTX 211 Environmental and Molecular Carcinogenesis
- GEN 205 Signal Transduction Pathways in Microbes and Plants *(Cross-listed with CMDB 205, BCH 205, BPSC 205, MCBL 205, and PLPA 205)*
- GEN 206 Gene Silencing
- GEN 240A Advances in Bioinformatics and Genomics
- GEN 240B Advances in Bioinformatics and Genomics
- PLPA 215 Genetics of Fungi

**Statistics and Quantitative Genetics**
- BPSC 148 Quantitative Genetics *(Cross-listed with BIOL 148)*
- BPSC 150 Principles of Plant Breeding
- BPSC 234 Statistical Genomics
- MATH 135A Numerical Analysis
- STAT 170A Regression Analysis
- STAT 170B Design of Experiments
- STAT 203AB Bayesian Statistics I & II
- STAT 207AB Statistical Computing
- STAT 210A Theoretical Statistics and Probability
- STAT 215 Stochastic Processes
- STAT 220A Multivariate Analysis
- STAT 220B Multivariate Analysis

**Computer Science**
- CS 141 Intermediate Data Structures and Algorithms
- CS 166 Database Management Systems
- CS 170 Introduction to Artificial Intelligence
- CS 171 Introduction to Expert Systems
- CS 205 Artificial Intelligence
- CS 218 Design and Analysis of Algorithms
- CS 234 Computational Methods for Biomolecular Data
- CS 235 Data Mining Techniques
- CS 236 Data Base Management Systems
- CS 238 Algorithm Techniques in Computational Biology
EE 144  Introduction to Robotics
EE 240  Pattern Recognition
EE 244  Computational Learning

MATH 112  Finite Mathematics

**Developmental and Cell Biology**
BIOL 114  Advanced Cell Biology: Cellular Reproduction and Signaling
BIOL 128  Immunology (Cross-listed with CBNS 128)
BIOL 168  Developmental Biology
BIOL 203  Cellular Biophysics
BIOL 208  Host-Parasite Relationships (Cross-listed with ENTM 208)
EEOB 211  Ecology: Genes to Ecosystem

BPSC 232  Plant Development
BPSC 236  Principles of Light Microscopy
BPSC 237  Plant Cell Biology

CBNS 101  Fundamentals of Cell Biology
CBNS 150  Cancer Biology (Cross-listed with ENTX 150)

CHEM 260  Analysis of Single Cells and Subcellular Organelles

CMDB 200  Cell Biology (Cross-listed with BIOL 200)
CMDB 202  Developmental Biology
CMDB 207  Stem Cell Biology (Spring)

GEN 205  Signal Transduction Pathways in Microbes and Plants
(Cross-listed with CMDB 205, BCH 205, BPSC 205, MCBL 205, and PLPA 205)

NRSC 200A  Fundamentals of Neuroscience (Cross-listed with PSYC 200A)

**Ethics and Genetically Modified Organisms**
BPSC 011  Plants and Human Affairs

MGT 218  Ethics in Management

PHIL 117  Environmental Ethics
PHIL 167  Biomedical Ethics

RLST 170  Current Issues in Religious Studies

**Evolution and Comparative Genomics**
BIOL 105  Evolution
BIOL 108  Introduction to Population Genetics
BIOL 112  Systematics (Cross-listed with BPSC 112 and ENTM 112)
EEOB 214  Population Genetics
EEOB 216  The Theory of Evolution
EEOB 219  Theory of Systematics (Cross-listed with ENTM 219 and GEO 219)

BPSC 148  Quantitative Genetics (Cross-listed with BIOL 148)
BPSC 185  Molecular Evolution (Cross-listed with BCH 185)
BPSC 223  Applied Evolutionary Genetics

**Molecular Biology and Genomics**
BCH 110C  General Biochemistry: Structure and Function Prokaryotic and Eukaryotic Genes
BCH 211  Molecular Biology
BCH 212  Signal transduction and biochemical regulation
BIOL 107A  Molecular Biology
BIOL 107B  Advanced Molecular Biology
BIOL 109  Laboratory in Cell and Molecular Biology
BIOL 221  Microbial Genetics (*Cross-listed with MCBL 221*)

BMSC 202  Molecular Basis of Disease

BPSC 153  Plant Genomics and Biotechnology Laboratory
BPSC 210  Methods in Arabidopsis Research
BPSC 231  The Plant Genome (*Cross-listed with BCH 231*)
BPSC 232  Plant Development
BPSC 233  Plant Molecular Responses to the Abiotic Environment

CBNS 150  Cancer Biology (*Cross-listed with ENTX 150*)

CEE 210  Cell Engineering

CMDB 201  Molecular Biology (*Cross-listed with BIOL 201*)

ENTM 210  Molecular Biology of Human Disease Vectors
ENTM 232  Molecular Biology of Insects

ENTX 204  Genome Maintenance and Stability (*Cross-listed with BCH 204 and CMDB 204*)

GEN 205  Signal Transduction Pathways in Microbes and Plants
        (*Cross-listed with CMDB 205, BCH 205, BPSC 205, MCBL 205, and PLPA 205*)
GEN 206  Gene Silencing

PLPA 219  Molecular Plant Virology
PLPA 231  Physiology of Plant Disease

**Macromolecules**

BCH 102  Biochemistry laboratory
BCH 110A-C  General Biochemistry
BCH 184  Topics in Physical Biochemistry
BCH 210  Biochemistry of Macromolecules
BCH 230 (E-Z)  Advanced Topics in Biochemistry

CEE 210  Cell Engineering

CHEM 229Q  Nuclear Magnetic Resonance
CHEM 260  Analysis of Single Cells and Subcellular Organelles

**Virology, Microbiology and Medicine**

BIOL 121  Introductory Microbiology (*Cross-listed with MCBL 121*)
BIOL 121L  Microbiology Laboratory (*Cross-listed with MCBL 121L*)
BIOL 123  Introduction to Comparative Virology (*Cross-listed with PLPA 123 & MCBL 123*)
BIOL 221  Microbial Genetics (*Cross-listed with MCBL 221*)

PLPA 215  Genetics of Fungi
PLPA 219  Molecular Plant Virology

**Bioengineering**

BIEN 233  Computational Modeling of Bimolecular (status pending eff. W07)
CEE 210  Cell Engineering
VIII. Financial Support

Many students are awarded Graduate Division fellowship(s) upon acceptance to the GGB. In many cases Graduate Student Research Assistantships (GSRs) provided by the student’s major professor will be the primary source of funding. In most cases the major professor will also provide funding during the summer term. Some funds are distributed directly through the GGB. To qualify for funding from the GGB, students must be in good academic standing. The funding is merit-based and is, therefore, competitive. Ask the Program Director, Graduate Advisor, or your major professor if you have questions about your funding situation.

Students are encouraged to take independent steps to find alternative sources of funding. A demonstrated ability to secure funding is viewed very positively in academia and industry, and plays an important role in professional development. Students can find information about alternative funding sources through the Graduate Division website (www.graduate.ucr.edu/FinSuptoc.html) and the Financial Aid office. You may also consult with the Program Director and Graduate Advisor regarding fellowships in your research area.

Additional UCR funding sources include:

Dissertation Research Grants: Graduate Division awards for students who have advanced to candidacy. This award is to help students defray their research expenses. There is one competition per quarter. Application deadlines are available from Graduate Division.

Dissertation-Year Fellowship Awards (DYFA): Graduate Division award of stipend plus fees, a research allowance, and a travel allowance. This award is for domestic students (including U.S. residents) who demonstrate high potential and promise for a career in teaching and research. Students are required to complete their Ph.D. within the coming academic year (by the end of the award period). The proposal requires an academic research plan. Student must be nominated by the GGB Director. The deadline is late Winter quarter.

Graduate Student Association Mini-Grant: The Graduate Student Association awards small grants to defray the costs of travel to meetings. Information about these grants and the application deadlines should be obtained from the Graduate Student Association (www.gsa.ucr.edu). GGB student advice on the protocol for obtaining and using travel grants is provided in a separate section of this handbook.

The College of Natural and Agricultural Sciences (CNAS) awards several scholarships, awards and prizes each year to graduate students. The application deadline is usually in May. Information about these can be obtained from the CNAS Dean’s office or from the Graduate Advisor.

Extramural funding sources include:

National Science Foundation Graduate Research Fellowships: Three years of support for graduate research. Applicants may have completed no more than 12 months of full time graduate study as of August 31, in the year they apply. (This means that students just starting their second year of graduate study in the fall are eligible to apply.) The application deadline is in the fall. See the NSF website for details (www.nsf.gov).

National Science Foundation Doctoral Dissertation Improvement Grants: Awards to students who have advanced to candidacy. Funding is for financial needs that cannot be met. Please check the NSF website for details. Applicants need not be U.S. citizens. The deadline is in the fall (www.nsf.gov).

American Association of University Scholars: Dissertation fellowship grants to women in the final year of their doctoral degree (www.aauw.org). Women in all tracks of GGB should qualify for this award.

Society of Sigma Xi: A society of biologists that supports graduate student study at UCR.
IX. Advice from GGB Students to GGB Students

1. I have been accepted; is there anything I can do before I get to UCR?

**Housing:** [http://housing.ucr.edu/](http://housing.ucr.edu/)
If you have a family you may want to sign up immediately for Family Housing, as it is relatively inexpensive and there is an approximately one year waiting list.

You can send an email to all grad students on campus letting them know you are looking for a room. Login to [http://ilearn.ucr.edu](http://ilearn.ucr.edu) and navigate to “UCR Graduate Community,” “Communications,” “Messages,” “New Message.”

**Rotations:** It is often possible to start your rotations early. Contact the Grad Advisor and the Professor(s) you are interested in rotating with.

**UCR Account:** Get your UCR email account setup: [http://cnc.ucr.edu/policies/studentmail/index.php](http://cnc.ucr.edu/policies/studentmail/index.php)

2. Now that I am here, what can I do before classes start?


Get a Student ID Card: [http://ucrcard.ucr.edu/](http://ucrcard.ucr.edu/)
Start your rotations.

3. What is the role of a Student Mentor and the GGB Graduate Student Association?

Each student entering the GGB program is assigned a Student Mentor. This mentor is a GGB student in the advanced stages of their Ph.D. program. The mentor aids the student in transitioning to the GGB program and life in Southern California. If you have not been assigned a student mentor, contact the Graduate advisor and the GGB-GSA president immediately. They will help in this process as the GGB Graduate Student Association (GGB-GSA) appoints the Student Mentor.

The GGB-GSA is an organization run by the GGB students at UCR. Every GGB student is automatically a member of the GGB-GSA, which meets frequently and strongly recommends student participation for various activities. Students serve as officers for the organization and on committees. The GGB-GSA organizes and plans student activities and helps sponsor speakers for the GEN 261 seminar series and the annual GGB symposium. Another major responsibility of the GGB-GSA is organizing the recruitment day and helping students to prepare for their Qualifying exams by conducting mock orals for each and every student. Participation in the GGB-GSA allows the GGB students to prepare for the administrative activities and responsibilities experienced in academia and industry.

4. How should I choose labs for my rotations?

Browse the professors’ websites, read some publications from those you’re interested in. (Instructions on how to access journal articles that UCR subscribes to can be found here: [http://library.ucr.edu/?view=help/remoteaccess/index.html](http://library.ucr.edu/?view=help/remoteaccess/index.html))

Don’t limit yourself just to the faculty list on the GGB website. GGB is a program, not a department; you can choose just about any faculty on campus working on some biological question – even if they don’t have a biological laboratory (i.e. statistics, computer science etc.).

Set up an appointment with a professor by email to chat about his/her research. If you do not get a response within a few days don’t take it personally. Try dropping by their office or lab until you bump into them then ask for an appointment. Remember: the relationship between a professor and a graduate student is symbiotic where each needs the other.

Things you can or should ask: Do they have room in their lab if you wanted to join? Are they funded? Can they pay you or would you have to teach a lot after the first year? You may want lots of teaching experience or you may not.
Look at their publication records. What are they publishing? If they produce lot of papers it’s more likely you will too if you join their lab. Talk to the Grad Advisor, your student mentor and other GGB students for their input/advice. Also, it is better to go for five-week rotations than ten-week rotations.

5. My rotations are almost over; which lab should I join?

There are lots of things to consider, but some of the most important would be: Do you think you can get along with the P.I. and others in the lab? You’ll be seeing them a lot in the next five years. Do you like the project/research you would be working on? Is the advisor open to his/her student’s ideas for research? What is the funding situation? You don’t necessarily need to be funded every quarter (lots of grad students have to TA) but it takes money to do research (supplies, etc.) Does the professor have tenure? If not, are they at a high risk of not getting it? If they have to leave UCR it can make things difficult for their students.

6. How do I choose which classes to take?

The Graduate Advisor will help you set up initially with your classes. You may have taken classes that you can transfer. Once you join a lab your professor may want you to take a class or two related to your research. Your student mentor can also help you with valuable input.

7. I’m swamped with both class work and lab work! How do I handle the pressure?

Most graduate students will feel this way, especially during the first couple of quarters. Don’t give up. Do your best and you will get used to the pace. Try to keep your GPA above a 3.5 but don’t despair if you have a bad quarter and it dips a bit below that. (Beware that your overall GPA needs to be high enough to keep your fellowship!) When you’re done and apply for a job no one will care what your GPA was – it’s all about your research. One professor said, “If you’re getting straight A’s you’re not spending enough time in the lab.”

8. There’s so much information in journal articles. What should I focus on?

Again, it is common for grad students to feel overwhelmed, and this is also true the first few times they read journal articles. You will get used to reading them with experience. However, you will often have a specific reason for reading the article so you should focus on that. Do you need to use a method in the paper? Focus on the methods. Do you need to understand the significance of the paper? Focus on the introduction and discussion sections. You usually don’t need to know every last detail. Underlining key concepts helps make re-reading papers easier. Expect to read a paper several times before you really grasp it.

9. How should I prepare for the Qualifying Exams?

Qualifying exams are usually taken near the end of the 2nd year or shortly thereafter. They are the major hurdle you will face in getting your PhD. Preparing for and taking your exams is a stressful time for all students. You can make this time less stressful and increase your odds of passing by becoming aware of what is expected of you and thinking in terms of these expectations as you conduct your research. These are discussed in the Written Exam and Oral Exam sections below.

Choosing a committee:
Yes, you get to decide who will decide your fate. Each track in GGB will have a listing of its requirements for the makeup of the committee in terms of each member’s area of expertise. You choose
whichever faculty you want within those general requirements (such as someone with expertise in, say, Molecular Biology).

There is no requirement to choose a professor you know personally but often students pick faculty from whom they have taken a class or have met in some other venue, such as a collaborator on their project. As you meet and interact with different professors during your first two years think about whether you might want them on your committee. It is advisable to ask other students about someone you’re considering, especially if you do not know the professor yourself. Other students may have had them on their own committee and can give you insight into the professor’s expectations.

Start deciding/finalizing the makeup of your committee as early as possible as it takes time (6 months is not too soon). Begin scheduling exam dates with your committee early as well (~3 months before you want to take the exams) as their schedules fill up early and it becomes difficult or impossible to get the five professors you want on the same day. For the same reason, once you have the exams scheduled, do your best not to change the dates unless absolutely necessary. Consider sending a courtesy reminder email to your committee one or two days ahead of the oral exam; it is rare for professors to forget a meeting but it can happen.

Proposal:
Obviously, be clear and concise in your writing. Grammatical mistakes are forgiven for non-native speakers as long as it’s readable. Nevertheless, you should get input from other people in your lab (not your professor) and other GGB students. Don’t wait until the last minute to show someone else your proposal or you won’t have enough time to revise it. Get several people’s advice and incorporate the best and the most common suggestions.

You should be able to discuss in detail everything you put into your proposal and be able to explain why you’re doing what you’re doing. Do not be tempted to include every last thing you know and have thought of or you will have nothing in reserve when the questions come. Include only what is necessary to clearly explain your project, unless you want to answer questions about something extra you’ve included (which you may, if you know a lot about it).

Written Exams:
When you ask a professor if they would be willing to be on your Qualifying Exam Committee (and if they say yes) it is good to ask if they have any suggestions on how you should prepare for the exams. They may give you some guidance immediately or they may want to know more about your research first. Everyone is different. In general, the more specific the areas of study they give you (most professors will be in this category) the more in detail you should know about it. If they do not want to give you any specifics then be prepared for questions that any self-respecting Geneticist in your track should know, such as, “What is a gene?”

Oral Exams:
If you haven’t already started preparing for the oral exam you should begin now. Why now? You should start now because during your exam the faculty will be trying to determine not only whether you are knowledgeable but also whether you can think like a scientist. Thinking like a scientist is not something you study for the last minute; it is a habit you must be in to do well. This applies to the written exam too but is crucial for the orals.

Whatever you do in the lab you should understand why you are doing it. Be careful of assuming things, as this can get you into trouble if, for instance, you’re asked why you use this organism or that technique instead of another and you’ve never asked yourself why. Understand why you are working on your project, what its significance is to the field, what research you could do next if you complete your proposed work. Be aware of who the leaders are in your field and why their work was important. Be careful not to overstate the importance and superior nature of your own work or you’ll get slammed; the committee would rather know that you understand the weaknesses of your project and have thought of ways to address them than hear you say your project will undoubtedly succeed and forever change the
world. What do you need to know to complete the project without supervision? Challenging yourself with questions as you do your research will go a long way towards preparing yourself for the exams.

For the exam itself, prepare a presentation of your proposal and practice it. Set up a mock oral exam with GGB’s Qualifying Exams Mock Oral Committee a minimum of two weeks before your real exam so that you can incorporate suggestions to your presentation.

An oral exam can be a discussion amongst scientists fascinated by science; let your enthusiasm for your project come out and the committee will enjoy it with you.

10. Can I attend conferences outside UCR? How and where to apply for travel funds?

Graduate students at the University of California at Riverside have many opportunities to attend academic conferences. Under most circumstances, they are able to obtain travel funds from several different sources. The procedure outlined below will provide the student with information about how to apply for travel funds and how to be reimbursed after the conference.

For UCR graduate students there are four potential sources of travel funds. These are the conference they will attend, their home department, the Graduate Student Association and their research advisor(s).

- From the Conference: It is common for academic conferences to provide travel funds to attendees. Students who will give an oral or poster presentation are qualified to apply for travel funds. Sometimes conferences do not post travel funding information on the conference websites or announce it in other ways. Under this circumstance, students should contact the conference organizer for this kind of information. There are deadlines for these fund awards, so the student should contact the conference as soon as they decide to take part.

- From the Department: To apply for this kind of travel fund, the student should first ask the appropriate administrative assistant in their department for an application form. After filling out the form, it should be turned in to the academic advisor or the chair of the department. Faculty or a committee of faculty will decide whether to provide the student with travel funds and the amount. In most cases, the student will not receive the funds immediately following approval of the application. Instead, they will be reimbursed according to their actual expenses after the conference.

- From the Graduate Student Association (GSA): Applications are due on the first day of the month preceding the conference end date. For example, if your conference ends Oct. 15, your application is due September 1st. Supporting material for the application (abstract, letter of recommendation etc.) is due prior to the start of the conference. Receipts for registration, accommodation, and travel will be accepted up to two weeks after the end of the conference. The minigrant program should be able to determine approximate award amounts prior to the start of the conference. Applicants will be contacted and told how much they can expect to receive from GSA prior to their conference. Application, supporting materials, and receipt deadlines will be strictly enforced.

- From the Research Advisor(s): If the above three sources do not cover all of the expenses, the research advisor(s) can often pay the balance.
X. Forms

Electronic versions of these forms can be obtained from the GGB Student Affairs Officer
**FORM AA-EPG**

**Course Program for a Ph.D. in GGB: Evolution and Population Genetics Track**

**Student’s Name:** ________________________________

Use the following outline as a check list to be sure that ALL coursework requirements have been met. This list (Form AA-EPG) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

**Entry Requirements (courses taken as an undergrad*):**

<table>
<thead>
<tr>
<th>Courses at UCR:</th>
<th>Equivalent Course at other institution: (Course #, Title, Year, Grade, Institution)</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ BCH 100</td>
<td>Elementary Biochemistry</td>
</tr>
<tr>
<td>__ BIOL 5A-5B-C</td>
<td>General Biology</td>
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<tr>
<td>__ BIOL 102</td>
<td>Introductory Genetics</td>
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<td>__ BIOL 108</td>
<td>Intro.to Population Genetics</td>
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<tr>
<td>__ CHEM 1A-1B-C</td>
<td>General Chemistry</td>
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<tr>
<td>__ CHEM 112A-B</td>
<td>Organic Chemistry</td>
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<tr>
<td>__ MATH 9A-B</td>
<td>Calculus</td>
</tr>
<tr>
<td>__ STAT 100A</td>
<td>Introduction to Statistics</td>
</tr>
</tbody>
</table>

* Deficiencies will be rectified in the first year at UCR

**Core Classes (required courses to be taken in the GGB program at UCR):**

**Evolutionary Biology Requirement:**

__ BIOL 216         Theory of Evolution *(Fall, Spring)*

**Population Genetics Requirement:**

__ EEOB 214        Evolutionary Genetics *(Winter)*

**Statistics Requirement:**

Complete at least one course from among the following:

__ MATH 149A  Probability and Mathematical Statistics *(Fall)*

__ PSYC 211  Statistical Inference *(Fall)*

__ PSYC 212  Multiple Regression and Correlation Analysis *(Spring)*

__ PSYC 213  Experimental Design and Analysis of Variance *(Winter)*
___ STAT 110  Biostatistical Methods in Life Sciences (Fall)
___ STAT 155  Probability and Statistics for Science and Engineering (Fall, Winter, Summer)
___ STAT 160A  Elements of Probability and Statistical Theory (Fall)
___ STAT 160B  Elements of Probability and Statistical Theory (Winter)
___ STAT 160C  Elements of Probability and Statistical Theory (Spring)
___ STAT 170A  Regression Analysis (Fall)
___ STAT 170B  Design of Experiments (Winter)
___ STAT 231A  Statistics for Biological Sciences (Winter)
___ STAT 231B  Statistics for Biological Sciences (Spring)

**Additional Course Requirements:**

Complete at least one course from among the following:

___ BIOL 215  Advanced Methods for Data Analysis (Spring)
___ BIOL 219  Theory of Systematics (Spring)
___ BPSC 223  Applied Evolutionary Genetics (Winter)
___ GEN 240A  Advances in Bioinformatics and Genomics (Winter)

___ or a graduate level course approved by the Guidance Committee and Graduate Advisor
FORM AA-GB

Course Program for a Ph.D. in GGB: Genomics and Bioinformatics Track

Student’s Name: ________________________________

Use the following outline as a check list to be sure that ALL coursework requirements have been met. This list (Form AA-GB) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

**Entry Requirements (courses taken as an undergrad*):**

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<td>___ CS 014</td>
<td>Data Structures and Algorithms</td>
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<td>Calculus</td>
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<td>Introduction to Statistics</td>
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</table>

* Deficiencies will be rectified in the first year at UCR

**Core Classes:**

Students will take the following classes at UCR that provide requisite training in statistics and bioinformatics/genomics.

**Bioinformatics and Genomics Requirement:**

___ GEN 240A    Advances in Bioinformatics and Genomics (*Winter*)
___ GEN 240B    Advances in Bioinformatics and Genomics (*Spring*)

**Computer Science Requirement:**

___ CS 141      Intermediate Data Structures and Algorithms (*Fall, Winter, Spring*)
Statistics Requirement:

Complete two courses from among the following:

- STAT 110 Biostatistical Methods in Life Sciences (Fall)
- STAT 160B Elements of Probability and Statistical Theory (Winter)
- STAT 161 Introduction to Probability Models (Spring)

Only one from the following:

- STAT 160A Elements of Probability and Statistical Theory (Fall)
- STAT 155 Probability and Statistics (Fall, Winter, Summer)
- MATH 149A Probability and Mathematical Statistics (Fall)
FORM AA-MG

Course Program for a Ph.D. in GGB: Molecular Genetics Track

Student’s Name: ___________________________________

Use the following outline as a check list to be sure that ALL coursework requirements have been met. This list (Form AA-MG) will be submitted to the Graduate Advisor along with a Course Plan (Form BB), additional relevant courses taken (Form CC) and a letter from the Chair of the Guidance Committee explaining any unusual features of the file.

**Entry Requirements (courses taken as an undergrad*):**

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* Deficiencies will be rectified in the first year at UCR

**Core Classes (required course to be taken in the GGB program at UCR):**

Students must also take two core classes from the list below:

| _ CMDB 201 or BCH 211 Molecular Biology (Fall) |
| _ BPSC/BCH 231 The Plant Genome (Winter)      |
| _ BIOL 221 Microbial Genetics (Fall)          |
| _ ENT 232 Molecular Biology of Insects (Spring) |
| _ENTX 204 Genome Maintenance and Stability (Spring) |
| _GEN 240A Advances in Bioinformatics and Genomics (Winter) |
Additional Course Requirements:

Students must take two additional courses which can be from the core list above, or other appropriate graduate level courses in any department and approved by the Guidance Committee and Graduate Advisor.

___ ______________________

___ ______________________
FORM BB
Course Plan Form
Courses Required by Guidance Committee

Name of Student

Track

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<th>Quarter _______</th>
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PROJECTED DATE OF QUALIFYING OR COMPREHENSIVE EXAMINATION: ________________________________

Guidance Committee Chair       Date       Guidance Committee Member       Date       Guidance Committee Member       Date
FORM CC

OTHER COURSES TAKEN RELATED TO GENETICS, GENOMICS & BIOINFORMATICS
PRIOR TO ENROLLMENT IN GGB

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<thead>
<tr>
<th>COURSE</th>
<th>Units</th>
<th>Grade</th>
<th>Date</th>
<th>Institution</th>
<th>GGB Grad Adviser Signature</th>
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FORM DD

Guidance Committee Approval Form

This form is to be completed in the first quarter in residence.

(Please type or print)

Name_____________________________ Date _______________

I would like to request the following members be appointed to my Guidance Committee. They have all agreed to serve on this committee.

__________________________________________, Chair

__________________________________________

__________________________________________

Approved: ________________________________
(Guidance Committee Chair) (Graduate Advisor)
FORM EE

Student Progress Record for Graduate Advisor and Student

Students should use this form to keep track of their progress to degree

Student Name: __________________________________  QTR Entered GGB: ______

<table>
<thead>
<tr>
<th>Guidance Committee</th>
<th>Qualifying Exam Committee</th>
<th>Dissertation Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair:</td>
<td>Chair:</td>
<td>Chair:</td>
</tr>
</tbody>
</table>

Date of Meeting

Year 1:

______________
Meet with Guidance Committee during First Quarter of Residence

______________
Meet with Guidance Committee in Third Quarter
(Annual Progress Report Due)

Year 2:

______________
Complete Form for Qualifying Exam Scheduling (6 wks prior to dates)

______________
Prepare Dissertation Research Proposal for Qualifying Exam Committee
(Due 2 weeks prior to Written Exam)

______________
Complete Qualifying Exam by end of 7th Quarter in Residence

______________
Meet with Guidance Committee in Third Quarter
(Annual Progress Report Due)

Year 3:

______________
Meet with Dissertation Committee to Complete Annual Progress Report
(Meet earlier if requested by the Qualifying Exam Committee)

Year 4:

______________
Meet with Dissertation Committee to Complete Annual Progress Report

Year 5:

______________
Meet with Dissertation Committee at least twice
Dissertation Defense

ENGLISH REQUIREMENTS FOR NON-NATIVE SPEAKERS

______________
ESL courses

______________
Pass SPEAK Test

TEACHING REQUIREMENTS

______________
TADP Training Completed

______________
Teaching Assistantship Requirement Completed
FORM FF

Qualifying Exam Committee Nominations
Evolution and Population Genetics Track and Molecular Genetics Track

For guidelines for the selection of committee members see: “Graduate Student’s Guidelines to the Qualifying Exams”.

Student: Date entered GGB:
Major Professor: GGB Track:
Resident Department: Written Dates:
Guidance Committee Members: Oral Dates:

Research Topic: (Paste a typed, 3-4 sentence statement into the space provided)

Qualifying Exam Committee

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Department</th>
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<tbody>
<tr>
<td>(Chair – Emphasis Area)</td>
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<tr>
<td>(Classical Genetics)</td>
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<td>(Molecular Genetics)</td>
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<td>(Evolution/Population Genetics)</td>
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<td>(Outside Member)</td>
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Approval:

<table>
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<th>(date)</th>
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<td>(Major Professor)</td>
<td>(date)</td>
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<tr>
<td>(Committee Chair)</td>
<td>(date)</td>
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<tr>
<td>(Graduate Advisor)</td>
<td>(date)</td>
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FORM GG

Qualifying Exam Committee Nominations
Genomics and Bioinformatics Track

For guidelines for the selection of committee members see: “Graduate Student’s Guidelines to the Qualifying Exams”.

Student: [Student's name]
Quarter entered GGB: [Quarter entered]
Major Professor: [Major Professor's name]
GGB Track: [Track]
Resident Department: [Department]
Written Dates: [Dates]
Guidance Committee Members: [Members]
Oral Dates: [Dates]

Research Topic: (Paste a typed, 3-4 sentence statement into the space provided)

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<td>(Outside Member)</td>
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Approval:

(Student) [Signature] (date)

(Major Professor) [Signature] (date)

(Committee Chair) [Signature] (date)

(Graduate Advisor) [Signature] (date)
ANNUAL REVIEW OF GRADUATE STUDENT PROGRESS
Program in Genetics, Genomics and Bioinformatics

STUDENTS MUST ATTACH A 2 TO 5 PAGE SUMMARY OF THEIR RESEARCH

Name of student: ______________________________ Date prepared: __________________________

Track: ☐ Evolution & Population ☐ Molecular Genetics ☐ Genomics & Bioinformatics

Date entered program: _________________ Date SPEAK test passed, if applicable: _________________

Qualifying exam dates: WRITTEN __________________________ ORAL __________________________

Dissertation title (working title):
_____________________________________________________________________________________
_____________________________________________________________________________________

Anticipated exit date: ____________________

ACADEMIC PROGRESS
(This section to be filled out by student.)

Courses taken this past year:

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Fall GPA _______ Winter GPA _______ Spring GPA _______
Cum GPA _______ Cum GPA _______ Cum GPA _______

Courses remaining to take in subsequent years:

Teaching: (indicate courses TA’d)

Have deficiencies been satisfied?
☐ Yes ☐ No, If no please indicate which deficiencies remain and when they will be met:

Are there changes to the previously approved Course Program forms?
☐ Yes, please indicate changes  ☐ No

ACCOMPLISHMENTS: (Please indicate any special accomplishments, meetings attended, awards, publications, etc. received this year):

RESEARCH SUMMARY (2 to 5 pages) ATTACHED?  ☐ Yes

__________________________________________________________

EVALUATION
(This section to be filled out by committee)

OVERALL EVALUATION OF STUDENT’S PROGRESS:
☐ Excellent  ☐ Very Good  ☐ Good  ☐ Needs significant improvement

SPECIFIC COMMENTS: (including recommendations on course work and research).

__________________________________________________________

STUDENT SIGNATURE

MAJOR PROFESSOR/CHAIRMAN (signature)

__________________________________________________________

GRADUATE ADVISOR

COMMITTEE MEMBER (Sign and Print Name)

COMMITTEE MEMBER (Sign and Print Name)

Please return completed form and attachments to the GGB Student Affairs Officer, 1140 Batchelor Hall
### A. Faculty in the GGB Program

<table>
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<tr>
<th>Faculty Name</th>
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<td>Genetic manipulation of Insects of commercial importance</td>
<td>Genomics &amp; Bioinformatics, Molecular Genetics</td>
<td>Entomology</td>
<td><a href="mailto:peter.atkinson@ucr.edu">peter.atkinson@ucr.edu</a> 951-827-4782 951-827-3086 (fax)</td>
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<td>Cell Biology &amp; Neuroscience</td>
<td><a href="mailto:jeffrey.bachant@ucr.edu">jeffrey.bachant@ucr.edu</a> 951-827-6473 951-827-3087 (fax)</td>
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<td>Genomics &amp; Bioinformatics, Molecular Genetics</td>
<td>Botany and Plant Sciences</td>
<td><a href="mailto:julia.bailey@ucr.edu">julia.bailey@ucr.edu</a> 951-827-3738 951-827-4437 (fax)</td>
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<td><a href="mailto:gregor.blaha@ucr.edu">gregor.blaha@ucr.edu</a> 951-827-3832 951-827-2364 (fax)</td>
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<td>Genomics &amp; Bioinformatics, Molecular Genetics</td>
<td>Plant Pathology</td>
<td><a href="mailto:katherine.borkovich@ucr.edu">katherine.borkovich@ucr.edu</a> 951-827-2753 951-827-4294 (fax)</td>
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<td><a href="mailto:james.borneman@ucr.edu">james.borneman@ucr.edu</a> 951-827-3584 951-827-4294 (fax)</td>
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<td><a href="mailto:xuemei.chen@ucr.edu">xuemei.chen@ucr.edu</a> 951-827-3988</td>
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<td><a href="mailto:chia-en.chang@ucr.edu">chia-en.chang@ucr.edu</a> 951-827-7263 951-827-2435</td>
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**XI. Faculty and Student Directories**
<table>
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<tr>
<th>Name, Firstname</th>
<th>Research Interests</th>
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<th>Email</th>
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<td><a href="mailto:timothy.close@ucr.edu">timothy.close@ucr.edu</a></td>
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<td><a href="mailto:david.crowley@ucr.edu">david.crowley@ucr.edu</a></td>
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<td>Molecular Genetics, Genomics &amp; Bioinformatics, Statistics</td>
<td><a href="mailto:xinping.cui@ucr.edu">xinping.cui@ucr.edu</a></td>
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<td><a href="mailto:paul.deley@ucr.edu">paul.deley@ucr.edu</a></td>
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<td>Molecular mechanisms involved in the regulation of chromatin structure and mammalian gene transcription</td>
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<td>Martins-Green, Manuela</td>
<td>The role of chemokines in wound healing and tumor development.</td>
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<td>Nair, Meera</td>
<td>Macrophage function in mucosal infection and inflammation. Research in the Nair lab is focused on understanding the function of macrophages recruited to mucosal sites following infection and how they regulate host immunity and inflammation</td>
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<td>My research focuses on mechanisms underlying the insect vector transmission of viruses, and virus-insect vector interactions mediating the transmission process.</td>
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associations; application to studying human diseases

### ACADEMIC COORDINATORS (non-faculty campus members)

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### B. Students in the GGB Program

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<td>Bradley White</td>
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<td><a href="mailto:eric.smith@email.ucr.edu">eric.smith@email.ucr.edu</a></td>
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<td>Sternburg, Erin</td>
<td>Molecular Genetics</td>
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<td>Tran, Tim</td>
<td>Molecular Genetics</td>
<td>Connie Nugent</td>
<td><a href="mailto:tim.tran@email.ucr.edu">tim.tran@email.ucr.edu</a></td>
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<td>Zhao, Bo</td>
<td>Molecular Genetics</td>
<td>Alexander Raikhel</td>
<td>951-827-2146</td>
<td><a href="mailto:bo.zhao@email.ucr.edu">bo.zhao@email.ucr.edu</a></td>
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Housed under the College of Natural & Agricultural Sciences, the Biological Sciences Graduate Student Affairs Center supports the graduate programs of Biochemistry and Molecular Biology, Biomedical Sciences, Cell, Molecular and Developmental Biology, Entomology, Environmental Sciences, Environmental Toxicology, Evolution, Ecology, and Organismal Biology, Genetics, Genomics and Bioinformatics, Geology, Mathematics, Microbiology, Nematology, Neuroscience, Plant Biology, Plant Pathology and Statistics. The Center’s staff can assist you with class registration, program requirements, Graduate Division policies, and fellowship and employment matters (TA/GSR). You will deal most often with the staff member who supports your graduate program, but please feel free to contact any Center staff member when your Student Affairs Officer is unavailable.

**CENTER STAFF MEMBERS**

**Kathy Redd**, Director and Student Affairs Officer – manages the operation of the Center and is the primary contact for the Cell, Molecular, and Development Biology graduate programs.
E-mail kathy.redd@ucr.edu
Phone: 951-827-5621

**Deidra Kornfeld**, Assistant Director and Student Affairs Officer - is the primary contact for the Genetics, Genomics and Bioinformatics and Mathematics graduate programs.
E-mail deidra.Kornfeld@ucr.edu
Phone: 951-827-7378

**Melissa Gomez**, Assistant Director and Student Affairs Officer - is the primary contact for the Entomology and Evolution, Ecology, and Organismal Biology graduate programs and all teaching assistant related issues.
E-mail melissa.gomez@ucr.edu
Phone: 951-827-5913

**Perla Fabelo**, Student Affairs Officer - is the primary contact for the Neuroscience, Statistics and Applied Statistics graduate programs.
E-mail perla.fabelo@ucr.edu
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**John Herring**, Student Affairs Officer – is the primary contact for the Biomedical Sciences, Environmental Sciences and Geology graduate programs.
E-mail john.herring@ucr.edu
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**Dawn Loyola**, Student Affairs Officer – is the primary contact for the Biochemistry and Molecular Biology and Environmental Toxicology graduate programs.
E-mail dawn.huffman@ucr.edu
Phone: 951-827-4116

**Jamy Yang**, Student Affairs Officer – is the primary contact for the Microbiology, Plant Biology and Plant Pathology graduate programs.
E-mail jammy.yang@ucr.edu
Phone: 951-827-5688
GRADUATE DIVISION REQUIREMENTS
For information on specific Graduate Division requirements, please refer to the Graduate Studies section of the University of California, Riverside General Catalog; and to the Graduate Division’s web site. That address is: http://www.graddiv.ucr.edu/GSHndbk.pdf

GRADUATE STUDENT ASSOCIATION
All graduate students are automatically members of the Graduate Student Association (GSA), which seeks to represent their views and promote their interests with the faculty and administration, both at the campus level and system wide. They are responsible for negotiating and reviewing healthcare insurance coverage. Their Grievance Mediation Officer acts as an advocate on grievance matters. It also administers the Minigrant Program, to provide travel grants to graduate students who represent GSA at professional conferences. For a more detailed description of GSA activities and services, call (951) 827-3740 or visit their website at http://www.gsa.ucr.edu/

UCR GRADUATE COMMUNITY COURSE/ILEARN
You will be enrolled in the UCR Graduate Community course through ILearn. This course is used to post announcements regarding funding opportunities, campus workshops and events pertinent to graduate students. The discussions boards are also available, including a "student exchange" where you can post items for sale or rooms for rent, etc.

R'MAIL ACCOUNTS
When you enroll at UCR you are automatically assigned a UCR R’Mail account on the Student server. Along with your account you will also receive an electronic generated login name. You cannot change your login name; it will stay the same throughout your time at UCR. However, you may choose to change your password at your own discretion. (Changes in your password will not affect your email address nor will they alter the URL of your home page.) Your initial password is your Permanent PIN number. If you forget it you can go to the Registrar’s Office. However, we strongly recommend that you change your password as soon as possible. Occasionally, passwords are stolen and the amount of damage that can be done from a stolen password is considerable. If your password is your Permanent PIN number, the amount of damage increases greatly, because your academic information and financial aid records may also be accessed.

The University requires that you read your UCR web mail account regularly. The University and Graduate Student Affairs Officers use e-mail to remind students of important deadlines or to pass on important messages.

MAILBOXES
Ask your graduate assistant about the location of your mailbox. Find out now where it is and check it daily.

COMPUTER ACCESS AND OFFICE SPACE
Ask your Graduate Student Affairs Officer about computer access. Some programs provide offices for their graduate students, some only desk space in a lab. If your program does not have a computer room, there are computer labs on campus that you are free to use. Find out now what’s available to you.
LABORATORY SAFETY TRAINING
As an employee of the University, you are required to attend Lab Safety Training provided by Environmental Health & Safety (EH&S). Please enroll in a session via their online website: http://www.ehs.ucr.edu/. If you have questions or problems enrolling, please contact the EH&S office at 951-827-5528. Please attend this training as soon as possible. Some graduate students will need to attend additional training depending on their research project.

UCR IDENTIFICATION CARD
The UCR Card is a multi-functional Campus ID card. It is the Official photo ID of UCR and it provides you with Library privileges as well as access to the Sports Recreation Complex.

Photos are taken at the UCR Card office which is located at the HUB, Suite 249, for a fee of $25. The UCR Card office hours are from 9:00am – 4:00pm Monday through Friday. Bring a valid form of ID, such as a driver’s license or passport. Appointments can be made, but are not necessary.

Students: The cost of your card is billed directly to your campus (GROWL) student account, so you do not need to bring cash. For information on optional UCR card services see: http://www.ucrcard.ucr.edu/

ESTABLISHING CALIFORNIA RESIDENCY
Domestic non-California resident students must establish California residency by the second year of study. Students should start planning for this as soon as they arrive. For more information, please go to the Graduate Division website: http://graduate.ucr.edu/residency_status.html

ENROLLMENT
It is the student’s responsibility to initially enroll in courses and to confirm course enrollment. Failure to enroll by scheduled deadlines may result in the lapse of student status or delay financial aid.

The GROWL system is the web service for enrolling in courses. Using GROWL via the Web, students can enroll in classes, confirm course enrollment, view grades, check their financial aid, billing, degree progress, view their Student ID, change their address or PERM PIN number, update privacy restrictions, and get help via the web. On the internet go to http://www.growl.ucr.edu. To use GROWL you must enter your date of birth, Student ID number, and PERM PIN number.

THE PERMANENT PERSONAL IDENTIFICATION NUMBER
Your PERM PIN is a permanent six-digit number that is set by the Office of the Registrar once a student is admitted to the university. Your Perm Pin and Student ID number are located on your Admissions Confirmation Letter.

CHANGE OF ADDRESS
Please keep your local address and phone number current. Let your Graduate Student Affairs Officer know when you move. You must update your addresses (local, billing, next of kin) in GROWL.
INFORMATION FOR TEACHING ASSISTANTS (TAs)
Teaching Assistant Development Program

UCR has a long history as a distinguished teaching campus and regards Teaching Assistant (TA) training as a crucial part of graduate instruction. TA orientation is required of TAs in all departments. It is offered every fall during the first week of the quarter. Focus workshops are required of all Teaching Assistants who scored a 4.0 or below on any single question on their Teaching Evaluations. Students who score low on their "overall effectiveness as a TA” question must be observed in class by a Mentor TA and prepare an Action Plan for improvement. Students who score low on their English language skills must attend a communication workshop and schedule six half hour sessions to use language software in the TADP Office. Registration is available on the TADP home page beginning Monday of the first full week of classes for the current quarter.

TADP provides services to the more experienced TA as well, including a teaching resource library, teaching portfolio development and assessment consultations, and seminars on professional development. Contact your department or TADP (951-827-3386, tadp@ucr.edu) for further information on training requirements and upcoming seminars. You may also visit their website: http://www.tadp.ucr.edu/

The SPEAK EXAM (TOEFL Academic Speaking Test)
To be appointed a TA, any student whose native language is not English must pass an English proficiency exam. This includes not only international students but also any student whose first language is not English. The SPEAK exam is scheduled by the International Education Programs in University Extension approximately two weeks before the beginning of every quarter.

Those who score a conditional pass can be appointed as a TA but are required to participate in the appropriate English language classes at the Extension Center and retake the test. Individuals in this range may be appointed as TAs for up to two quarters on a probationary basis with the approval of the Graduate Dean. For those students within the probationary range, a determination of their continuing eligibility to serve as TAs will be made by the Graduate Dean on the basis of:

- Departmental recommendation, including an assessment of the student’s academic ability;
- Student teaching evaluations;
- Other evidence of commitment to/performance in teaching (e.g., faculty evaluations or statements of support, videotapes);
- Evidence of a good-faith effort to improve English skills; and Relative proximity to the level of competence represented by a clear pass.

GRADUATE STUDENT FINANCIAL ASSISTANCE
Funding Sources
Graduate Students are supported from a variety of sources. Here is information on the various types of funding and definitions of the commonly-used acronyms:

Graduate Division Stipend: Usually awarded as part of a larger fellowship package, these dollars go directly from Graduate Division to the student through the Financial Aid
The student receives "pay checks" at the beginning of each quarter starting in late September (for the October 1 stipend check).

**Graduate Student Researcher (GSR):** An employment title for graduate students conducting research (either independent or directed). Students may not be appointed at more than 49% during the academic year. During academic breaks and the summer a student may be employed up to 100%.

GSR appointments at 25% or more during the academic year are entitled to GSHIP and PFR (see below). Financial support for GSR employees is provided by faculty extramural grants and departmental general funds. Students are paid in arrears (just like other university employees) and receive their first check after their first month of work. (I.e. a student who begins work in fall quarter does not get a check until November 1)

**Teaching Assistant (TA):** Also known as Academic Student Employee (ASE). This employment title is for graduate students who are teaching part of a course (normally labs or discussion sections) under the guidance of a faculty member/instructor. Students may not be appointed at more than 50% during the academic year. If they are appointed at 25% or more time during an academic quarter, they are entitled to GSHIP and PFR (see below). There are many rules that are associated with this title now that there is an employee contract. See the United Auto Workers Union Contract for more information. TA funds are distributed to the Departments by the CNAS Dean's Office. Students are paid in arrears (just like other university employees) and receive their first check after their first month of work. (I.e. a student who starts work in fall quarter does not get a check until November 1)

**Partial Fee Remission (PFR):** Students who are appointed at 25% or more time during an academic quarter as a GSR or TA are entitled to PFR. This entitlement pays part (but not all) of the students' mandatory university fees. The Graduate Student Affairs Officer provides Graduate Division with a list of the students who are eligible for this entitlement before the student bills are printed. If an award is placed on the system after bills are printed, the student's bill will not reflect the correct fees they owe.

**Graduate Student Health Insurance (GSHIP):** Students who are appointed at 25% or more time during an academic quarter as a GSR or TA are entitled to have their GSHIP fees paid for them. The Graduate Student Affairs Officer provides Graduate Division with a list of the students who are eligible for this entitlement before the student bills are printed. If an award is placed on the system after bills are printed, the student's bill will not reflect the correct fees they owe. The actual dollar amount of GSHIP changes as the insurance prices change from year to year. Students who have private Health Insurance comparable to the University's coverage can apply for waivers of the GSHIP fees. If a student has comparable health insurance coverage s/he may apply for an exemption of the GSHIP premium by filing the appropriate paperwork with the Health Center. Deadline dates for petitioning for exemption from GSHIP are firm. Contact the Student Health Insurance coordinator at (951) 827-5683 or (951) 827-3031 for information.

**Non-Resident Tuition Remission (NRT or NRTR):** Non-residents of California (either Domestic or International) who are appointed at 45% or more as a GSR are entitled to have their Non-Resident Tuition paid for them. The Graduate Student Affairs Officer provides Graduate Division with a list of the students who are eligible for this entitlement before the student bills are printed. If an award is placed on the system after bills are
printed, the student's bill will not reflect the correct fees they owe. International Students cannot ever establish residency and will owe Non-Resident Tuition for their entire student careers. (However, when a student Advances to Candidacy, his/her Non-Resident Tuition is reduced to 0% for a period of nine quarters.) Domestic non-resident students must establish California residency by the second year of study. You must petition in person at the Office of the Registrar, Student Services Building, for a change of classification from nonresident to resident status. All changes of status MUST be initiated before the first day of classes for the term for which you intend to be classified as a resident. Students planning to file for residence status after their first year should talk with the Residence Deputy well before the appropriate residence determination date, preferably during their first few weeks in California.

**Fee Differential:** This is the left-over university mandatory fee amount for a student with a PFR and GSHIP and NRTR entitlements. This dollar amount changes as GSHIP and PFR go up. Most students are required to pay this.

**Departmental Grant In Aid (DGIA):** Departments or individual faculty members with unrestricted funds (many federal grants will not allow payment of student fees) can grant fellowship-like awards to individual students. This is most often used to pay the student's Fee Differential. The Graduate Student Affairs Officer provides Graduate Division with a list of the students who are to receive these awards indicating the account and fund information. Graduate Division then pulls the money out of the account and awards it to the student through the Financial Aid System.

**CAMPUS FUNDING**

**Graduate Diversity Programs**

**Dissertation-Year Fellowships**

The Dissertation-Year Fellowship Program provides financial support during the final year of dissertation work. Recipients must demonstrate high potential, promise and the desire for an academic career. Faculty mentors assist fellows in acquiring skills necessary to become candidates for faculty positions at major universities. Support is also provided to enable fellows to present their research at other UC and CSU (California State University) campuses.

Students may be nominated for the following fellowships:

1. Graduate Research Mentorship Programs (GRMP)
2. Dissertation-Year Fellowship Awards (DYFA)

For more information on Graduate Diversity Programs, contact the Director, Maria Franco-Aguilar at (951) 827-3680 or e-mail maria.franco-aguilar@ucr.edu

**RESEARCH GRANTS**

**Dissertation Research Grants**

Dissertation Research Grants provide funds to doctoral candidates for research expenses associated with the dissertation. Applicants must be advanced to candidacy and plan to be registered during the period of the award. These funds may not be used for preparing the dissertation copy or as a stipend for personal support.

Deadlines to apply for Dissertation Research Grant funding are usually in October, January, and April. The Graduate Division sends announcements by email with deadlines and application instructions.
**Graduate Student Association Mini-grants**
Graduate Student Association Mini-grants help to meet the financial needs of students who have been invited to present scholarly papers or posters at regional and national professional conferences. The program is administered by the Graduate Student Association and requires that departments agree to provide matching funds.

**OTHER SOURCES OF FUNDING**

* California Student Aid Commission Home Page: http://www.csac.ca.gov/

* Fellowship Office National Research Council:
  http://www.nas.edu/subjectindex/fel.html

* Financial Aid Information Page: http://www.finaid.org
  (check FASTWEB)

* National Science Foundation: http://www.nsf.gov/

* U.S. Department of Education Student Guide, Financial Aid:

* The Foundation Center's Home Page: http://www.fdncenter.org/

* Purdue University (includes general listings): http://www.purdue.edu/DFA/

For more information contact Karen Smith at (karen.smith@ucr.edu) with the UCR Graduate Division.

**Extramural Support**
There are many opportunities for Graduate Students from outside funding sources from federal agencies and private foundations. UCR subscribes to several searchable databases listed on the Office of Research Affairs web site at www.ora.ucr.edu: UCLA also offers a comprehensive database called GRAPES (Graduate and Post doctorate Extramural Support). The web address is http://www.gdnet.ucla.edu/grpinst.htm

**TAX INFORMATION FOR GRADUATE STUDENTS**
Teaching Assistantships, Research Assistantships, and Fellowships are considered taxable income. Refer to the UCR Graduate Student Handbook for more information. Each year the Rivera Library and the Graduate Division have IRS publication materials available to students.
International students should visit the International Education Center website for information about tax workshops and filing help.