

# PLANT PATHOLOGY

## Degree Requirements

### Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The Master of Science degree program in Plant Pathology leads students either to the development of special proficiencies in Plant Pathology, which will allow the individual to directly enter a professional career, or to the development of a basic knowledge of the discipline, allowing for advancement to the Ph.D. degree. M.S. degree students will be introduced to the broad aspects of the field of plant pathology, including:

- exposure to the various causal agents of plant disease and the diseases they incite;
- diseases of current and classical importance affecting a wide range of crop plants;
- a variety of techniques used to isolate, characterize, and identify causal agents of plant disease; and
- an appreciation for the relationship between plant pathology and other biological and physical sciences.

A minimum of 30 credits at the 400, 500, 600, or 800 level is required, with at least 18 credits in the 500 and 600 series combined.

| Code                    | Title                                                            | Credits |
|-------------------------|------------------------------------------------------------------|---------|
| <b>Required Courses</b> |                                                                  |         |
| PPEM 405                | Microbe-Plant Interactions: Plant Disease and Biological Control | 3       |
| PPATH 502               | Plant Disease Diagnosis                                          | 3       |
| PPATH 505               | Fundamentals of Phytopathology                                   | 4       |
| PPATH 522               | Professional Development & Ethics in Plant Pathology             | 1       |
| PPATH 590               | Colloquium <sup>1</sup>                                          | 2       |

#### ADDITIONAL COURSES

All M.S. students must take a minimum of 9 total credits from the following two lists, as described.

|                                                                                |                                                                                  |   |
|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---|
| <i>Microbial Groups (choose at least 6 credits):</i>                           |                                                                                  | 6 |
| PPEM 416                                                                       | Plant Virology: Molecules to Populations                                         |   |
| PPEM 417W                                                                      | Good Bugs, Bad Bugs: How Bacteria Shape Plant Health                             |   |
| PPEM 425                                                                       | Biology of Fungi                                                                 |   |
| <i>Microbial Interactions and the Environment (choose at least 3 credits):</i> |                                                                                  | 3 |
| PPEM 412                                                                       | Turfgrass Disease Management or PPEM 412                                         |   |
| PPEM 440                                                                       | Introduction to Microbiome Analysis                                              |   |
| PPEM 454                                                                       | Virus Ecology                                                                    |   |
| PPEM 456                                                                       | Applied Microbial Ecology                                                        |   |
| AGECO 457                                                                      | Principles of Integrated Pest Management                                         |   |
| PPATH 533                                                                      | Molecular Genetics of Plant-Pathogen Interactions                                |   |
| PPATH 542                                                                      | Epidemiology of Plant Diseases                                                   |   |
| AGBIO 802                                                                      | Plant Protection: Responding to Introductions of Threatening Pests and Pathogens |   |

#### Electives

As approved by the thesis adviser, M.S. students must choose an additional two credits of 400, 500, 600 or 800 level courses in PPEM, PPATH or a related field.

| <b>Culminating Experience <sup>2</sup></b> |                            |           |
|--------------------------------------------|----------------------------|-----------|
| PPATH 600                                  | Thesis Research            | 6         |
| or PPATH 610                               | Thesis Research Off Campus |           |
| <b>Total Credits</b>                       |                            | <b>30</b> |

<sup>1</sup> All students are required to register for and participate in PPATH 590 (1 credit Pass/Fail) for all semesters enrolled. No more than two (2) credits of PPATH 590 may count towards the Master's degree.

<sup>2</sup> A maximum of 6 thesis credits can be applied to the 18 credits required at the 500-600 level.

Students may complete additional course work at other levels as required and/or approved by their committee.

Equivalent courses taken in a previous program may be substituted for M.S. course requirements, by approval of the Program. However, equivalent courses cannot be applied to the 30-credit requirement.

Master's degree students must prepare and present seminars in the departmental PPATH 590, which will evaluate English communication skills. During their studies, Master's degree students may have an opportunity to assist in teaching a disciplinary subject.

All Master's degree students must write a thesis proposal which must be accepted by the adviser(s), committee members, and the Head of the Graduate Program. All Master's degree students must write a thesis which must be accepted by the adviser(s), committee members, the Head of the Graduate Program, and the Graduate School. The student must present and pass a final oral thesis defense.

### Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

| Code                    | Title                                                            | Credits |
|-------------------------|------------------------------------------------------------------|---------|
| <b>Required Courses</b> |                                                                  |         |
| PPEM 405                | Microbe-Plant Interactions: Plant Disease and Biological Control | 3       |
| PPATH 502               | Plant Disease Diagnosis                                          | 3       |
| PPATH 505               | Fundamentals of Phytopathology                                   | 4       |
| PPATH 522               | Professional Development & Ethics in Plant Pathology             | 1       |
| PPATH 590               | Colloquium <sup>1</sup>                                          | 2       |
| PPATH 602               | Supervised Experience in College Teaching <sup>2</sup>           | 1       |

#### ADDITIONAL COURSES

All Ph.D. students must take a minimum of 6 total credits from the following two lists, taking a minimum of 3 each as described.

|                                                                                |                                                      |   |
|--------------------------------------------------------------------------------|------------------------------------------------------|---|
| <i>Microbial Groups (choose at least 3 credits):</i>                           |                                                      | 3 |
| PPEM 416                                                                       | Plant Virology: Molecules to Populations             |   |
| PPEM 417W                                                                      | Good Bugs, Bad Bugs: How Bacteria Shape Plant Health |   |
| PPEM 425                                                                       | Biology of Fungi                                     |   |
| <i>Microbial Interactions and the Environment (choose at least 3 credits):</i> |                                                      | 3 |
| PPEM 412                                                                       | Turfgrass Disease Management                         |   |

or PPEM 412WC

|           |                                                                                  |
|-----------|----------------------------------------------------------------------------------|
| PPEM 440  | Introduction to Microbiome Analysis                                              |
| PPEM 454  | Virus Ecology                                                                    |
| PPEM 456  | Applied Microbial Ecology                                                        |
| AGECO 457 | Principles of Integrated Pest Management                                         |
| PPATH 533 | Molecular Genetics of Plant-Pathogen Interactions                                |
| PPATH 542 | Epidemiology of Plant Diseases                                                   |
| AGBIO 802 | Plant Protection: Responding to Introductions of Threatening Pests and Pathogens |

#### Culminating Experience

|              |                            |   |
|--------------|----------------------------|---|
| PPATH 600    | Thesis Research            | 6 |
| or PPATH 610 | Thesis Research Off Campus |   |

**Total Credits** **26**

<sup>1</sup> Ph.D. students enrolled in the PPATH graduate program must enroll in PPATH 590 every semester until they have passed their comprehensive exam. Two credits of PPATH 590 can be counted toward the degree requirements.

<sup>2</sup> Students may take up to 3 credits of PPATH 602 Supervised Experience in College Teaching.

Students may enroll in other courses tailored to the individual by the student's Ph.D. committee.

Ph.D. students must prepare and present seminars in the departmental PPATH 590, which will evaluate English communication skills. During their studies, Ph.D. students will have an opportunity to assist in teaching a disciplinary subject.

All doctoral students must pass a qualifying examination, a comprehensive examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral students must also write a dissertation proposal and a dissertation. The dissertation proposal must be accepted by the adviser(s), committee members, and the head of the graduate program. The dissertation must be accepted by the adviser(s), committee members, and the head of the graduate program, and the Graduate School. The student must present and pass a dissertation defense.