

PLANT BIOLOGY GRADUATE GROUP
Ph.D. DEGREE REQUIREMENTS
Revised: 2/23/2015
Graduate Council Approval: April 10, 2015

Ph.D.'s Degree Requirements

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 General Test scores taken within the last 5 years, and an Office of Graduate Studies online application with fee by the stated admission deadline. 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.

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 interests correspond with their own.

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

BIS 2A, 2B, and 2C	Biology	3 quarters/2 semesters
CHE 2A, 2B, and 2C	Inorganic Chemistry	3 quarters/2 semesters
CHE 8A and 8B	Organic Chemistry	2 quarters/2 semesters
PHE 7A and 7B	Introductory Physics	2 quarters/2 semesters
BIS 102 and 103	Biochemistry	2 quarters/1 semester
MAT 16A and 16B	Calculus	2 quarters/1 semester
STA 100 or PLS 120	Introductory Statistics	1 quarter/1 semester
BIS 101	Genetics	1 quarter/1 semester
PLB 111 or 112	Intro. Plant Physiology	1 quarter/1 semester
PLB 113 or BIS 104	Cell & Mol. Biology	1 quarter/1 semester
EVE 100	Evolution	1 quarter/1 semester
PLB 105 or PLB 116	Plant Development & Structure	1 quarter/1 semester

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 PBGG 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 (41 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 approval from the Ph.D. program's Master Adviser (the student submits a written email request to the Master Adviser).

a) Core Courses (15 units total):

PBI 200A Core Course Series (5 units) – To be taken in the first year

PBI 200B Core Course Series (5 units) – To be taken in the first year

PBI 200C Core Course Series (5 units) – To be taken in the first year

b) Required Seminars (17 units):

3 units of PBI 290A (1 unit each) – To be taken and completed in the second year

6 units of PBI 290B (1 unit each) – To be completed by the end of second year

5 units of PBI 291 (1 unit each) – To be completed by the end of second year

3 units of PBI 292 (1 unit each) – To be completed in the first year

Note: *Students may request exception to the seminar requirements if there is a scheduling conflict with an especially important specialization course. Such requests are subject to approval by the student's Graduate Adviser and the Master Adviser. If the request is approved, the minimum number of required seminars will also be changed accordingly.*

c) Courses in Specialization Area (9 units):

A student must take 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 in Appendix 2 A-D). Alternatively, a student may take two courses from the course list for their area of specialization and one course not on the list. The Graduate Adviser must approve all courses.

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.

41 units are required at a minimum: 15 units of core courses, 9 units of specialization/elective courses, and 17 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, after they advance to candidacy, students 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, when appropriate. 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 PBI 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 by the Office of Graduate Studies, 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. The Office of Graduate Studies will send notification of admissions decisions.

b) Qualifying Examination Committee

The student, in consultation with his/her Major Professor and Graduate Adviser (see Section 6 below), nominates five faculty members 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 member 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 program's Master Adviser. At a meeting of all the Graduate Advisers, typically in the Fall quarter, the nominations for qualifying examination committees 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 determine whether to 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 from the PBGG faculty** 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 checklist in Appendix 2 A-D) 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, held prior to the Adviser fall 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, 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 coursework requirements including seminar 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 members 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 (QE) before being advanced to candidacy for the Ph.D. in Plant Biology. The QE is to be held before the end of the ninth quarter in residence and after the student has completed all PBGG course requirements, or while the student is taking the final 1 or 2 required courses, 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. The sections should be structured as follows:

- (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 dissertation research. Critically evaluate the existing knowledge relevant to your research and identify an important question or unsolved problem that your dissertation 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. (Approximately one page).
- (3) **Preliminary data.** Briefly describe research that has been conducted by you and/or collaborators that is relevant to the proposal. Clearly state your contributions to this research (Approximately 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 dissertation 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 all Graduate Advisers which typically occurs at the annual advisers' meeting when QE members are nominated.

The student will prepare an oral presentation for the first part of the examination. 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 same Qualifying Examination Committee will administer the second examination. Only two outcomes are possible for the second examination: *Pass* or *Fail*. A *Fail* on either the first or second attempt results in the student being recommended for disqualification to the Dean of 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. Satisfactory 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 on 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. Dissertation committee members are expected to return comments to the student within 4 weeks, not including summer months for nine-month faculty. So, students should plan sufficient time for this review and the incorporation of requested changes. Informing committee members of progress as writing proceeds helps the members to schedule their reading the dissertation and provide feedback in a timely manner. 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 six 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.

The following is a sample study time line for the program.

Note-1: For a full time student, a minimum course load is 12 units each academic quarter. In addition, 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.

Note-2: If a graduate-level elective course were taken to fulfil specialization requirements in any of the three quarters in Year 1, it would need to be a 3-unit class. Under rare conditions in which the student's option is limited (for example, the course is not offered every year and it is a 4-unit class), however, a petition for an exception to the "12-unit limit rule" may be prepared by the student, her/his Graduate Adviser and Master Adviser, and submitted to the Office of Graduate Studies for approval. If the petition were not granted by the first day of the quarter, a student might request an exception to the seminar requirements (see p10, section 3b). Such a request is subject to approval by the student's Graduate Adviser and Master Adviser, and the approval can be made one quarter only. If the request is approved, the minimum number of required seminars will also be changed accordingly.

Year 1	Fall	Winter	Spring
	PBI 200A	PBI 200B	PBI 200C
	PBI 291	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	Fall	Winter	Spring
	PBI 290A	PBI 290A	PBI 290A
	PBI 290B	PBI 290B	PBI 290B
	PBI 299	PBI 291	PBI 291
	Elective	PBI 299	PBI 299
Year 3	Fall	Winter	Spring
	Qualifying Exam	Advancement to Candidacy	PBI 299
	PBI 299	PBI 299	
Years 4-5	Fall	Winter	Spring
	Dissertation research (PBI 299) and completion of Dissertation. Filing Fee recommended one quarter prior to completion of Dissertation.		

11) Sources of funding.

The nature of student support varies according to each student, but generally includes one or more of the following: research assistantship (GSR appointment), fellowship, training grant, and/or teaching assistantship.

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 completes 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. The 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 paperwork approved. 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.

Appendix 1

Suggested Additional Areas of Examination for MS Comprehensive and PhD Qualifying Examinations

Below are listed the 4 specialization areas of the program. 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-Appendix 2A
Advising Checklist for Specialization Area: Cell and Developmental Biology

Student: _____ Entry Date: _____

Major Professor: _____ Degree Sought: _____

Graduate Adviser: _____ Student Email: _____

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
- ___ 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
- 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)

Course List in alphabetic order by departmental abbreviation code, then in numeric order

EVE 210: Molecular Phylogenetic Analysis (F, O, 3)	MCB 255: Molecular Mechanisms in Pattern Formation & Development (F, E, 3)
GGG 201A: Advanced Genetic Analysis (F, 5)	PBI 214: Plant Cell Walls (W, E, 3)
GGG 201B: Genomics (F, 5)	PBI 220: Plant Development (W, O, 4)
GGG 201C: Molecular Genetic Mechanisms of Disease (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)
MCB 213: Developmental Biology (W, 3)	

Key: Courses in bold are 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 Graduate Adviser.

REV: 09-2014

Plant Biology Graduate Group-Appendix 2B
Advising Checklist for Environmental and Integrative Biology Specialization Area

Student: _____ Entry Date: _____

Major Professor: _____ Degree Sought: _____

Graduate Adviser: _____ Student Email: _____

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
- ___ 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
- 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)

Course List in alphabetic order by departmental abbreviation code, then in numeric order

ATM 133: Biometerology (W, 4)	PLS 157: Physiol. Environ. Stresses in Plants (W, O, 4)
ATM 223: Advanced Boundary Layer Meterology (S, E, 3)	PLS 158: Mineral Nutrition of Plants (S, O, 4)
ECL 200A: Principles and Applications of Ecology (F, 5)	PLS 162: Urban Ecology (W, E, 3)
ECL 200B: Principles and Applications of Ecology (F, 5)	PLS 173: Molec. & Cellular Aspects of Postharvest Biology (S, 3)
ECL 206: Concepts and Methods in Plant Community Ecology (F,4)	PLS 205: Experimental Design and Analysis (W, 5)
ECL 216: Ecology & Agriculture (F, E, 4)	PLS 206: Applied Multivariate Modeling (F, 4)
HRT 203: Research Perspectives in Horticulture (W, 3)	PLS 212: Postharvest Biology of Fruits & Nuts (S, E, 3)
HRT 251: Modeling Horticultural Systems (W, 4)	PLS 213: Postharvest Physiology of Vegetables (S, 3)
HYD 124: Plant-Water-Soil Relationships (S, 4)	PLS 222: Advanced Plant Breeding (S, 4)
PBI 210: Plant Ecophysiology (W, E, 3)	SSC 109: Sustainable Nutrient Management (S, 4)
PLB/EVE 117: Plant Ecology (F, 4)	SSC 208: Soil-Plant Interrelationships (W, O, 3)
PLB 119: Population Biology of Invasive Plants and Weeds (S, O, 3)	VEN 210: Grape Development & Composition (S, O, 4)
PLB 143: Evolution of Crop Plants (S, 4)	

Key: Courses in bold are 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 Graduate Adviser.

REV: 09-2014

Plant Biology Graduate Group-Appendix 2C
Advising Checklist for Molecular Biology, Biochemistry, and Genomics Specialization Area

Student: _____ Entry Date: _____

Major Professor: _____ Degree Sought: _____

Graduate Adviser: _____ Student Email: _____

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
- 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
- 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)

Course List in alphabetic order by departmental abbreviation code, then in numeric order

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: Theory and Practice of 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: Higher Plant Cell Walls (F, E, 3)
GGG 201A: Advanced Genetic Analysis (F, 5)	PBI 220: Plant Development Biology (W, O, 4)
GGG 201B: Genomics (F, 5)	PBI 227: Plant Molecular Biology (W, E, 4)
GGG 201C: Molecular Genetic Mechanisms of Disease (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: Advanced Molecular Biology (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: Experimental Design and Analysis (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: Courses in bold are 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 Graduate Adviser.

REV: 09-2014

Plant Biology Graduate Group-Appendix 2D
Advising Checklist for Systematics and Evolutionary Biology Specialization Area

Student: _____ Entry Date: _____

Major Professor: _____ Degree Sought: _____

Graduate Adviser: _____ Student Email: _____

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
- ___ 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
- 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)

Course List in alphabetic order by departmental abbreviation code, then in numeric order

ECL 200A: Principles of Ecology (F, 5)	GGG 210: Horizontal Gene Transfer (F, 3)
ECL 200B: Principles of Ecology (W, 5)	PBG: 200A: Principles of Population Biology (F, 5)
ECL 206: Plant Community Ecology (F, E, 4)	PBG: 200C: Principles of Population Biology (S, 6)
ENH 105: Taxonomy & Ecology of Environmental Plant Families (S, 4)	PLB/EVE 108: Angiosperm Systematics (S, O, 3)
ENH 150: Conservation Genetics (S, 3)	PLB 119: Population Biology of Weeds (S, O, 3)
EVE 140: Paleobotany (W, O, 4)	PLB 143: Evolution of Crop Plants (S, 4)
EVE 141: Principles of Systematics (S, E, 3)	PLB/PLP 148: Introductory Mycology (F, 4)
EVE 149: Evolution of Ecological Systems (F, E, 4)	PLS 102: California Floristics (S, 5)
EVE 210: Molecular Phylogenetic Analysis (F, O, 3)	PLS 141: Ethnobotany (W, O, 4)
GGG 201D: Quantitative and Population Genetics (W, 5)	

Key: Courses in bold are 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 Graduate Adviser.

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