# PhD in Plant, Insect and Microbial Sciences

## Degree Requirements

To satisfy the course requirements for a doctoral degree, a student must complete:

- A minimum of 72 credit hours from courses numbered 7000-9000 (this includes dissertation research credit hours - i.e. PLNT_S 9090).
- 15 credit hours (towards the 72 hour requirement) must be from courses numbered at the 8000 or 9000 level, exclusive of dissertation research, problems or independent study.
- For the Horticulture Program Area, all Doctoral students will have successfully completed the requirements for a master's degree before beginning a doctoral program and no more than 30 hours of dissertation research may be counted towards the 72 hr minimum.
- Two semesters of PLNT_S 9087.
- Three semesters of PLNT_S 7087.

## Teaching Requirement

With the exception of the Entomology Program Area, all students must participate in an approved teaching opportunity or an approved extension program.

## Reasonable Rate of Progress

A reasonable rate of progress toward the degree is required. A Ph.D. student must successfully complete the comprehensive exam within 5 years of their first semester of enrollment as a Ph.D. student. In addition, the remaining program for the doctoral degree must be completed within 5 more years after passing the Comprehensive Exam.

## Sample Plan of Study

There are several areas of study within the PhD in Plant, Insect and Microbial Sciences degree. A student can select training from a wide range of courses and research programs to prepare for a career in research, teaching, industry and extension work. Note: Areas of Study will not appear on transcripts or diplomas. Each program area emphasizes a customized approach towards the course of study. Each student will work with their advisor and graduate committee to develop a course of study best suited to the student's educational and career goals.

## Crop, Soil and Pest Management

### Core Requirements:

- **PLNT_S 8010** Professionalism and Ethics 2
- **PLNT_S 9087** Seminar in Plant Science (must enroll twice) 2
- **PLNT_S 7087** Seminar (must enroll three times) 3
- **PLNT_S 9090** Dissertation Research 1-10 per semester

## Entomology

### Core Requirements:

- **PLNT_S 7710** Systematic Entomology 5
- **PLNT_S 7820** Principles of Insect Physiology 4
- **PLNT_S 8010** Professionalism and Ethics 2

## Horticulture

### Core Requirements:

- **PLNT_S 8010** Professionalism and Ethics 2
- **PLNT_S 9087** Seminar in Plant Science (must enroll twice. Only 1 credit will count towards the 15 credit hour at 8000/9000-level requirement.) 2
- **PLNT_S 7087** Seminar (must enroll three times) 3
- **PLNT_S 9090** Dissertation Research 1-10 per semester

### Electives

- **PLNT_S 9810** Insect Ecology 3

## Plant Breeding, Genetics, and Genomics

### Core Requirements:

- **PLNT_S 8010** Professionalism and Ethics 2
- **PLNT_S 9087** Seminar in Plant Science (must enroll twice. Only 1 credit will count towards the 15 credit hour at 8000/9000-level requirement.) 2
- **PLNT_S 7087** Seminar (must enroll three times) 3
- **PLNT_S 9090** Dissertation Research 1-10 per semester

### Electives

- **PLNT_S 8330** Molecular Breeding and Translational Genomics 3
- **PLNT_S 8362** Introduction to Plant Metabolism 2
- **PLNT_S 8370** Introduction to Molecular Cell Biology 2
- **PLNT_S 9415** Advanced Plant Physiology 3
- **PLNT_S 9440** Applied Quantitative and Statistical Genetics 3
- **PLNT_S 9540** Genetics of Plant-Microorganism Interaction 3
- **PLNT_S 9810** Insect Ecology 3

## Plant Stress Biology

### Core Requirements:

- **PLNT_S 7315** Crop Physiology 3
- **PLNT_S 7320** Molecular Plant Physiology

## Bridging Courses to Expand Your Background in Plant Biology

- **PLNT_S 7315** Crop Physiology 3
- **PLNT_S 7320** Molecular Plant Physiology 3
- **PLNT_S 7500** Biology and Pathogenesis of Plant-Associated Microbes 4

## Elective Courses to Fulfill the Requirement for 15 Credit Hours at 8000 or 9000 Level

- **AN_SCI 8430** Introduction to Bioinformatics Programming 4
- **BIO_SC 8300** Advanced Plant Genetics 3
- **BIO_SC 8310** Fungal Genetics and Biology 3
- **PLNT_S 8330** Molecular Breeding and Translational Genomics 3
- **PLNT_S 8362** Introduction to Plant Metabolism 2
- **PLNT_S 8370** Introduction to Molecular Cell Biology 2
- **PLNT_S 9415** Advanced Plant Physiology 3
- **PLNT_S 9440** Applied Quantitative and Statistical Genetics 3
A dissertation is required of every Ph.D. Candidate in the Division of Plant Sciences. This is to be a substantial scholarly manuscript of original research conducted by the student. The dissertation should reflect the depth of understanding, independent thought, and original work worthy of a Ph.D.

The Dissertation Defense consists of a research seminar and final examination. It is the student's responsibility to check the Graduate School's graduation deadlines when scheduling the exam. The seminar will be presented by the student for division faculty, staff, students, committee members, and other interested persons. The student may choose to present the seminar as part of the Division Seminar Series. It must summarize the dissertation research conducted by the student during the Doctoral program. The seminar will be followed by the final, oral examination administered by the Doctoral Committee. Although the general protocol followed during the oral examination shall be at the discretion of the Major Advisor, a typical oral examination lasts about 2 hours and is divided between discussion of the dissertation and related, dissertation subject matter. The research seminar should be scheduled the same day (preferably) or during the week preceding the remainder of the final examination.

**Admissions**

Applicants are required to meet two sets of minimum qualifications for admission: the requirements of the PhD in Plant, Insect, and Microbial Sciences (https://gradstudies.missouri.edu/degreecategory/plant-insect-microbial-sciences) and the minimum requirements of the Office of Graduate Studies (https://gradstudies.missouri.edu/admissions/eligibility-process). Because requirements vary, you must refer to a degree program's graduate admission page to learn about specific admission criteria, application deadlines, eligibility and application process. Your application materials will be reviewed by both the Office of Graduate Studies and the degree program to which you've applied before official admission to the University of Missouri.

**Financial Aid from the Program**

Financial assistance is available to qualified students at both the MS and PhD levels, as either fellowships or research assistantships. Some programs require an extra form or statement from those who wish to be considered for internal assistantships, fellowships or other funding packages. Check the program website (http://plantsci.missouri.edu/graduate) or ask the program contact for details.