

School of Plant Sciences  
University of Arizona

Graduate Handbook



PhD and MS degrees  
in  
Plant Pathology and Plant Science  
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## **SPLS Graduate Program**

### **I. Orientation and initiation of your degree program**

#### *A. Prior to arrival*

Once you have accepted our offer, there are a few things you need to do to prepare. First, make sure that you are receiving emails through your new official UA email account. This is how we will communicate with you before and during your program. Then, consult with your prospective Major Advisor, as listed on your letter of offer, regarding two things: courses, and your PAC (see below). It is common that you cannot register for courses until you arrive, but it will be good to have a rough idea of what you might take. Unless you are exempt from rotations (this will also be indicated in your letter of offer), prepare to reach out to potential mentors for rotations in consultation with your prospective Major Advisor. If you are coming from abroad, please work closely with our Business Office to ensure timely acquisition of a visa.

#### *B. Orientation*

Very close to the start of your first semester, we will hold an orientation event at which you will meet other incoming students, receive an overview of the program, meet your graduate mentor, Directors of Graduate Studies (DGS), Graduate Coordinator, and more. Around this time, you will need to obtain an official UA identification card called a “CatCard.” If you have not gotten one by the time of the orientation, we will walk you over to the appropriate office. The Graduate and Professional Student Council ([gpsc.arizona.edu](http://gpsc.arizona.edu)) also provides an orientation to the University of Arizona, in August (for Fall admissions only). International students, students in the ABBS program, University Fellows, and others have additional orientations to attend. Look for emails (in your new UA email account!) regarding these events.

#### *C. Qualifying Exam and PAC*

All aspects of your degree are overseen and approved initially by a Provisional Advisory Committee (PAC). The PAC will consist of your prospective Major Advisor and at least two other faculty members, selected by the major advisor. The PAC will serve as temporary advisors during the first semester for MS students and the first two semesters for PhD students. Each student should meet with his or her PAC on arrival, preferably before classes begin (at the latest, within the first two weeks of class).

The first meeting between you and your PAC constitutes a Qualifying Exam. During this meeting, the PAC will focus on evaluating your background, assisting with course selection, and addressing potential rotation projects/mentors as needed. The format of the PAC meeting is flexible, but generally includes evaluation of retention and synthesis of knowledge from previous coursework. Importantly, this is not an “exam” in the sense that you will pass or fail, but rather a formal process to ensure that everyone receives appropriate guidance at the beginning of their graduate career. In addition to evaluating your command of the subject matter in your field of study, the PAC may administer an assessment of writing. For example, you may be asked to write a mini-review of a selected research article or articles. This should be entirely your own effort and will be used by the PAC to evaluate whether supplemental instruction in writing skills is required.

The PAC will also advise on minor fields of study (for PhD students), and generally help orient you to graduate education at the University of Arizona. Throughout, you will have an opportunity to ask questions and seek constructive feedback from faculty who are invested in helping you commence graduate school with a sense of support, focus, and goal-oriented achievement. International students may be evaluated for your ability to speak professional English during this meeting. This is a brief assessment to be completed by the PAC faculty.

#### *D. Graduate Mentors*

Incoming students may be assigned a Graduate Student Mentor upon entering the program. The Student Mentor would be available to assist with any other questions about the campus, the School of Plant Sciences (SPLS), and/or the graduate major.

## **II. Advisors**

#### *A. Major Advisor*

In SPLS, part of the application process is to identify a potential Major Advisor. Generally, this is the faculty member whose lab you will be entering after rotations (or immediately, if rotations are waived). The Major Advisor will be your mentor and advisor throughout your time in the program. In rare cases, students may change Major Advisor with departmental approval. The Major Advisor should be formally established by the end of year one for PhD students, or by the end of the first semester for MS students. In some circumstances, two Co-Advisors can be assigned.

#### *B. Advisory Committee*

In addition to the Major Advisor, students receive substantial guidance and intellectual support from their Advisory Committee (AC). The AC includes members from the major and minor (see below for selecting a minor) and may or may not include the members of the PAC. Usually, the AC is the same committee that will administer comprehensive exams, approve the final thesis or dissertation, and conduct the oral dissertation defense. The Major Advisor assists in establishing the AC by the end of year one. For PhD students, it is highly recommended that the AC include four members in addition to the Advisor (or Co-Advisors), because this is the number you will need for your comprehensive exam committee. The GC requires three members for MS students, including the Advisor.

Annual meetings with the Advisory Committee are **required** to ensure appropriate progress toward completion of the degree program. After each meeting, you and your Major Advisor will complete an Annual Progress Report, which must be on file by the end of Spring semester each year in order to remain in good standing and be considered for financial support the following year. See the website for current instructions regarding the Annual Progress Report.

## **III. Curriculum**

#### *A. Rotations*

The School of Plant Sciences offers the opportunity for students to conduct rotations in the first 1-2 semesters of study, allowing students to experience a variety of labs. PhD and MS students conduct two rotations during the first semester, one of which may be in the intended primary lab (PhD students may pursue an additional project in the Spring). Each rotation lasts eight weeks and culminates in a short oral presentation to the School. If a student is fully supported by their Major Advisor in year one, rotations may be waived. Students should work with the Graduate Coordinator to enroll in rotation units.

#### *B. Plan of Study*

During year one, you and your Major Advisor, in concert with your Advisory Committee, will develop your Plan of Study. This is a formal document to be submitted to the Graduate College that enumerates all planned coursework for the major and for the minor and indicates any transfer credits. The SPLS Graduate Coordinator will help you ensure that your plan satisfies all

requirements from the University, the College, and the School, prior to submission online. The Plan of Study then must be approved by the Major Advisor, by the Director of Graduate Studies, and by the Graduate College. This process should be completed by the end of your second semester (MS) or third semester (PhD).

Changes to your Plan of Study will need your Advisor's approval, followed by DGS approval.

### *C. Credit and GPA requirements*

PhD students are required by the Graduate College to complete 36 units in the major area (including research units), 9 units in the minor, and 18 dissertation units. MS students are required to take 30 units, including up to 6 thesis units. Some courses award regular grades (A, B, C) and some award alternative grades (pass/fail).

Credit requirements are summarized in the following table. However, many factors can affect this calculation, so all Plans of Study must be evaluated by the Graduate Coordinator to ensure all requirements are satisfied.

The College of Agriculture and Life Sciences requires graduate students to be enrolled in at least **10 units each semester**, and to maintain a GPA of 3.0 in order to remain in good standing. SPLS requires a cumulative **GPA of 3.2** to remain in good standing.

### *D. Courses and policies*

Coursework trains you broadly, develops your expertise, and prepares you to conduct innovative research. Required coursework in our program is relatively minimal, allowing each student, under the guidance of their Major Advisor and Advisory Committee, to tailor their educational experience to the scientific domain of interest. Our program requires (1) core courses, (2) electives, (3) journal clubs, and (4) seminar participation (summarized in the table below):

#### *1. Core courses*

- PLP 550 - Principles of Plant Microbiology, 4 units (Spring)
- PLS 560 - Advanced Plant Biology, 4 units (Fall)

These two core courses provide in-depth training in the two broad fields that encompass most of our research labs: Microbiology and Plant Biology. Core courses may be offered every other year, so students take them in their first or second year.

Core courses are waived if they are not offered within a feasible timeframe for a student to include them in their coursework. In the rare case when a waiver is granted, the affected student's committee will be responsible for approving a plan to cover the material. If there is no obvious alternative course, the student will work with their Major Advisor and the rest of their committee to develop an Independent Study that will address the content and educational outcomes of the waived course, in the context of the student's program. The plan will then be submitted to the Graduate Coordinator for approval by the DGS and the Graduate Student Program Committee (GSPC).

#### *2. Elective courses*

In consultation with your advisor and your committee, you should plan to take elective courses that will strengthen expertise in your area of research.

Courses on our website are approved at the level of the School for further consideration in individual cases. Additions to the list may be proposed, with a syllabus, and will be considered by the GSPC. Courses approved at the program level then require further approval by your Advisory Committee to be added to your Plan of Study.

### *3. Courses outside majors and minors*

Students may take courses outside the major and minor, including while supported by a Research Assistantship or Teaching Assistantship. However, the student's Advisory Committee is responsible for assessing whether doing so will substantially and negatively impact the student's performance, ability to meet teaching and research expectations, and time to completion. Therefore, to add a non-major/minor course, the student's Advisory Committee approval is required.

### *4. Journal clubs*

The ability to effectively read, discuss, and critique a broad range of primary literature is a fundamental skill for a scientist. Graduate student journal clubs serve as a training venue in this regard. Through journal clubs, first, you will learn processes, including how to question assumptions (written or unwritten), to evaluate methods, and to question the strength of conclusions, given a particular set of data. Second, you will learn content by reading about the latest results, or the classics, in particular fields. Third, you will learn to verbally communicate, and revise your understanding, through dialog with your peers. These skills take years of practice, and we expect that all students participate in journal clubs throughout their time in our programs.

At a minimum, PhD students are required to take four semesters of for-credit journal clubs. At least two of these must be the School-wide journal club, PLS/PLP 695A. This course generally involves reading and discussing one paper each week that is drawn from any of the diverse fields represented in our School. PhD students may substitute, with GSPC approval, two of these four semesters with domain-specific journal clubs. Several such journal clubs are offered in our School and in closely related departments (e.g., MCB, EEB). To be considered as a substitute for PLS/PLP 695A, the alternative journal club must be in a similar format (reading and discussing primary literature each week), and a syllabus must be provided to the GSPC for review. MS students are required to take two semesters of PLS 695A and are encouraged to participate in additional domain-specific journal clubs.

### *5. Departmental seminar*

Each week during the fall and spring semesters, SPLS hosts a seminar speaker, traditionally at 4:00 pm on Tuesdays. Speakers are usually active researchers in fields related to plant and/or microbial biology, and usually come from outside the UA. This is a valuable opportunity for students to interact with a range of excellent scientists. Therefore, students are required to sign up for a one-credit course, PLS/PLP 596A: twice for MS, five times for PhD. The structure of this course varies from year to year, but generally involves meeting with the seminar speaker, attending seminar, and at least one written assignment.

### *6. Curricular changes*

Changes to these requirements may be necessary, for example, as courses are retired. The GSPC will carefully consider steps to mitigate impact to students. To petition the GSPC for seminar substitutions, new elective courses, or similar matters, contact the Graduate Coordinator, who will work with the DGS(s) and the GSPC to resolve.

## Curricular requirements

	Course name	Course number	Units (PhD)	Units (MS)
Core courses	Principles of Plant Microbiology	PLP 550	4	4
	Advanced Plant Biology	PLS 560	4	4
Electives	Major courses and Research units		17	10
	Minor (governed by the Minor Dept).		9	
Additional requirements	SPLS Seminar	PLS/P 596A	5	2
	Journal Club	PLS/P 695A	4	2
	Rotations <sup>a</sup>	PLS/P 695C	2	2
	Dissertation or Thesis <sup>b</sup>	PLS/P 910/20	18	6
<b>Total<sup>c</sup></b>			63	30

<sup>a</sup> Some students are exempt from the rotation requirement, and PhD students may conduct 3 rotations.

<sup>b</sup> This is the minimum for PhD and the maximum for MS.

<sup>c</sup> The Graduate College requires some units to receive regular grades (A,B, or C): 15 for MS and 22 for PhD.

### E. Professional development

#### 1. Presentations

Presenting your research provides you with an opportunity to practice public speaking, an important transferable skill. Therefore, students are required to present to the School: MS students present at least twice (including at the final exam), and PhD students present three times (including at the dissertation defense). At least one of your seminars should be videotaped, to enhance your opportunity for self-assessment and improvement. An oral presentation at a national or international meeting may be substituted for one local presentation, with GSPC permission.

#### 2. Workshops

Numerous workshops and training opportunities are available through CALS, the Graduate College, and elsewhere. Topics range widely, and include the statistical programming language R, best practices for teaching, grant writing, dissertation completion. We strongly encourage participation in these opportunities; watch the website and your email for updated lists of events and see below (and the website) for financial support for travel.

#### 3. Teaching

The ability to teach is an important component of professional preparation, for any career path that requires an advanced degree in science. Therefore, each student is required to serve as a Teaching Assistant at least once. Performance will be assessed in two ways: enrolled students may provide feedback using the standardized Teacher-Course Evaluation (depending on the course), and the Faculty Instructor will provide feedback through a TA Evaluation. Students who receive positive assessments are eligible for additional TA assignments. Students from non-English speaking countries may be required to receive additional language training.



## IV. Completing the MS degree

### A. Thesis

SPLS is a research-oriented unit and is committed to training MS students in this context. Therefore, most of our MS students write a thesis, which is expected to be the product of original and at least partially independent research, ideally leading to a publication for which the student is first author. If the thesis includes a manuscript for which the student is not first author, the student will be asked by the committee to write a stand-alone document including background, methods, results, and discussion. Be sure to discuss these issues with your Advisory Committee, well in advance of your final exam.

### B. Final examination

SPLS requires that MS students present the results of their research in an open seminar and to defend their thesis in a closed oral examination administered by the Advisory Committee. Failure will result in dismissal from the program, unless the AC recommends a second exam.

### C. Non-thesis MS

In rare cases, MS students are admitted with the intent of pursuing a non-thesis MS degree. In this case, the student needs *six additional units* of coursework in the major and submits a written report of research accomplishments. The Major Advisor and the Advisory Committee determine the format for the report and evaluate its sufficiency for completing the degree. Public presentation is not required.

## V. Completing the PhD Degree

### A. Selecting a minor

#### 1. For SPLS students

PhD degrees comprise a major (in our case, PLS or PLP) and a minor. The minor should be selected prior to assembling your Advisory Committee, and must be selected prior to submitting the Plan of Study. Most departments with graduate programs will offer the opportunity to obtain a minor with the same name as their major. With guidance from your Major Advisor, seek a minor that will enhance expertise in an area that is relevant for your research program. Once identified, you will need to (1) obtain the requirements from that department's Graduate Coordinator, (2) make a plan to take the necessary coursework, and (3) incorporate at least one faculty member from the minor department on your Advisory Committee. The Graduate College requires 9 units from the minor, but the minor department may have additional requirements.

Minors may be the same as majors: PLS majors can select PLS as the minor, and PLP majors can select PLP minors. For combining PLS and PLP, the minor must be represented in the coursework and on the Advisory Committee.

#### 2. SPLS Minor Policy (for students in other programs)

A Graduate Minor in PLS or PLP requires nine or more units in courses whose home unit is SPLS (this generally coincides with courses taught by members of the SPLS primary faculty). Core courses must be included: for PLS minor, PLS 560 is required, for PLP minor, PLP 550 is required.

## B. *Dissertation Prospectus*

Completion of a PhD dissertation requires careful planning and communication with the student's Advisory Committee. To facilitate this, the GC requires that each PhD student has an approved prospectus or proposal on file with the department, enforced and documented by the Graduate Coordinator. SPLS further requires that the prospectus be submitted by the start of year two and updated annually.

A prospectus is a document that outlines the series of projects intended to be included in the dissertation and should include the overall goal of the dissertation, titles of proposed dissertation chapters, and general approaches that will be employed. It is expected to be brief and in outline form in the early years, and to develop as the dissertation nears completion. See the SPLS website for current formatting instructions.

## C. *Comprehensive Examination*

### 1. *Overview*

PhD students are required to take a comprehensive exam, which tests for breadth of knowledge in both the major and the minor, and depth of understanding in the area of specialty. The exam comprises two portions, written and oral, and is administered by your Comprehensive Examination Committee (CEC).

The exam should be attempted after completion of the planned coursework, during year three. If the exam is not completed by the end of that year, a justification for the delay must be included on the Annual Progress Report and *may result in the inability to receive an assistantship*. Once the exam is passed and all coursework is completed, you will be advanced to PhD Candidacy and given the title Graduate Associate (MS students and PhD students prior to these exams are Graduate Assistants). The Graduate College requires at least three months between successful completion of the comprehensive exam and the final defense.

### 2. *Committee*

Usually, the CEC is the same as the Advisory Committee, except that the Major Advisor(s) does not participate fully in the exam. The GC requires four members, including representation from the minor department. One member is selected as Chair of the committee and manages communication with the student and with the Graduate College for both the written and oral portions of the exam.

### 3. *Written exam*

You have two options for the written portion of the exam:

#### Option 1: Proposal

You can select to write a proposal on a topic that is unrelated to your dissertation project, both in terms of the experimental system and the conceptual question. This option provides the opportunity to demonstrate that you are prepared to embark on original research, including the ability to identify and document a knowledge gap in the literature, to devise experiments and analyses that would allow you to fill that gap, and to discuss potential impacts of your results.

After you select a topic, confirm that it is acceptable with your CEC and work with them to clarify expectations for format and length.

Once they have approved your topic, you will have three weeks to complete the proposal. The proposal is to be entirely your own work.

#### Option 2: Questions

This option provides the opportunity to demonstrate that you are prepared to efficiently evaluate primary literature and to synthesize and communicate complex scientific ideas. Each committee member will provide you with a topic from which you select three; the associated committee members will then supply specific questions. The author of the question can stipulate the expected length and any format requirements. If this is not provided, it is your responsibility to clarify expectations (e.g., whether you are allowed to rely on review articles). Once you have the questions, you will have three weeks to complete the exam. The answers must be entirely your own work.

The committee will determine by consensus whether revisions are required within two weeks. Any revisions must be completed within the following two weeks, and the committee decision on whether you are ready to move on to the oral exam will be provided within two weeks of the resubmission.

#### 4. *Oral exam*

The oral exam is designed to test your general knowledge as well as your depth in the major and minor fields of study. The exam also provides an opportunity to evaluate your ability to synthesize information quickly and to communicate verbally. The Chair of the CEC works with the committee to determine the format of the exam and will communicate this to you at least two weeks in advance of the exam. Generally, the exam begins with the Chair asking you to leave the room for a brief committee discussion. Upon return, you may be asked to provide a brief overview of your research accomplishments and plans (e.g., 15 minutes). The committee may ask questions during the presentation and will continue to ask questions, testing your knowledge and communication skills. After the committee has thoroughly examined you, you will be asked to wait outside the room while they evaluate your performance.

The Major Advisor is allowed to attend the oral exam and participate in asking questions. They may also decide not to attend. GC rules stipulate that the exam may not last longer than three hours, including the committee discussions and student presentation.

#### 5. *Evaluation*

The CEC evaluates the student's examination based on both the written and oral portions of the examination. Votes are conducted by voice or by anonymous ballot (pass, fail, abstain) at the end of the oral exam. The GC stipulates that more than one negative vote (either fail or abstain) results in a failed exam. The CEC has the option to recommend a second attempt. The CEC chair must contact the DGS within 24 hours of the conclusion of the exam if the student has not passed.

If the student fails the first comprehensive examination and a second examination is recommended, at least 4 months must pass between the first and second attempt.

#### D. *Dissertation*

##### 1. *Expectations*

The GC requires "completion of a dissertation which meets required standards of scholarship and demonstrates the candidate's ability to conduct original research." The Major Advisor and Advisory Committee are responsible for supporting and enforcing an appropriate level of

scholarship in the dissertation, and generally expect the dissertation to lead to multiple publications for which the student is first or co-first author. A typical dissertation includes three or more such manuscripts, as well as introductory chapters (see GC website for instructions).

The dissertation must comprise chapters written by the student, reflecting the student's own work. If the dissertation is to include a manuscript for which the student is not first author, this may indicate to the committee that the student neither led in designing the study, nor in writing the manuscript. In this case, the student will be asked by the committee to write a chapter covering their portion of the larger project, i.e., a stand-alone document including background, methods, results, and discussion.

### *2. Final Oral Defense Examination*

The defense includes an open seminar (announced to the public by the GC) and a closed oral examination administered by the Advisory Committee, presided over by the Major Advisor. The exam may focus on the dissertation or any relevant topic, and it is not to exceed three hours, including the seminar. At the completion of the exam, the Advisory Committee votes to determine if the dissertation is acceptable, or if revisions are required. Any revisions must be approved by the Advisory Committee before the dissertation is accepted. See the GC website for details.

### *3. Submission of the Dissertation*

The GC governs the format and submission requirements for the final, approved, dissertation. Published manuscripts are acceptable as appendices, but see the GC website for details.

## **VI. Financial Information**

### *A. Assistantships*

All students in our programs are expected to work full time (including coursework, seminars, outreach, and research) during the academic semesters as well as during the summer. To facilitate this, the Major Advisors and the School aim to provide stipends, tuition, and student-only health insurance for two years (MS) or five years (PhD), pending availability of funds and satisfactory academic progress. Financial support is usually provided in the form of Teaching or Research Assistantships.

#### *1. Research Assistantships*

Major Advisors with grants may decide to hire students as Research Assistants, in which case the student is expected to work 20 hours on the project (for a 0.5 FTE, or "full" RA). It is also expected that this research advances the student's progress towards completing their thesis or dissertation, directly or indirectly. Performance while serving as an RA may be evaluated each semester or at the end of the academic year.

#### *2. Teaching Assistantships*

An important mission of the School is to provide excellence in instruction. To this end, graduate students are hired to lead lab sections or assist with lecture courses. The time commitment is also expected to average 20 hours per week (for a full TA). We consider this an important component of your professional training. Each SPLS student must serve as a TA for at least one semester (see Professional Development). Performance will be evaluated each semester. The Graduate College requires online training, prior to the first semester serving as a TA: <https://grad.arizona.edu/funding/ga/mandatory-online-training>. Students who are not proficient in English may have restrictions on their TA duties and will be expected to take steps to improve their skills.

### *B. Scholarships*

Scholarships are available through a wide variety of sources. See the School website for some current opportunities, and enter an application into Scholarship Universe (<https://scholarshipuniverse.arizona.edu>). All students should apply for scholarships in order to practice writing, refine research ideas, and enhance C.V.s.

Students on scholarship support that meets or exceeds our standard RA or TA stipends are not typically offered assistantships, and are expected to engage fully in their research endeavors and coursework as needed.

### *C. Travel*

SPLS often has financial support for approved travel, such as for research or to a conference. Students are generally awarded these funds no more than one time during their career here. See the website for current opportunities.

### *D. Research support*

Financial support for research supplies generally comes from the lab and the Major Advisor. However, scientific societies often have opportunities for small grants aimed at enhancing a research project, and several small grants are available through Scholarship Universe (<https://scholarshipuniverse.arizona.edu>). Opportunities are regularly sent to students via email.

## **VII. Final notes**

### *A. Which handbook should I use?*

This one! All SPLS and GC policies are updated annually and applied universally, with the following exceptions:

- Curriculum changes will not apply to students midstream (see Curriculum, above).
- Changes in the procedure for comprehensive exams will not affect students who are actively preparing for, or in the process of, being examined.
- For all other issues, students and Advisors may petition for any hardships caused by a change in policy.

### *B. Petitions*

To petition for an exception to a School requirement, you and your Advisor each write brief statements describing the issue and proposing a solution. These documents are submitted to the Graduate Coordinator, who will then forward the request to the GSPC.

C. Timeline

