

PLANT BIOLOGY GRADUATE GROUP DEGREE REQUIREMENTS

Revised: revised by PBGG EPC 6/2010, approved by PBGG 9/ 2010
Graduate Council Approval: March 4, 2011

MASTER'S PROGRAM

1. Admissions Requirements

For admission into the M.S. degree program, a level of scholastic development equivalent to that of a Bachelor's degree in biological sciences from a recognized college or university is required. An applicant must have a minimum 3.0 GPA to be considered for admission. The applicant must submit one official transcript for each school attended, three letters of recommendation and GRE scores taken within the last 5 years. A GRE subject test is recommended, but not required. TOEFL or IELTS scores are also required if the applicant's native language is not English or if prior instruction has not been in English; applicants must meet the minimum scores required by the Office of Graduate Studies. Admission is for the following fall quarter only.

- a) **Prerequisites:** Preparation should be substantively equivalent to courses offered at UCD, as indicated by the example courses below.

Subject

Biology 3-Qtrs/2-Sem
Inorganic Chemistry, 3-Qtrs/2-Sem
Organic Chemistry, 2-Qtrs/2-Sem
Introductory Physics, 2-Qtrs/2-Sem
Biochemistry, 2-Qtrs/1-Sem
Calculus, 2-Qtrs/1-Sem
Introductory Statistics, 1-Qtr/1-Sem
Genetics, 1-Qtr/1-Sem
Intro. Plant Physiology 1-Qtr/1-Sem
Cell & Mol. Biology, 1-Qtr/1-Sem
Ecol., Systematics & Evolution, 1-Qtr/1-Sem
Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent

Biological Science BIS 2A, B and C
Chemistry CHE2A, B, and C
CHE 8A and B
Physics PHE 7A and B
BIS 102 and 103
Mathematics MAT 16A and B
Statistics STA100 or Plant Sciences PLS 120
BIS 101
Plant Biology PLB 111 or 112
PLB 113 or BIS 104
Evolution and Ecology EVE 100, 140,
141, PLB 108 or 117
PLB 105

- b) **Deficiencies:** Deficiencies can be made up after admission to the graduate program, preferably during the student's first year. The student's Graduate Adviser is responsible for identifying and communicating to the student the courses that must be taken to fulfill deficiencies. Courses taken to fulfill a deficiency cannot be taken S/U unless the courses are approved as exceptions by Graduate Council (there are no current exceptions on file). A course taken to fulfill an undergraduate deficiency cannot be used to complete specific degree requirements.

2. Plans of Study for an M.S. Degree in Plant Biology

Plan I. This plan requires a minimum of 32 units of upper division (100 level) and graduate (200 level) coursework, a written thesis, and an oral presentation of the thesis research. A maximum of 3 units of research (299) may be applied toward the total unit requirement. The oral presentation of the thesis research will be held as a public seminar (also called an exit seminar), and, when scheduling allows, will be given during the Tuesday student seminar series (Plant Biology 291).

Plan II. This plan requires a minimum of 36 units of upper division (100 level) and graduate (200 level) coursework, a comprehensive final examination, and a written report.

3) Course Requirements - Core and Electives

The M.S. degree will be specialized in one of four areas of Plant Biology: (a) Cell and Developmental Biology; (b) Environmental and Integrative Biology; (c) Molecular Biology, Biochemistry and Genomics; or (d) Systematics and Evolutionary Biology. Students are required to choose an area of specialization and change in this area is subject to approval by a Master Advisor in writing or via email. The area of specialization will determine which electives are taken.

a) Core Courses:

Plan I (15 units)	Plan II (15 units)
PBI 200A Core Course Series –Fall Quarter (5 units)	
PBI 200B Core Course Series –Winter Quarter (5 units)	
PBI 200C Core Course Series –Spring Quarter (5 units)	

b) Specialization Requirements :

Plan I (minimum 6 units)	Plan II (minimum 9 units)
Two upper division or graduate courses (100 or 200 level) totaling at least 6 units, chosen from the courses designated in the student's specialization area (see Appdx 1).	Three upper division or graduate courses (100 or 200 level) totaling at least 9 units, chosen from the courses designated in the student's specialization area (see Appdx 1).

**For both plans, other courses may be substituted with the approval of the Graduate Adviser.*

c) Seminar Requirements:

Plan I (8 units minimum)	Plan II (8 units minimum)
First Year: PBI 292 (1 unit ea/3 units total) Fall, Winter, Spring	
First Year→Graduation: PBI 290B (1 unit ea/3 units minimum)	
Fall, Winter, Spring first year and second year or Fall, Winter, Spring first year and then second year until graduation	
First Year→Graduation: PBI 291 (1 unit ea/2 units minimum)	
Fall, Winter, Spring first year and second year or Fall, Winter, Spring first year and then second year until graduation	

Second Year → Graduation: PBI 290A (1 unit ea)
 Fall, Winter, Spring first year and second year or Fall, Winter, Spring first year and then second year until graduation

Students may request exception to the seminar requirements if there is a scheduling conflict with a specialization course that is also required. Such requests are subject to approval by the student's Graduate Advisor.

d) Research Unit Requirements:

Plan I (maximum 3 units)	Plan II (minimum 4 units)
PBI 299 (3 units)	PBI 299 (4 units)

e) Coursework Summary:

Plan I	Plan II
Core Courses: 15 units Specialization Courses: 6 units Seminars: 8 units minimum Research Courses: 3 units of PBI 299	Core Courses: 15 units Specialization Courses: 9 units Seminars: 8 units minimum Research Courses: 4 units of PBI 299
Total minimum units: 32	Total minimum units: 36

Both Plan I and II students: No single course may be used to satisfy more than one degree requirement (for example, the same course cannot be used to fulfill an undergraduate deficiency and satisfy the elective course requirement). All courses taken to fulfill degree requirements for which a letter grade is offered must be taken for a grade (and not Passed/Not Passed or Satisfactory/Unsatisfactory). A grade of C- or better is required to satisfy the degree requirement for an advanced undergraduate level (100) course and a grade of B- or better is required to pass a graduate (200) level course. Please note for a full time student that a minimum course load is 12 units each academic quarter. Per UC regulations, students cannot enroll in more than 12 units of graduate level coursework (200) or more than 16 units of combined upper division and graduate level coursework (100, 200, 300) per quarter.

4) Special requirements:

Plan I	Plan II
In addition to an approved thesis, students must present an exit seminar on their thesis research; this will typically occur in the Tuesday student seminar series (PBI 291) in the quarter prior to graduation.	In addition to passing the comprehensive examination, students must complete a written report (10 pages minimum, double spaced, 12 pt font, not including references and tables or figures), the subject matter of which must be approved by the Master's Examination Committee prior to the writing of the report.

5) Committees:

a) Admission Committee

Once the completed application, all supporting material, and the application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of at least four Plant Biology Graduate Group faculty and one Plant Biology Graduate Group student. Based on a review of the entire application and consultation with graduate group faculty, a recommendation is made to accept or decline an applicant's request for admission. That recommendation is forwarded to the Dean of Graduate Studies for final approval of admission. Notification of admissions decisions will be sent by the Office of Graduate Studies.

b) Thesis Committee (Plan I)

The student, in consultation with his/her Major Professor and Graduate Adviser, nominates two Plant Biology Graduate Group faculty in addition to the major professor to serve on the thesis committee. These nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy, typically in the 5th quarter.

c) Comprehensive Examination Committee (Plan II)

The student, in consultation with his/her Graduate Adviser, will submit nominations of three faculty members to serve on the Comprehensive Examination Committee to the Master Adviser. Nominations are typically submitted in the 4th quarter. One member on the committee must be from the student's area of specialization. Neither the faculty member who served as the instructor in charge of the 299 units, nor others deemed to have a conflict of interest with the student or the major professor (for example, close collaborators), shall serve on the committee. A committee member from the student's area of specialization will normally serve as chair.

The Master Adviser may appoint the comprehensive exam committee either:

1. At the Adviser Meeting held in Winter quarter, in conjunction with the PhD QE Committee assignments; or
2. At any time during the academic year as is necessary, in consultation with the student's Graduate Adviser.

6) Advising Structure and Mentoring

Each student will be assigned a **Graduate Adviser** from the PBGG. The student is expected to meet with the Graduate Adviser before the first, and during the third and fourth quarters. During the first quarter meeting, the Graduate Adviser will assist with coursework and career planning. The purpose of the third quarter meeting will be to evaluate progress (via the student progress report) and discuss future coursework. The fourth quarter meeting will verify the completion of coursework and will discuss the completion of capstone requirements; additionally, students will submit nominations for their thesis or comprehensive examination committees during this fourth quarter meeting.

The **Major Professor** is the Thesis Committee Chair, and directs the student's research in 299 coursework. The **Master Adviser** is a PBGG faculty member who has been appointed to serve as a resource for other advisers, and who approves the nomination of thesis committees,

and approves the membership of comprehensive examination committees. The **Graduate Program Staff** assists students in identifying appointments and is a resource for information on general program requirements and university policies. The **Mentoring Guidelines** can be found at: <http://biosci3.ucdavis.edu/GradGroups/PB/People/mentoringguidelinesapproved6-24-99.pdf>

7) Advancement to Candidacy

Every student must file an official application for Candidacy for the Degree of Master of “Plant Biology” after completing one-half of their course requirements and at least one quarter before completing all degree requirements; this typically in the 5th quarter of enrollment. The Candidacy for the Degree of Master form can be found online at: <http://www.gradstudies.ucdavis.edu/forms/>. A completed form includes a list of courses the student will take to complete degree requirements. If changes must be made to the student’s course plan after s/he has advanced to candidacy, the Graduate Adviser must recommend these changes to the Office of Graduate Studies. Students must have their Graduate Adviser and thesis committee chair sign the candidacy form before it can be submitted to the Office of Graduate Studies. If the candidacy is approved, the Office of Graduate Studies will send a copy to: the appropriate graduate staff person, and the student; the thesis committee chair will also receive a copy, if applicable. If the Office of Graduate Studies determines that a student is not eligible for advancement, the department and the student will be told the reasons for the application’s deferral. Some reasons for deferring an application include: grade point average below 3.0, outstanding “I” grades in required courses, or insufficient units.

8) Thesis and Comprehensive Examination Requirements

a) **Thesis Requirements (Plan I)**

At the time of the thesis is submitted, the student must have advanced to candidacy and be registered or on filing fee. The student will conduct original research in the laboratory of a faculty member who will serve as sponsor for the 299 research units and as chair of the thesis committee, also referred to as the Major Professor.

The thesis committee will pass on the merits of the thesis. The thesis will include original research conducted by the student. The thesis should show the student's ability to identify research questions, develop and test hypotheses, and reach a well-justified conclusion. The research should be of publishable quality in a peer-reviewed journal but be not as extensive as a PhD dissertation.

The student must present an exit seminar on his/her thesis research (usually in the Tuesday student seminar series, PB291), during their last quarter of residence.

b) **Comprehensive Examination (Plan II)**

At the time of the examination, the student must have advanced to candidacy and be registered or on filing fee. The comprehensive examination is an oral examination that should not exceed three hours in length. The oral exam must cover general plant biology, the student's area of specialization and at least one additional area.

In consultation with the student's Graduate Adviser, the student will choose the additional area (see Appendix 1 for suggested topics) and submit it along with suggested faculty members to serve on the examination committee to the Master Adviser. The additional area must be approved by the Master Adviser.

The results of the examination are submitted to the Office of Graduate Studies using the Master's Report Form. The outcome of the examination is either a pass, not pass or fail. If the decision is a not pass, then the student may be re-examined one additional time, with the approval of their Graduate Adviser. The outcome of the second examination can only be either a pass or fail. A student who receives a fail on the first or second attempts, will be recommended for disqualification by the Dean of Graduate Studies.

9) Normative Time to Degree

The Normative Time to Degree for the M.S. program is six quarters (two years).

10) Typical Time Line and Sequence of Events

Plan I

Year 1:

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 200A	PBI 200B	PBI 200C
PBI 291	PBI 291	
PBI 292	PBI 292	PBI 292
PBI 290B	PBI 290B	PBI 290B
PBI 299	PBI 299	PBI 299
	Elective (any quarter)	

Year 2:

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 290A	PBI 290A	PBI 290A
PBI 290B	PBI 290B	PBI 290B
PBI 291	PBI 291	
PBI299	PBI 299	PBI 299
Elective	advancement to candidacy	submission of thesis and exit seminar

Plan II

Year 1:

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 200A	PBI 200B	PBI 200C
PBI 291	PBI 291	
PBI 292	PBI 292	PBI 292
PBI 290B	PBI 290B	PBI 290B
PBI 299	PBI 299	PBI 299
	Elective	Elective

Year 2:		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 290A	PBI 290A	PBI 290A
PBI 290B	PBI 290B	PBI 290B
PBI 291	PBI 291	
PBI 299	PBI 299	PBI 299
Elective	advancement to candidacy	comprehensive exam

11) Sources of funding.

MS students are not generally provided with financial support by the graduate group. MS students may be funded by TAs and/or GSRs.

12) PELP, In Absentia and Filing Fee status.

Information about PELP (Planned Educational Leave), In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications/>

Ph.D. PROGRAM

1) Admissions Requirements

For admission into the PhD degree program, a level of scholastic development equivalent to that of a Bachelor's degree in biological sciences from a recognized college or university is required. An applicant must have a minimum 3.0 GPA to be considered for admission. The applicant must submit one official transcript for each school attended, three letters of recommendation and GRE scores taken within the last 5 years. A GRE subject test is recommended, but not required. TOEFL or IELTS scores are also required if the applicant's native language is not English or if prior instruction has not been in English; applicants must meet the minimum scores required by the Office of Graduate Studies. Admission is for the following fall quarter only.

Students in the Plant Biology Graduate Group work closely with a particular faculty member on a significant research project. Students may enter the program uncommitted to a major professor and do laboratory rotations (typically during the first two quarters). Alternatively, students can be admitted under the sponsorship of a major professor. International students may be required to identify a major professor prior to admission into the program. Applicants are encouraged to correspond directly with faculty members whose research interest correspond with their own.

- a) **Prerequisites:** Preparation should be substantively equivalent to courses offered at UCD, as indicated by the example courses below.

Subject

Biology 3-Qtrs/2-Sem
Inorganic Chemistry, 3-Qtrs/2-Sem
Organic Chemistry, 2-Qtrs/2-Sem
Introductory Physics, 2-Qtrs/2-Sem
Biochemistry, 2-Qtrs/1-Sem
Calculus, 2-Qtrs/1-Sem
Introductory Statistics, 1-Qtr/1-Sem
Genetics, 1-Qtr/1-Sem
Intro. Plant Physiology 1-Qtr/1-Sem
Cell & Mol. Biology, 1-Qtr/1-Sem
Ecol., Systematics & Evolution, 1-Qtr/1-Sem
Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent

Biological Science BIS 2A, B and C
Chemistry CHE2A, B, and C
CHE 8A and B
Physics PHE 7A and B
BIS 102 and 103
Mathematics MAT 16A and B
Statistics STA100 or Plant Sciences PLS 120
BIS 101
Plant Biology PLB 111 or 112
PLB 113 or BIS 104
Evolution and Ecology EVE 100, 140,
141, PLB 108 or 117
PLB 105

- b) **Deficiencies:** Deficiencies can be made up after admission to the graduate program, during the student's first year. The student's Graduate Adviser is responsible for identifying and communicating to the student courses that must be taken to fulfill deficiencies. Courses taken to fulfill a deficiency cannot be taken S/U unless the courses are approved as exceptions by Graduate Council (there are currently no exceptions on file). A course taken to fulfill an undergraduate deficiency cannot be used to complete specific degree requirements.

2) **Dissertation Plan**

The Plant Biology Graduate Group operates under Plan B, as described in the Davis Division Regulation 520(C). Plan B specifies a three member (minimum) dissertation committee, a final oral examination (decision to hold at the discretion of the Dissertation Committee on an individual student basis), and an exit seminar is required of all candidates.

Candidate in Philosophy Degree.

A student who has advanced to candidacy for the Doctor of Philosophy degree may need to or choose to leave the program. Such a student may petition the PBGG program for receipt of a Candidate in Philosophy (C.Phil.) degree. To be eligible for this degree, the student must be in good standing and possess the intellectual capacity to complete the requirements for the Ph.D. To receive this degree, the student must make a written request to the PBGG Chair, indicating his/her progress in dissertation research and the circumstances surrounding his/her decision to leave the program. If approved by the PPGG Chair, the Chair will then write a letter in support of the request to the Office of Graduate Studies. Graduate Studies has the authority to approve the request. This degree cannot be awarded to students who remain in the program, only those that will leave the program, and no students will be admitted with the C. Phil as a degree objective. A student choosing this option is eligible to return to the program and complete his/her degree.

3) **Course Requirements (40 units minimum)**

The student will complete his/her degree in one of 4 areas of specialization in (a) Cell and Developmental Biology; (b) Environmental and Integrative Biology; (c) Molecular Biology, Biochemistry and Genomics; or (d) Systematics and Evolutionary Biology. The area of specialization determines the nature of the student's elective coursework and the topics covered in the qualifying examination. The student chooses his/her area of specialization. A change in a student's area of specialization requires Master Adviser approval (the student submits a written email request to the Master Adviser).

a) Core Courses (15 units total):

PBI 200A Core Course Series –Fall Quarter (5 units) **taken the first year*

PBI 200B Core Course Series –Winter Quarter (5 units) **taken the first year*

PBI 200C Core Course Series –Spring Quarter (5 units) **taken the first year*

b) Required Seminars (16 units):

3 units of PBI 292 (1 unit each) - Fall, Winter, Spring of the first year

3 units of PBI 290A (1 unit each) - Fall, Winter, Spring of the second year

6 units of PBI 290B (1 unit each) Fall, Winter, Spring of both the first and second years

4 units of PBI 291 (1 unit each) – Fall and Winter of both the first and second years

Taking both PBI291 and PBI290A each quarter in the first two years is mandatory. However, an exception may be made if there is a conflict with another especially important class (e.g., the one taken to satisfy the specialization requirement), upon approval by the student's Graduate Adviser.

c) Courses in Specialization Area (9 units):

A minimum of three additional courses (for a minimum of 9 units), taken from the student's specialization area course list (see Specialization Course Lists). Alternatively, a student may take two courses from the course list for their area of specialization and one course not on the list. All courses must be approved by the Graduate Adviser.

The expectation is that all three courses will be at the graduate level; however, one of the three may be an upper division undergraduate course from the course lists upon approval by the student's Graduate Adviser.

d) Summary

No single course may be used to satisfy more than one degree requirement (for example, the same course cannot be used to fulfill an undergraduate deficiency and satisfy the elective course requirement). All courses taken to fulfill degree requirements for which a letter grade is offered must be taken for a grade (and not Passed/ Not Passed or Satisfactory/ Unsatisfactory). A grade of C- or better is required to satisfy the degree requirement for an advanced undergraduate level (100) course and a grade of B- or better is required to pass a graduate (200) level course.

40 units are required at a minimum: 15 units of core courses, 9 units of specialization/elective courses, and 16 units of seminar courses. A minimum course load is 12 units per quarter. Per UC regulations, students cannot enroll in more than 12 units of graduate level coursework (200) or more than 16 units of combined upper division and graduate level coursework (100, 200, 300) per quarter.

4) Special Requirements

As part of their annual evaluation of progress, students after they advance to candidacy are required to present at least one oral presentation on their dissertation work at the Tuesday noon seminar series (PBI 291). This "in progress" seminar is in addition to the required exit seminar (which is given following completion of their dissertation research). Typically, the "in progress" presentation will occur in the students' third or fourth year, more than a year before completion of the dissertation. Students may present more than one time. An additional objective of this requirement is to provide students with an opportunity to practice giving oral presentations on their own area of research and practice placing their work in the broad context of plant biology research. In addition, it is expected that the students' dissertation committee members will attend this seminar to assess the students' research progress as part of their annual evaluation. These presentations do not require completion of a large body of work. The expectation is that students present the background of the research problem, the questions asked, approaches taken, the results obtained to date and future experiments to be undertaken.

In addition, all advanced students are encouraged to regularly attend these seminars to learn about other research on campus and to learn to evaluate their peers' presentations and research. The Tuesday noon seminar series is also reserved for the exit seminar. All students are required to present their dissertation work through a public exit seminar, and it is highly recommended that they present in this course, but not required.

5) **Committees**

a) **Admissions Committee**

Once the completed application, all supporting material, and the application fee have been received, the application will be submitted to the Admissions Committee. The Admissions Committee consists of at least four PBGG faculty and one PBGG student. Based on a review of the entire application and consultation with graduate group faculty, a recommendation is made to accept or decline an applicant's request for admission. That recommendation is forwarded to the Dean of Graduate Studies for final approval of admission. Notification of admissions decisions will be sent by the Office of Graduate Studies.

b) **Qualifying Examination Committee**

The student, in consultation with his/her Major Professor and Graduate Adviser, nominates five faculty to serve on the Qualifying Examination Committee, and chooses two areas of plant biology outside their specialization area for examination. Neither the Major Professor nor others deemed to have a conflict of interest with the student or the Major Professor (for example, close collaborators) shall serve on the committee. A PBGG faculty with expertise in the specialization area will serve as Chair of the committee. Two members will examine in one of the two additional areas, one member will examine in general plant biology and one member and the chair will examine in the specialization area. The student nominates a first and second choice for each of the members, including the chair. These nominations are submitted to the Master Adviser. At a meeting of all the advisers, typically in the winter quarter, the nominations for qualifying examination committee are generated. These nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy.

PBGG has been approved for an exception to the policy requiring a member outside of the graduate group on the PBGG qualifying examination committees, so all qualifying examination committee members may be from the PBGG membership (approved by the Graduate Council in July 2006).

c) **Dissertation Committee**

After successful completion of the qualifying examination, the student is eligible for advancement to candidacy. In consultation with the Major Professor and Graduate Adviser, the student nominates two faculty members to serve on the dissertation committee; the third member and Chair is the Major Professor. These nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council policy. The dissertation committee will advise the student on the dissertation research and pass on the merits of the dissertation. The PBGG group requires yearly dissertation committee meetings.

6) **Advising Structure and Mentoring**

Each student has a **Graduate Adviser** who serves as an adviser in planning the coursework program, approves the program of study, and is a resource for information on academic requirements, policies and procedures, and registration information. The student is expected to meet with the Graduate Adviser before the first, and during the third and fourth quarters. During the first quarter meeting, the Graduate Adviser will assist with coursework

and career planning. The purpose of the third quarter meeting will be to evaluate progress (via the student progress report) and discuss future coursework. The fourth quarter meeting will verify the completion of coursework and will discuss qualifying examination requirements and issues; additionally, students will submit nominations for their qualifying examination committees during this fourth quarter meeting.

The **Major Professor** is the faculty member who supervises the student's research and dissertation; this person serves as the Chair of the Dissertation Committee. The **Master Adviser** is a resource for other Graduate Advisers and oversees the nominations of faculty to serve on examination committees. The **Graduate Program Staff** assists students in identifying appointments, and is a resource regarding program policies and requirements, and general university policies. In addition, to assist student in defining mentoring responsibilities, a **Mentoring Guideline document** can be found at <http://biosci3.ucdavis.edu/GradGroups/PB/People/mentoringguidelinesapproved6-24-99.pdf>.

7) Advancement to Candidacy

The student is eligible for Advancement to Candidacy after successful completion of all graduate program degree requirements, must have maintained a 3.0 GPA in all coursework (except those courses graded S/U), and after passing the Qualifying Examination; this is typically in the 7th quarter. The student must file the appropriate paperwork with the Office of Graduate Studies and pay the candidacy fee in order to be officially promoted to Ph.D. Candidacy.

According to university policy, a graduate student cannot hold an academic title (e.g., GSR/TA/AI) for more than 9 quarters before passing their Qualifying examination. After passing the Qualifying Examination, the student is eligible for advancement to candidacy and should complete the paperwork promptly. The expectation is that advancement to candidacy will occur within one month after successful passing of the Qualifying examination. The student, after consultation with his/her Major Professor and Graduate Adviser, selects member of the dissertation committee and submits their names to Graduate Studies for approval.

8) Qualifying Examination and Dissertation Requirements:

a) Qualifying Examination

1. General Information on the QE: PBGG students are required to pass an oral qualifying examination before being advanced to candidacy for the Ph.D. in Plant Biology. The QE is to be held before the end of the seventh quarter in residence and after the student has completed all PBGG course requirements, which is verified by the student's Graduate Adviser.

PBGG students are strongly advised to meet with committee members to discuss their expectations for the Qualifying Examination. The purpose of the exam is (1) to evaluate the breadth and depth of the student's knowledge and understanding of Plant Biology, and (2) to assess the student's intellectual capability and preparedness for conducting a productive dissertation research, which should identify and address a significant question in Plant Biology and culminate in a dissertation of high quality.

2. The Written Component of the Qualifying Examination.

Students are required to prepare a dissertation proposal that will be evaluated by the Qualifying Examination Committee. The candidate will be expected to distribute a written dissertation research proposal to the chair of the Qualifying Examination Committee at least two weeks prior to the oral examination. If necessary, the chair may make recommendations on improving the quality of the proposal before it will be distributed by the student to the other members of the committee at least one week prior to the examination.

The purpose of the dissertation proposal is to concisely introduce, describe and justify the proposed research. The scope and format of the proposal should be similar to that of a formal application for funding (e.g., application for a doctoral fellowship). The student is expected to show mastery in scientific writing, in the critical analysis of preliminary data, and in the synthesis of information derived from the relevant literature. The dissertation research proposal (single-spaced, 12 pts font size, 1 in. margins) should be organized into five sections and should not exceed 5 pages for sections 1-4, including figures.

- (1) **General objective and specific aims.** State briefly the overall objective of your dissertation research in its broad context and list the specific aims to achieve this goal. (less than half a page).
- (2) **Background and significance.** Describe the background and rationale for your thesis research. Critically evaluate the existing knowledge relevant to your research and identify an important question or unsolved problem that your thesis research will address in order to advance the field. State concisely the significance of the proposed research and relate the specific aims to the long-term objective. (approx. one page).
- (3) **Preliminary data.** Briefly describe research that has been conducted and that is relevant to the proposal. Clearly state your contributions to this research (approx. one page).
- (4) **Experimental plan and research methods.** Outline the experimental design and the procedures to be used to accomplish the specific aims of your thesis research. Include the means by which data will be collected, analyzed and interpreted. Discuss the potential difficulties and limitations of the proposed procedures as well as alternative approaches to achieve the major objective. Provide a tentative timetable of your research. (two to three pages).
- (5) **References.** Consult a major journal in the field of plant biology and follow its style of citation. Each citation must include the names of all authors, title of the article, name of the journal or book, volume number, page numbers, and year of publication. (no more than two pages or 25 references).

3. The Oral Component of the Qualifying Examination.

The oral portion of the Qualifying Examination will consist of three parts: (1) oral presentation and defense of the dissertation research proposal, which will include a broader discussion of questions from the candidate's area of specialization; (2) an oral

examination of the candidate's knowledge in general Plant Biology, which will be conducted at a level comparable to content and depth of the undergraduate preparation for the major and of the core course curriculum; and (3) oral examination of two topics from two areas in Plant Biology that will be selected by the student and will be different from the candidate's own area of specialization. These two topics can be selected from a list of suggested topics (see Appendix 1). All topics must be approved by the advisers. This approval typically occurs at the annual advisers' meeting when QE members are nominated.

The student will prepare an oral presentation for the first part. In addition to the chalk/white board, the student may utilize visual aids to efficiently convey essential information as deemed necessary (limited to the display of information that is difficult to draw on the board). The presentation should not exceed 20 min, excluding intermittent discussions. The exam in total should not last longer than 3 hours.

4. Outcome of the Exam.

The committee will reach a decision on the student's performance and inform the student immediately after the oral exam. There are three possible outcomes of the first examination: Pass, Not Pass, and Fail. *Pass* allows the student to advance to candidacy for the Ph.D. *Not Pass* means the student is required to retake all or part of the examination or satisfy another requirement (e.g., take a specific class, assist a specific class as a TA, etc.). If requested, the second examination is to be scheduled at the earliest possible date deemed to be appropriate by the committee. The second examination will be administered by the same Qualifying Examination Committee. Only two outcomes are possible for the second examination: *Pass* or *Fail*. A *Fail* on the first or second attempt results the student being recommended for disqualification to the Dean Graduate Studies.

The Qualifying Committee should make every effort to reach a unanimous decision. Split decisions will be referred to Graduate Studies for a final decision.

b) The Dissertation

1. Exit Seminar

The Exit Seminar is a formal public presentation of the student's research before the program faculty and students. Satisfaction of the completion of the Exit Seminar is verified by the Dissertation Committee Chair, who shall not sign the dissertation until this requirement is completed. Adequate scheduling of the exit seminar is the responsibility of the student. The Tuesday noon seminar series (PBI291) is reserved for students to present the exit seminar; it is highly recommended that they present in this course, but not required.

2. Dissertation: General Requirements

Filing of a PhD dissertation with the Office of Graduate Studies is normally the last requirement satisfied by the candidate. The deadlines for completing this requirement are listed each quarter in the General Catalog, and on the Office of Graduate Studies website. A candidate must be a registered student or in Filing Fee status at the time of filing a dissertation, with the exception of the summer period between the end of the

Spring Quarter and the beginning of Fall Quarter. The dissertation will be prepared, submitted and filed according to regulations instituted by the Office of Graduate Studies.

3. Dissertation:

The research conducted by the student must be of such character as to show ability to pursue independent research. The dissertation reports a scholarly piece of work of publishable quality that solves a significant scientific problem in the field and is carried out under the supervision of a member of program while the student is enrolled in the program. The Major Professor’s laboratory is the setting for most of the student’s research activities.

Students should meet regularly with their dissertation committee. The dissertation must be submitted to each member of the dissertation committee at least one month before the student expects to make requested revisions; committee members are expected to respond within 4 weeks, not including summer months for nine month faculty. Informing committee members of progress as writing proceeds helps the members to plan to read the dissertation and provide feedback within this time frame. The dissertation must be approved and signed by the dissertation committee before it is submitted to Graduate Studies for final approval.

9) Normative Time to Degree

The normative time for completion of a Ph.D. program in Plant Biology is five years.

10) Typical Time Line and Sequence of Events

Course requirements are generally completed by the end of year (2) and the Qualifying exam is normally completed by the end of the seventh quarter.

Year 1:

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 200A	PBI 200B	PBI 200C
PBI 291	PBI 291	
PBI 292	PBI 292	PBI 292
PBI 290B	PBI 290B	PBI 290B
299 units	299 units	299 units
	Elective	Elective

Year 2:

<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
PBI 290A	PBI 290A	PBI 290A
PBI 290B	PBI 290B	PBI 290B
PBI 291	PBI 291	
PBI 299	PBI 299	PBI 299
Elective		

Year 3:

QE examination
Advancement to Candidacy
Dissertation Research (299)

Year 4-5:

Dissertation Research (299), 12 units per quarter.
Completion of Dissertation

11) Sources of funding.

Students are supported by a combination of fellowships, awards teaching assistantships and research awards to faculty.

12) PELP, In Absentia and Filing Fee status.

Information about PELP (Planned Educational Leave), In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications/>

13) Awarding of the MS Degree While Pursuing a Ph.D. Degree

A student pursuing the Ph.D. degree is eligible to obtain a Masters Degree only upon completion of all of the requirements for either the MS Plan I or Plan II program. A student who wishes to obtain a Masters and then subsequently a Ph.D. degree must either (a) pass the Ph.D. qualifying exam and submit to Graduate Studies an approved Masters thesis required of Plan I students; or (b) pass the Ph.D. qualifying exam at a level to satisfy a Masters degree comprehensive examination (Plan II) as well as have approved the 10 page (minimum) report required of Plan II students (see M.S. degree requirements). In these cases, the student fills out the appropriate MS Candidacy Form (for Plan I or Plan II). For a Plan II MS, a Plan II report form is additionally required. For Plan I MS, the student submits an approved thesis. The forms are signed by the Graduate Adviser, and in the case of the Plan II report form, additionally signed by the Chair of the QE Committee. It is the student's responsibility to submit these forms to Graduate Studies. A MS degree will be awarded and the student remains in the Ph.D. program.

At the discretion of the qualifying examination committee, a student in the Ph.D. program who has been awarded a score of "not pass" or "fail" on their examination overall may nonetheless be judged to have performed satisfactorily in the portion of the examination covering General Plant Biology, and thereby be permitted to use this examination in satisfaction of the requirement for a comprehensive examination for the Plan II Masters. In this case, three forms are required, the Change of Degree Form (from Ph.D. to MS), the MS Candidacy Form (Plan II) and the Masters Plan II report form. The approved paper required of Plan II students is also required to complete the Plan II MS degree requirements. Plan II report form has to be signed by the instructor in charge of the 299 units.

Alternatively, in the case of a "not pass" or "fail" decision for the first qualifying examination or a "fail" decision after the second qualifying examination, the QE committee may decide that the student has not satisfied the requirement for passing the comprehensive examination in the Plan II Masters program. In such cases, the student shall have the right to request appointment of a three person comprehensive masters examination committee

that will administer an examination specifically for the Plan II Masters degree. In order to receive the MS degree, the student is then required to pass the MS Plan II comprehensive exam and have the required paper approved. In this case, three forms are required, the Change of Degree Form (from Ph.D. toMS), the MS Candidacy Form (Plan II) and the Masters Plan II report form.

Appendix 1

Qualifying Examination Areas of Examination Specialization Areas and suggested QE topic areas for examination

Below are listed the 4 specialization areas. Underneath each specialization category are suggested topical areas chosen by students whose course of study is *outside* that specialization area. Additional topics not listed are possible, subject to approval by the student's Graduate Adviser and by the Advisers at their annual QE assignment committee meeting.

1. Cell and Developmental Biology Specialization Area:

- Cell Biology
- Developmental Biology
- Organelle Structure and Function
- Seed and Seedling Development
- Cell signaling in response to developmental or environmental cues

2. Environmental and Integrative Plant Biology Specialization Area:

- Environmental Plant Biology,
- Stress Biology- Plant Responses to abiotic stress
- Integrative Plant Biology
- Transport processes at cellular and organismal levels
- Whole Plant Physiology, such as assimilate distribution and canopy level processes
- Plant Water Relations
- Plant Ecophysiology
- Plant Mineral Nutrition

3. Molecular Biology, Biochemistry, and Genomics Specialization Area:

- Molecular Biology
- Biochemistry
- Genomics
- Genetics
- Plant genes, genomes and genomics
- Plant Biotechnology
- Agricultural Genomics

4. Systematics and Evolutionary Biology Specialization Area:

- Systematics
- Evolutionary Biology
- Land Plant Evolution

Plant Biology Graduate Group
Advising Checklist - Cell and Developmental Biology

Student: _____ Entry Date: _____

Major Professor: _____ Phone #: _____

Academic Adviser: _____ Guidance Committee Member: _____

Undergraduate Preparation:

- ___ Introductory Biology, 3-Qtrs/2-Sem
- ___ Inorganic Chemistry, 3-Qtrs/2-Sem
- ___ Organic Chemistry, 2-Qtrs/2-Sem
- ___ Introductory Physics, 2-Qtrs/2-Sem
- ___ Biochemistry, 2-Qtrs/1-Sem
- ___ Calculus, 2-Qtrs/1-Sem
- ___ Introductory Statistics, 1-Qtr/1-Sem
- ___ Genetics, 1-Qtr/1-Sem
- ___ Intro. Plant Physiology 1-Qtr/1-Sem
- ___ Cell & Mol. Biology, 1-Qtr/1-Sem
- ___ Ecol., Systematics & Evolution, 1-Qtr/1-Sem
- ___ Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent:

- BIS 2A, 2B, and 2C
- Chemistry 2A, 2B, and 2C
- Chemistry 8A and 8B
- Physics 7A and 7B
- BIS 102 and BIS 103
- Mathematics (MAT) 16A and 16B
- Statistics (STA) 100 or PLS 120
- BIS 101
- PLB 111 or PLB 112
- PLB 113 or BIS 104
- EVE 100, 140 or 141 or PLB 108, or 117
- PLB 105 or PLB 116

Core and breadth requirements:

- ___ Plant Biology 200A, 200B, 200C – Core courses for PBGG taken during the first year
- ___ Plant Biology 292 – First year student journal club – taken every quarter offered during the first year
- ___ Plant Biology 290B – Friday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 291 – Tuesday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 290A -- Seminar discussion course – taken every quarter during the second year

Specialization requirements (at least 2 courses at the graduate level):

- M.S. Plan I: Minimum of two courses (totaling at least 6 units) from list below:
- M.S. Plan II: Minimum of three courses (at least 9 units) from list below:
- Ph.D.: Either three courses from the list below OR two courses from the list below and one course from another area of specialization approved by the guidance committee (courses total at least 9 units)

EVE 210: Molecular Phylogenetic Analysis (F, O, 3)	MCB 213: Developmental Biology (W, 3)
GGG 201A: Advanced Genetic Analysis (F, 5)	MCB 255: Molecular Mechanisms in Pattern Formation & Development (F, E, 3)
GGG 201B: Comparative and Functional Genomics (F, 5)	PBI 220: Plant Development (W, O, 4)
GGG 201C: Molecular Genetics (S, 4)	PBI 227: Plant Molecular Biology (W, E, 4)
GGG 210: Horizontal Gene Transfer (F, 3)	PLP 210 Biochemistry & Molecular Biology of Plant-Microbe Interaction (W, 4)
MCB 212: Cell Biology (W, 3)	VEN 210: Grape Development & Composition (S, O, 4)

Key: Course in bold is offered every other year with E and O designating odd or even quarter when taught. F, W, S= Fall, winter and spring quarter when course offered. Number indicates unit value of course.

Other courses may be substituted with the approval of the guidance committee/academic adviser.

Plant Biology Graduate Group
Advising Checklist - Environmental and Integrative Biology

Student: _____

Entry Date: _____

Major Professor: _____

Phone #: _____

Academic Adviser: _____

Guidance Committee Member: _____

Undergraduate Preparation:

- ___ Introductory Biology, 3-Qtrs/2-Sem
- ___ Inorganic Chemistry, 3-Qtrs/2-Sem
- ___ Organic Chemistry, 2-Qtrs/2-Sem
- ___ Introductory Physics, 2-Qtrs/2-Sem
- ___ Biochemistry, 2-Qtrs/1-Sem
- ___ Calculus, 2-Qtrs/1-Sem
- ___ Introductory Statistics, 1-Qtr/1-Sem
- ___ Genetics, 1-Qtr/1-Sem
- ___ Intro. Plant Physiology 1-Qtr/1-Sem
- ___ Cell & Mol. Biology, 1-Qtr/1-Sem
- ___ Ecol., Systematics & Evolution, 1-Qtr/1-Sem
- ___ Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent:

- BIS 2A, 2B, and 2C
- Chemistry 2A, 2B, and 2C
- Chemistry 8A and 8B
- Physics 7A and B
- BIS 102 and BIS 103
- Mathematics (MAT) 16A and 16B
- Statistics (STA) 100 or PLS 120
- BIS 101
- PLB 111 or PLB 112
- PLB 113 or BIS 104
- EVE 100, 140 or 141 or PLB 108, or 117
- PLB 105 or PLB 116

Core and breadth requirements:

- ___ Plant Biology 200A, 200B, 200C – Core courses for PBGG taken during the first year
- ___ Plant Biology 292 – First year student journal club – taken every quarter offered during the first year
- ___ Plant Biology 290B – Friday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 291 – Tuesday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 290A -- Seminar discussion course – taken every quarter during the second year

Specialization requirements (at least 2 courses at the graduate level):

M.S. Plan I: Minimum of two courses (totaling at least 6 units) from list below:

M.S. Plan II: Minimum of three courses (at least 9 units) from list below:

Ph.D.: Either three courses from the list below OR two courses from the list below and one course from another area of specialization approved by the guidance committee (courses total at least 9 units)

ATM 133: Biometeorology (W, 4)	PLS 162: Urban Ecology (W, E, 3)
ATM 223: Advanced Boundary Layer Meteorology (S, E, 3)	PLS 173: Molec. & Cellular Aspects of Postharvest Biology (S, 3)
ECL 216: Ecology & Agriculture (F, E, 3)	PLS 205: Design, Analysis, and Interpretation of Experiments (W, 5)
HRT 203: Research Perspectives in Horticulture (W, 3)	PLS 206: Applied Multivariate Modeling (F, 4)
HRT 251: Modeling Horticultural Systems (W, 4)	PLS 212: Postharvest Biology of Fruits & Nuts (S, E, 3)
HYD 124: Plant-Water-Soil Relationships (S, 4)	PLS 213: Postharvest Physiology of Vegetables (S, 3)
PBI 210: Plant Ecophysiology (W, E, 3)	PLS 222: Advanced Plant Breeding (S, 4)
PLB 119: Population Biology of Weeds (S, O, 3)	SSC 109: Sustainable Nutrient Management (S, 4)
PLB 143: Evolution of Crop Plants (S, 4)	SSC 208: Soil-Plant Interrelationships (W, E, 3)
PLS 157: Physiol. Environ. Stresses in Plants (W, O, 4)	VEN 210: Grape Development & Composition (S, O, 4)
PLS 158: Mineral Nutrition of Plants (S, 4)	

Key: Course in bold is offered every other year with E and O designating odd or even quarter when taught. F, W, S= Fall, winter and spring quarter when course offered. Number indicates unit value of course.

Other courses may be substituted with the approval of the guidance committee/academic adviser.

REV: 04-2013

Plant Biology Graduate Group
Advising Checklist - Molecular Biology, Biochemistry, and Genomics

Student: _____ Entry Date: _____

Major Professor: _____ Phone #: _____

Academic Adviser: _____ Guidance Committee Member: _____

Undergraduate Preparation:

- ___ Introductory Biology, 3-Qtrs/2-Sem
- ___ Inorganic Chemistry, 3-Qtrs/2-Sem
- ___ Organic Chemistry, 2-Qtrs/2-Sem
- ___ Introductory Physics, 2-Qtrs/2-Sem
- ___ Biochemistry, 2-Qtrs/1-Sem
- ___ Calculus, 2-Qtrs/1-Sem
- ___ Introductory Statistics, 1-Qtr/1-Sem
- ___ Genetics, 1-Qtr/1-Sem
- ___ Intro. Plant Physiology 1-Qtr/1-Sem
- ___ Cell & Mol. Biology, 1-Qtr/1-Sem
- ___ Ecol., Systematics & Evolution, 1-Qtr/1-Sem
- ___ Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent:

- BIS 2A, 2B, and 2C
- Chemistry 2A, 2B, and 2C
- Chemistry 8A and 8B
- Physics 7A and 7B
- BIS 102 and BIS 103
- Mathematics (MAT) 16A and 16B
- Statistics (STA) 100 or PLS 120
- BIS 101
- PLB 111 or PLB 112
- PLB 113 or BIS 104
- EVE 100, 140 or 141 or PLB 108, or 117
- PLB 105 or PLB 116

Core and breadth requirements:

- ___ Plant Biology 200A, 200B, 200C – Core courses for PBGG taken during the first year
- ___ Plant Biology 292 – First year student journal club – taken every quarter offered during the first year
- ___ Plant Biology 290B – Friday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 291 – Tuesday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 290A -- Seminar discussion course – taken every quarter during the second year

Specialization requirements (at least 2 courses at the graduate level):

- M.S. Plan I: Minimum of two courses (totaling at least 6 units) from list below:
- M.S. Plan II: Minimum of three courses (at least 9 units) from list below:
- Ph.D.: Either three courses from the list below OR two courses from the list below and one course from another area of specialization approved by the guidance committee (courses total at least 9 units)

BIS 181: Comparative Genomics (F, 3)	MCB 212: Cell Biology (W, 3)
BIT 160: Principles of Plant Biotechnology (W, 3)	MCB 213: Developmental Biology (W, 3)
ECS 124: Bioinformatics (S, 4)	MCB 214: Molecular Biology (S, 3)
ECS 129: Computational Structural Bioinformatics (F, O, 4)	MCB 241: Membrane Biology (S, 3)
ECS 221: Computational Methods in Systems and Synthetic Biology (Check w/department for when taught, 4).	MIC 215: Recombinant DNA (F, 3)
EVE 210: Molecular Phylogenetic Analysis (F, O, 3)	PBI 214: Plant Cell Walls (F, E, 3)
GGG 201A: Advanced Genetic Analysis (F, 5)	PBI 220: Plant Development (W, O, 4)
GGG 201B: Comparative and Functional Genomics (F, 5)	PBI 227: Plant Molecular Biology (W, E, 4)
GGG 201C: Molecular Genetics (S, 4)	PLB/MCB 126: Plant Biochemistry (W, 3)
GGG 210: Horizontal Gene Transfer (F, 3)	PLP 210: Biochemistry & Molecular Biology of Plant-Microbe Interaction (W, 4)
GGG/PLS 220: Genomics & Biotechnology of Plant Improvement (S, 3)	PLP/PLB 123: Plant-Virus-Vector Interaction (F, 3)
MCB 121: Molecular Biology of Eukaryotic Cells (F, W, S, 3)	PLS 173: Molec. & Cellular Aspects of Postharvest Biology (S, 3)
MCB 123: Behavior and Analysis of Enzymes and Receptor Systems (F, S, 3)	PLS 205: Design, Analysis, and Interpretation of Experiments (W, 5)
MCB 124: Macromolecular Structure & Function (F, W, 4)	PLS 206: Applied Multivariate Modeling (F, 4)
MCB 210: Molecular Genetics & Genomics (F, 3)	PLS 222: Advanced Plant Breeding (S, 4)
MCB 211: Macromolecular Structure & Interactions (F, 3)	

Key: Course in bold is offered every other year with E and O designating odd or even quarter when taught. F, W, S= Fall, winter and spring quarter when course offered. Number indicates unit value of course.

Plant Biology Graduate Group
Advising Checklist - Systematics and Evolutionary Biology

Student: _____

Entry Date: _____

Major Professor: _____

Phone #: _____

Academic Adviser: _____

Guidance Committee Member: _____

Undergraduate Preparation:

- ___ Introductory Biology, 3-Qtrs/2-Sem
- ___ Inorganic Chemistry, 3-Qtrs/2-Sem
- ___ Organic Chemistry, 2-Qtrs/2-Sem
- ___ Introductory Physics, 2-Qtrs/2-Sem
- ___ Biochemistry, 2-Qtrs/1-Sem
- ___ Calculus, 2-Qtrs/1-Sem
- ___ Introductory Statistics, 1-Qtr/1-Sem
- ___ Genetics, 1-Qtr/1-Sem
- ___ Intro. Plant Physiology 1-Qtr/1-Sem
- ___ Cell & Mol. Biology, 1-Qtr/1-Sem
- ___ Ecol., Systematics & Evolution, 1-Qtr/1-Sem
- ___ Plant Development & Structure, 1-Qtr/1-Sem

UCD Equivalent:

- BIS 2A, 2B, and 2C
- Chemistry 2A, 2B, and 2C
- Chemistry 8A and 8B
- Physics 7A and 7B
- BIS 102 and BIS 103
- Mathematics (MAT) 16A and 16B
- Statistics (STA) 100 or PLS 120
- BIS 101
- PLB 111 or PLB 112
- PLB 113 or BIS 104
- EVE 100, 140 or 141 or PLB 108, or 117
- PLB 105 or PLB 116

Core and breadth requirements:

- ___ Plant Biology 200A, 200B, 200C – Core courses for PBGG taken during the first year
- ___ Plant Biology 292 – First year student journal club – taken every quarter offered during the first year
- ___ Plant Biology 290B – Friday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 291 – Tuesday afternoon listening seminar – taken every quarter during the first two years
- ___ Plant Biology 290A -- Seminar discussion course – taken every quarter during the second year

Specialization requirements (at least 2 courses at the graduate level):

- M.S. Plan I: Minimum of two courses (totaling at least 6 units) from list below:
- M.S. Plan II: Minimum of three courses (at least 9 units) from list below:
- Ph.D.: Either three courses from the list below OR two courses from the list below and one course from another area of specialization approved by the guidance committee (courses total at least 9 units)

ENH 105: Taxonomy & Ecology of Environmental Plant Families (S, 4)	PLB 119: Population Biology of Weeds (S, O, 3)
ENH 150: Conservation Genetics (S, 3)	PLB 143: Evolution of Crop Plants (S, 4)
EVE 149: Evolution of Ecological Systems (F, E, 4)	PLB/PLP 148: Introductory Mycology (F, 4)
EVE 210: Molecular Phylogenetic Analysis (F, O, 3)	PLS 102: California Floristics (S, 4)
GGG 201D: Quantitative & Population Genetics (W, 5)	PLS 141: Ethnobotany (W, O, 4)
GGG 210: Horizontal Gene Transfer (F, 3)	

Key: Course in bold is offered every other year with E and O designating odd or even quarter when taught. F, W, S= Fall, winter and spring quarter when course offered. Number indicates unit value of course.

Other courses may be substituted with the approval of the guidance committee/academic adviser.