

Status: PENDING

PROGRAM REQUEST
Doctorate of Philosophy in Plant Pathology

Last Updated: Myers, Dena Elizabeth
01/19/2011

Fiscal Unit/Academic Org	Plant Pathology - D1178
Administering College/Academic Group	Food, Agric & Environ Science
Co-administering College/Academic Group	
Semester Conversion Designation	Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses)
Current Program/Plan Name	Plant Pathology
Proposed Program/Plan Name	Doctorate of Philosophy in Plant Pathology
Program/Plan Code Abbreviation	PLNTPH-PH
Current Degree Title	Doctor of Philosophy

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		120	80.0	80	0.0
Required credit hours offered by the unit	Minimum	36	24.0	30	6.0
	Maximum	37	24.7	32	7.3
Required credit hours offered outside of the unit	Minimum	84	56.0	48	8.0
	Maximum	84	56.0	50	6.0
Required prerequisite credit hours not included above	Minimum	0	0.0	0	0.0
	Maximum	0	0.0	0	0.0

Explain any change in credit hours if the difference is more than 4 semester credit hours between the values listed in columns B and C for any row in the above table

The required courses in the semester are necessary to provide the comprehensive curriculum in our discipline that is the foundation for our learning objectives. We feel requiring the additional pathogen classes will give the student a more well-rounded education. There was additional courses added to the required list of courses for the Ph.D. degree. This was in part because a course that was not taught in quarters will now be taught in semesters (PLNTPH 5030: Nematology).

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

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Program Learning Goals

- (See attached file for specially formatted learning outcomes.)
- Understand the importance of the history, principles, and practices of plant pathology.
- Understand social and global issues pertinent to plant pathology, including economic, political, scientific and ethical perspectives that pertain to international development and commerce.
- Know the basic core foundation in biology (including general plant anatomy and physiology), chemistry, mathematics, and statistics.
- Understand the fundamental biology of the major pathogen groups and plant-associated microbes that affect plant health, including fungi, oomycetes, bacteria, viruses, and nematodes.
- Understand how plant diseases develop temporally and spatially in plant populations using simple mathematical models.
- Understand the basic ecology of plant-associated microbes including means of transmission, dissemination and survival.
- Know the molecular basis for disease development and suppression as it relates to pathogenesis, host resistance, and biological control.
- Know and characterize major mechanisms of plant disease resistance and host-pathogen interactions at the cellular and molecular levels.
- Know the principles of plant disease management and how to deploy integrated plant health management strategies.
- Know the basic tenets and applications of genetic and genomic-based studies as they relate to plant pathology.
- Be able to diagnose plant diseases (and use Koch's Postulates) and explain pathogen-induced changes on plant anatomy and physiology.
- Be able to isolate and identify plant-associated microbes that affect plant health and know classical, biochemical and molecular characterization methods.
- Be able to generate and test hypotheses on a central research question using the scientific method.
- Be able to conduct experiments using good laboratory/field practices and standard operating procedures.
- Be able to communicate with diverse audiences in both written and oral forms and describe, interpret and present a disease related topic.
- Demonstrate professional behavior that is consistent with the highest ethical and moral standards.

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes

Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? No

A full assessment plan has been submitting using the survey form

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

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Pre-Major

Does this Program have a Pre-Major? No

Attachments

- PLNTPH PhD Learning Outcomes 8-27-10.docx: PLNTPHPhDLearningOutcomes9-13-10
(Other Supporting Documentation. Owner: Ellis,Sarah Dee)
- PLNTPH PhD Assessment Plan 9-29-10.pdf: PLNTPHPhDAssessmentPlan/CurricularMap9-29-10
(Curricular Map(s). Owner: Ellis,Sarah Dee)
- PLNTPH PhD Program Proposal 11-19-10.pdf: PLNTPHPhDProgramProposal11-19-10
(Program Proposal. Owner: Ellis,Sarah Dee)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Ellis,Sarah Dee	10/01/2010 11:18 AM	Submitted for Approval
Approved	Graham,Terrence Lee	10/01/2010 11:42 AM	Unit Approval
Revision Requested	Stokoe,Laurie Anne	10/18/2010 10:50 AM	College Approval
Submitted	Ellis,Sarah Dee	10/28/2010 01:34 PM	Submitted for Approval
Approved	Mitchell,Thomas Kenneth	10/28/2010 01:54 PM	Unit Approval
Revision Requested	Stokoe,Laurie Anne	11/05/2010 03:55 PM	College Approval
Submitted	Ellis,Sarah Dee	11/10/2010 03:54 PM	Submitted for Approval
Approved	Mitchell,Thomas Kenneth	11/10/2010 05:22 PM	Unit Approval
Revision Requested	Stokoe,Laurie Anne	11/16/2010 07:41 AM	College Approval
Submitted	Ellis,Sarah Dee	11/22/2010 02:42 PM	Submitted for Approval
Approved	Mitchell,Thomas Kenneth	11/22/2010 02:52 PM	Unit Approval
Revision Requested	Stokoe,Laurie Anne	11/29/2010 03:22 PM	College Approval
Submitted	Ellis,Sarah Dee	12/08/2010 03:45 PM	Submitted for Approval
Approved	Mitchell,Thomas Kenneth	12/08/2010 05:18 PM	Unit Approval
Approved	Stokoe,Laurie Anne	01/14/2011 04:09 PM	College Approval
Approved	Myers,Dena Elizabeth	01/19/2011 10:17 AM	GradSchool Approval
Pending Approval	Soave,Melissa A	01/19/2011 10:17 AM	CAA Approval



Department of Plant Pathology

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September 15, 2010

Office of Academic Affairs
203 Bricker Hall
190 North Oval Mall
Columbus, OH 43210

Dear Office of Academic Affairs,

Currently the Department of Plant Pathology consists of 4 programs: Minor in Plant Pathology, Major in Plant Health Management, Master's of Science in Plant Pathology, and Doctorate of Plant Pathology. All programs will remain in the semester system with modifications to each and the addition of a new major (Major in Plant Pathology) and tagged masters (Master in Plant Health Management).

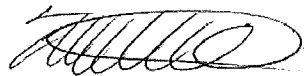
The following document is the Doctorate of Philosophy in Plant Pathology (within the College of Food, Agricultural and Environmental Science) to begin Summer of 2012. Currently the Ph.D. degree in our department is Plant Pathology and is typically a 4-6 year program. When we convert to semesters, the name of the degree will remain the same and the degree will require a dissertation. The major will consist of 80 credit hours or course work not including research hours. The core curriculum consists of courses at the 5000-8000 level. Students will begin their coursework with our advanced plant pathology course (PLNT PTH 6001- equivalent to PLNT PTH 401 in the quarter system). Following completion of this course, they are required to take the following 5000-level courses: pathogen based courses (mycology, virology, bacteriology, and nematology), plant disease management, disease diagnosis May/summer course, and lastly an advanced statistics course. The following 7000-8000 level courses will also be required of students: Plant Disease Epidemiology, Agricultural Genomics: Principles and Applications, Current Topics in Plant Pathology, Molecular Bases of Plant Host-Microbe Interactions, and Mentored Teaching/Extension.

As part of the development of this program proposal, we sought the assistance of our existing graduate students. Specifically, a graduate student representative is a member of the Department of Plant Pathology Academic Affairs Committee. As part of her duties, she brought the proposal and new curriculum to the graduate students for review and comment. The students did a thorough job of reviewing the plan and made excellent suggestions for improvement. We believe their input was vital to the quality of this proposal.

The faculty in the Department of Plant Pathology faculty, staff, and students met on March 6, 2010 in a retreat specifically designed to discuss the transition to semesters. At the retreat, the undergraduate program's curricula were determined. The faculty since has reviewed the curricula, learning outcomes,

rationale, assessment plan, transition policy, semester course list, and curriculum maps. A vote was conducted by the faculty on Thursday, June 17, 2010. The vote for the proposal unanimously affirmative (13/13). Subsequently, we forwarded the proposal to the College of Food, Agricultural, and Environmental Science for review.

Sincerely,



Thomas Mitchell
Academic Affairs Committee Chair
Department of Plant Pathology
Assistant Professor
Ohio State University
Columbus, OH

Doctorate of Philosophy in Plant Pathology

Rationale for proposed program change and description of how the changes will benefit students and enhance program quality.

The Ph.D. in Plant Pathology program is primarily a research degree, however a number of changes were made to ensure students graduated with a solid foundation in the discipline as reflected in our learning objectives. The most substantive changes were to the courses themselves rather than the requirements of the degree. Students will still be required to take the core curriculum of the pathogen groups with the addition of Nematology, which was added following the recent hiring of a new faculty in that area. In the quarter system, the major pathogen groups each compose a full quarter course, which are changed in the semester system where three of the 4 groups will become half semester courses. Currently new students to the degree have to take PLNTPH401 – General Plant Pathology, however they do not receive graduate credit. This course has been changed to the 600-level (6001 in semesters) with added content and rigor. PLNTPH602 Molecular Plant Microbe Interactions, is currently required, but will be changed in the semester system and developed into an 800-level (8400 in semesters) capstone course. Following the completion of the core curriculum, a series of elective courses is open for students to tailor their studies towards the research they are doing or the career they are looking towards.

Plant Pathology
Semester Course
List

Quarter Course Number	Semester Course Number	Course Title in Semester	Instructor(s)	Quarter Credit Hours	Semester Credit Hours	Number of Weeks	Semester Offered
	2000 - GEC	Molds, Mushrooms and Man	Tom Mitchell		3	14 weeks	Spring
201D	2001	Sick Plants and a Hungry World	Sarah Ellis	3	2	14 weeks	Autumn, Spring
401	3001	General Plant Pathology Lecture	Sarah Ellis	5	2	14 weeks	Autumn
	3002	General Plant Pathology Lab	Sarah Ellis		2	14 weeks	Autumn
395	3195	Plant Health Science Forum	Monica Lewandowski	1	1	14 weeks	May
597	3597	Societal Issues: Pesticides, Alternatives, and the Environment	Monica Lewandowski	5	3	14 weeks	Autumn, Spring
489	4191	Internship Experiences in Plant Health Management	Monica Lewandowski	1-5	1-6	14 weeks	Autumn, Spring, Summer
	4683	Research with Distinction	Faculty		1-6	14 weeks	Autumn, Spring, Summer
H683	4683 (H)	Research with Distinction	Faculty	1-10	1-6	14 weeks	Autumn, Spring, Summer
455	4550	Bioterrorism: An Overview	Michael Boehm	5	2	7 weeks	Spring
	4998	Undergraduate Research	Faculty		1-6	14 weeks	Autumn, Spring, Summer
600.01	5010	Phytobacteriology	Brian McSpadden-Gardener	3	2	7 weeks	Spring
600.02	5020	Introductory Plant Virology	Feng Qu	3	2	7 weeks	Spring
636	5030	Plant Nematology	Chris Taylor	3	2	7 weeks	Spring

660	5040	Science of Fungi: Mycology Lecture	Tom Mitchell	5	3	14 weeks	Autumn
	5041	Science of Fungi: Mycology Lab	Tom Mitchell		1	14 weeks	Autumn
610	5110	Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments	Enrico Bonello/Dan Herms	4	3	14 weeks	Spring
501	5120	Diseases of Ornamentals	Dennis Lewandowski	5	2	7 weeks	Spring
612/613	5130	Turf Diseases and Integrated Turf Health Management	Joe Rimelspach	3-4	3	14 weeks	Autumn
614	5140	Diseases of Field Crops	Anne Dorrance and Pierce Paul	3	2	14 weeks	Spring
615	5150	Fruit and Vegetable Diseases	Michael Ellis and Sally Miller	3	2	7 weeks	Spring
603	5603	Plant Disease Management	Michael Ellis and Larry Madden	5	3	14 weeks	Autumn
	5604	Capstone Course: Problem-Based Studies in Plant Health	Faculty from Plant Path and Entomology		2	14 weeks	Spring
685	5685	Plant Disease Diagnosis	Sally Miller	3	2	3 weeks May/Summer	Summer, May
401	6001	Advanced Plant Pathology	Sarah Ellis		3	14 weeks	Autumn
693	6193	Individual Studies	Faculty	1-5	1-6	14 weeks	Autumn, Spring, Summer
702	7002	Plant Disease Epidemiology	Larry Madden	4	3	14 weeks	Spring
703	7003	Agricultural Genomics: Principles and Applications	Guo-Liang Wang and Eric Stockinger	3	3	14 weeks	Spring
830	8300	Current Topics in Plant Pathology	Bonello, Mitchell, McSpadden-Gardener, Wang	1-2	1-2	14 weeks	Autumn, Spring, Summer
602/841/842/843	8400	Molecular Bases of Plant Host-Microbe Interactions	Graham/ Bonello/ McSpadden- Gardener/Redinbaugh/ Taylor/ Mitchell/Wang	1-3	3	14 weeks	Spring

995	8899	Plant Pathology Seminar	Various Instructors	1	1	14 weeks	Autumn, Spring
901	8901	Mentored Teaching in Plant Pathology	Various Instructors	1-5	1-3	14 weeks	Autumn, Spring, Summer
902	8902	Mentored Extension/Outreach Teaching in Plant Pathology	Michael Ellis	1-3	1	14 weeks	Autumn, Spring, Summer
999	8999	Plant Pathology Research	Various Instructors	1-100	1-100	14 weeks	Autumn, Spring, Summer

*No longer offering: 294, 300, 602, 604, 613, 655, 694, 704, 832, 838, 839, 841, 842, 843. Either doing away with or incorporating course into other semester courses.

Doctor of Philosophy in Plant Pathology

Semester Curriculum Advising Sheet

Requirements and Curriculum

Doctoral degree programs give students the opportunity to achieve a high level of scholarly and technical competence. The doctoral degree program consists of a coherent schedule of courses and laboratory and/or field-based research. Success in coursework does not guarantee success in dissertation research, which must constitute an original and significant contribution to the field of plant pathology. Normally, a dissertation should include or be equivalent to several publications in peer-reviewed scientific journals.

- **80 credit hour minimum**

Course and Credit Hour Requirements

- *Core Curriculum* **33-35 credits**

All students seeking a Doctor of Philosophy Degree in Plant Pathology will take the following courses:

Core 5000-6000 level graduate courses:

PLNTPTH 6001: Advanced Plant Pathology	3 credits
PLNTPTH 5010: Phytobacteriology	2 credits
PLNTPTH 5020: Virology	2 credits
PLNTPTH 5030: Nematology	2 credits
PLNTPTH 5040 & 5041: Science of Fungi: Mycology Lecture and Lab	4 credits
PLNTPTH 5603: Plant Disease Management	3 credits
PLNTPTH 5685: Plant Disease Diagnosis	2 credits
Advanced Statistics Course (agreed upon by SAC)	3 credits

Core 7000-8000 level graduate courses:

PLNTPTH 7002: Plant Disease Epidemiology	3 credits
PLNTPTH 7003: Agricultural Genomics: Principles and Applications	3 credits
PLNTPTH 8300: Current Topics in Plant Pathology	2 credits
PLNTPTH 8400: Molecular Bases of Plant Host-Microbe Interaction	3 credits
PLNTPTH 8901 or PLNTPTH 8902: Mentored Teaching/Extension	1-3 credits

- *Electives* **45-47 credits**

Electives will consist of courses chosen by the SAC to support the student's area of research. It will also consist of PLNTPTH 8899 Seminar credits and PLNTPTH 8999 Research credits.

After meeting with the student to determine the student's proficiency and needs for coursework, and during the development of Form I, the SAC may decide to recommend substitutions in

courses listed above with other courses more appropriate for the student's graduate program. Such changes should be listed and each individually justified on Form I and a copy sent to the Graduate Studies Chair for signature and approval. Often changes in coursework are necessary later in a student's program of study. Justification for these substitutions will be listed as an amendment to Form I, and subject to approval by signature by the Graduate Studies Chair.

As specified by the SAC, a typical Ph.D. degree program will include from 80 credit hours of coursework, not including PLNTPH 8899 - Seminar. Research credits will be registered for under PLNTPH 8999 - Research. To lower the requirement for total credit hours, credits for qualified courses taken elsewhere may be transferred to The Ohio State University. This requires approval of the advisor, the SAC, and the GSC, **and will be done within the first 2 semesters of enrolling** (Graduate School policy). The exception could be for part-time students or students enrolling for the minimum number of credit hours.

The requirement for 80 credit hours of course work comes from the department, not the Graduate School. The SAC has maximum flexibility over a student's course work. For instance, the SAC may give "credit" to a student for three graduate courses taken at another institution prior to coming to The Ohio State University. This is not an official credit transfer, but an in-house acknowledgment that some course requirements and learning goals have been met. This also will not reduce the requirement of graduate credit hours beyond the baccalaureate degree required to earn a doctoral degree. The specific courses taken, as well as the exact number of credit hours, are determined by the SAC based on the specifications in the departmental Graduate Student Handbook. In the example above, the SAC will decide whether one-to-three additional courses should be taken by the student at OSU, or if research credit is required.

Plant Pathology Quarter's Advising Sheet

Doctor of Philosophy (Ph.D.) Degree

Doctoral degree programs give students the opportunity to achieve a high level of scholarly and technical competence. The doctoral degree program consists of a coherent schedule of courses and laboratory and/or field-based research. Success in coursework does not guarantee success in dissertation research, which must constitute an original and significant contribution to the field of plant pathology. Normally, a dissertation should include or be equivalent to several publications in peer-reviewed scientific journals.

Course and Credit Hour Requirements

Core 600-level graduate courses in Plant Pathology

PLNTPTH 600.01 Phytobacteriology 3 credits
PLNTPTH 600.02 Plant Virology 3 credits
PLNTPTH 602 Plant-Microbe Interactions 4 credits
PLNTPTH 603 Plant Disease Management 5 credits
PLNTPTH 660 Mycology 5 credits

In addition, a minimum of sixteen additional credit hours of graduate courses at the 700 or 800 level are required for the Ph.D. degree. At least three of the following courses must be taken:

PLNTPTH 702 Plant Disease Epidemiology 4 credits
PLNTPTH 703 Agricultural Genomics 3 credits
PLNTPTH 830 Current Topics in Plant Pathology 1-2 credits
PLNTPTH 842 Biochemistry of Plant Response to Infection 3 credits
PLNTPTH 843 Ecology of Plant-Associated Microbes 5 credits

Ph.D. students accepted into the Plant Molecular Biology and Biotechnology (PMBB) Program and majoring in Plant Pathology must take:

PLNTPTH 600.01 Phytobacteriology 3 credits
PLNTPTH 600.02 Plant Virology 3 credits
PLNTPTH 660 Mycology 5 credits

and two of the following courses:

PLNTPTH 703 Agricultural Genomics 3 credits
PLNTPTH 842 Biochemistry of Plant Response to Infection 3 credits
PLNTPTH 843 Ecology of Plant-Associated Microbes 5 credits

PMBB students must also fulfill the PMBB program's course requirements. Additional Plant Pathology courses, such as PLNTPTH 655 - Quantitative Methods in Applied Biology, PLNTPTH 685 - Diagnostic Field Plant Pathology, and PLNTPTH 841 - Molecular Mechanisms of Pathogenicity may be recommended by the student's SAC.

After meeting with the student to determine the student's proficiency and needs for coursework, and during the development of Form I, the SAC may decide to recommend substitutions in courses listed above with other courses more appropriate for the student's graduate program. Such changes should be listed and each individually justified on Form I and a copy sent to the Graduate Studies Chair for signature and approval. Often changes in coursework are also necessary later in a student's program of study. Justification for these substitutions should be listed as an amendment to Form I, again subject to approval by signature by the Graduate Studies Chair.

As specified by the SAC, a typical Ph.D. degree program may include from 75 to 95 credit hours of coursework, not including PLNTPH 995 - Seminar. Research credits will typically be 40 to 60 credit hours and will be registered for under PLNTPH 999 - Research.

To lower the requirement for total credit hours, credits for qualified courses taken elsewhere may be transferred to The Ohio State University. This requires approval of the advisor, the SAC, and the GSC, **and should be done within the first 2 quarters of enrolling** (Graduate School policy). In most cases, a formal transfer is not needed because it is rare for a full-time Ph.D. student to have less than 120 credit hours by the time of graduation. The exception could be for part-time students or students enrolling for the minimum number of credit hours. See more details and important requirements for these transfers below under "Important Residency Requirements".

The requirement for 75-95 credit hours of course work comes from the department, not the Graduate School. The SAC has great flexibility here. For instance, the SAC may give "credit" to a student for three graduate courses taken at another institution prior to coming to The Ohio State University. This is not an official credit transfer, but an in-house acknowledgment that some of our course requirements have been met. This also would not reduce the requirement of 120 graduate credit hours beyond the baccalaureate degree required to earn a doctoral degree. The specific courses taken, as well as the exact number of credit hours in courses, are determined by the SAC based on the specifications in the departmental Graduate Student Handbook. In the example above, the SAC would decide whether one-to-three additional courses should be taken by the student at OSU, or if research credit should be taken.

Doctorate of Philosophy in Plant Pathology

4-Year Plan

Typical semester course map for a Ph.D. student (to be modified by SAC):

Year 1: Autumn Semester

PLNTPTH 6001: Advanced Plant Pathology (3)

Advanced Statistics (3)

PLNTPTH 8899: Seminar (1)

Year 1: Spring Semester

PLNTPTH 5010: Phytobacteriology (2)

PLNTPTH 5020: Virology (2)

PLNTPTH 5030: Nematology (2)

PLNTPTH 8899: Seminar (1)

Year 1: May-Term

PLNTPTH 5685: Plant Disease Diagnosis (2)-----or-----PLNTPTH 5685: Plant Disease Diagnosis (2)

PLNTPTH 8999: Research (X)

Year 1: Summer Semester

PLNTPTH 5685: Plant Disease Diagnosis (2)

PLNTPTH 8999: Research (X)

Year 2: Autumn Semester

PLNTPTH 5603: Plant Disease Management (3)

PLNTPTH 5040/5041: Science of Fungi: Mycology (4)

PLNTPTH 8899: Seminar (1)

PLNTPTH 8901 or 8902: Mentored Teaching/Extension(1-3)PLNTPTH 8999: Research (X)

Year 2: Spring Semester

PLNTPTH 7002: Plant Disease Epidemiology (3)

PLNTPTH 8300: Current Topics in PlantPath(2)

PLNTPTH 8899: Seminar (1)

PLNTPTH 8999: Research (X)

Year 2: May Term

PLNTPTH 8999: Research (X)

Year 2: Summer Semester

Electives (X)

PLNTPTH 8999: Research (X)

Year 3: Autumn Semester

Electives (X)

PLNTPTH 8400: Molecular Bases of Plant

Host-Microbe Interactions (3)

Year 3: Spring Semester

PLNTPTH 7003: Agricultural Genomics: Principles
and Applications (3)

Doctorate of Philosophy in Plant Pathology

Transition Policy

A student entering the Ph.D. in Plant Pathology program in **Academic Year 2010-2011** (SU, AU, WI, SP) will spend up to two years in the current quarter system and subsequent terms in the semester system. A suggested quarter/semester course plan is included below.

Plant Pathology course requirements for the Ph.D. will change from the quarter to semester systems. In general, more courses will be required in the semester system. Plant Disease Diagnosis (PLNTPH 5685) and Nematology (PLNTPH 5030), two courses not required in the quarter system curriculum, will be required in the semester system. Some electives in the quarter system will become requirements in the semester system: Plant Disease Epidemiology (PLNTPH 7002), Agricultural Genomics (PLNTPH 7003), and Current Topics in Plant Pathology (PLNTPH8300). As stated in the Graduate Program Handbook, the SAC may allow for substitutions of courses with others that are more appropriate for the student's graduate program.

Course Map for Students Entering Academic Year 2010-2011
(The map for the PhD program starts in Autumn 2010)

Year	Quarter/Semester	Required Courses	Possible Elective Courses
1	Autumn 2010	General PP 401(5Q) (4S); advanced statistics course (5Q) (3S)	
1	Winter 2011	Mycology 660 (5Q) (4S)	Fruit and Veg Path 615 (3Q) (2S)
1	Spring 2011	Plant Disease Mgt. 603 (5Q) (3S)	
2	Summer 2011	Plant Dis. Diagnosis 685 (3Q) (2S)	
2	Autumn 2011	Bacteriology 600.01 (3Q) (2S), Virology 600.02 (3Q) (2S)	Turf Path 613 (4Q) (3S), 655 (3Q), Forest Path 610 (4Q) (3S)
2	Winter 2012	Epidemiology 702 (4Q) (3S)	Plant Responses 842 (3Q)
2	Spring 2012	Current Issues 830 (1-2Q) (1- 2S)	Field Crop Path 614 (3Q) (2S)
Semester System Begins			
3	May/Summer 2012		
3	Autumn 2012	Plant-Microbe Interactions (8400 - 3S),	
3	Spring 2013	Nematology (5030 - 2S)* Agricultural Genomics (7003 - 3S)	

Q: Number of credit hours on the quarter system

S: Number of credit hours on the semester system

* Elective course unless required by the SAC

Note: international students from countries where English is not the first language may be required to take English writing courses.

A student entering the Ph.D. in Plant Pathology program in **Academic Year 2011-2012** will spend up to one year in the current quarter system and subsequent quarters in the semester system. A suggested course plan for quarters and semesters is included below.

Requirements for the degree will change from the quarter to semester systems. In general, more courses will be required in the semester system. Students will be required to take Plant Disease Diagnosis (PLNTPH 5685) and Nematology (PLNTPH 5030). These two courses are not required in the quarter system. Some electives in the quarter system will be requirements in the semester system. These include Plant Disease Epidemiology (PLNTPH 7002), Agricultural Genomics (PLNTPH 7003), and Current Topics in Plant Pathology (PLNTPH 8300). As stated in the Graduate Program Handbook, the SAC may allow substitutions of courses with others that are more appropriate for the student's graduate program.

Course Map for Students Entering Academic Year 2011-2012
(The map for the PhD program starts in Autumn 2011)

Year	Quarter/Semester	Required Courses	Possible Elective Courses
1	Autumn 2011	General PP 401 (5Q) (4S); advanced statistics course (5Q) (3S)	Turf Path 613 (4Q) (3S), Forest Path 610 (4Q) (3S), PP Stats 655 (3Q)
1	Winter 2012	Mycology 660 (5Q) (4S) Epidemiology 702 (4Q – or Spring 2012) (3S)	Fruit and Veg Path 615 (3Q) (2S)
1	Spring 2012	Plant Disease Mgt. 603 (5Q) (3S) Agricultural Genomics 703 (3Q) 3S)	Field Crop Path 614 (3Q) (2S)
Semester System Begins			
2	May/Summer 2012	Plant Disease Diagnosis(5685 - 2S)	
2	Autumn 2012	Plant-Microbe Interactions (8400 – 3S)	Turf Path 612/613 (5130 – 3S) , Forest Path 610 (5110 – 3S),
2	Spring 2013	Phylobacteriology (5010 – 2S), Virology (5020 – 2S), Nematology (5030 – 2S) Current Topics (8300- 1-2S)	Field Crop Path 614 (5140 – 2S)
3	May/Summer 2013		
3	Autumn 2013		

Q: Number of credit hours on the quarter system

S: Number of credit hours on the semester system

Note: international students from countries where English is not the first language may be required to take English writing courses.

Doctor of Philosophy in Plant Pathology
Assessment Plan

Learning Outcome Course Matrix

(Note: international students from countries where English is not the first language may be required to take English writing courses.)
(SAC = Student Advisory Committee)
(* indicates required courses for Plant Pathology Ph.D. program)

<i>Learning Outcomes for each Program</i>		<i>Course that achieves this goal at a beginning level</i>	<i>Course that achieves this goal at an intermediate level</i>	<i>Course that achieves this goal at an advanced level</i>	<i>OTHER means of assessment</i>
FOUNDATIONAL KNOWLEDGE					
Global Perspectives					
LO#1: Understand the importance of the history, principles, and practices of plant pathology;	6193 (Individual Stud.)	*5010 (Phytobacteriology), *5030 (Nematology), *7002 (Epidemiology), 8400 (Plant-Host Interaction)	*5040 (Mycology Lecture), 5140 (Dis. of Field Crops), *6001 (Adv. Plant Path)	PhD candidacy examination (written and oral); advanced level. Final oral examination; advanced level. Annual student evaluation by faculty advisor; advanced level. PhD dissertation; advanced level	
LO#2: Understand social and global issues pertinent to plant pathology, including economic, political, scientific and ethical perspectives that pertain to international development and commerce;	*5010 (Bacteriology), 5110 (Forest Health Protect.), 5120 (Dis. of Ornaments)	*5030 (Nematology), *8899 (Seminar)	*5040 (Mycology Lecture), 5140 (Dis. of Field Crops), *6001 (Adv. Plant Path)	PhD dissertation; advanced level	
Core Science and Mathematics					

Learning Outcomes for each Program	Course that achieves this goal at a beginning level	Course that achieves this goal at an intermediate level	Course that achieves this goal at an advanced level	OTHER means of assessment
<p>LO#3: Know the basic core foundation in biology (including general—plant anatomy and physiology), chemistry, mathematics, and statistics;</p>	<p>*5010 (Bacteriology), 5110 (Forest Health Protect.), 5130 (Turf Dis.), *8899 (Seminar), 8400 (Plant-Host Interaction)</p>	<p>5140 (Dis. of Field Crops), *6001 (Adv. Plant Path), *7002 (Epidemiology)</p>	<p>Faculty advisor and SAC review of students previous coursework and knowledge of field; recommendations are made for additional coursework.</p> <p>Annual student evaluation by faculty advisor; advanced level.</p> <p>PhD candidacy examination (written and oral); intermed-advanced level.</p> <p>PhD final oral examination; intermed-advanced level.</p> <p>PhD dissertation; advanced level</p>	
<p>Plant Pathology</p>				
<p>LO#4: Understand the fundamental biology of the major pathogen groups and plant-associated microbes that affect plant health, including fungi, oomycetes, bacteria, viruses, and nematodes;</p>	<p>*5020 (Virology), *5030 (Nematology), 5110 (Forest Health Protect.), 5130 (Turf Dis.), 5150 (Fruit and Veg Dis.), *5603 (Dis. Mgt.), *5685 (Dis. Diagnosis), *8899 (Seminar), *8300 (Current Topics), 8400 (Plant-Host Interaction)</p>	<p>*5010 (Bacteriology), *5040 (Mycology Lecture), *5041 (Mycology Lab), 5140 (Dis. of Field Crops), *6001 (Adv. Plant Path)</p>	<p>Faculty advisor and SAC review of students' previous coursework and knowledge of field; recommendations are made for additional coursework.</p> <p>Annual student evaluation by faculty advisor; intermed-advanced level.</p> <p>PhD candidacy examination (written and oral) ; intermed-advanced level.</p> <p>PhD final oral examination. Beginning to advanced levels.</p> <p>PhD dissertation; advanced level.</p>	
<p>LO#5: Understand how plant diseases develop temporally and spatially in plant populations using simple mathematical models;</p>	<p>*5030 (Nematology), 5110 (Forest Prob.)</p>	<p>*5603 (Dis. Mgt.), *8899 (Seminar)</p>	<p>PhD candidacy examination.</p> <p>PhD final oral examination. Beginning to advanced levels</p> <p>PhD dissertation; advanced level</p>	

Learning Outcomes for each Program	Course that achieves this goal at a beginning level	Course that achieves this goal at an intermediate level	Course that achieves this goal at an advanced level	OTHER means of assessment
LO#6: Understand the basic ecology of plant-associated microbes including means of transmission, dissemination and survival;	5120 (Dis. of Ornamentals), *8899 (Seminar)	*5030 (Nematology), 5130 (Turf Dis.), 5150 (Fruit and Veg Dis.), *5603 (Dis. Mgt.)	*5010 (Bacteriology), *5040 (Mycology Lecture), *5041 (Mycology Lab), 5110 (Forest Health Protect.), 5140 (Dis. of Field Crops), *6001 (Adv. Plant Path), *7002 (Epidemiology), *8300 (Current Topics), 8400 (Plant-Host Interaction)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level
LO#7: Know the molecular basis for disease development and suppression as it relates to pathogenesis, host resistance, and biological control;	*8899 (Seminar)	*5010 (Bacteriology), *5020 (Virology), *5030 (Nematology), *5040 (Mycology Lecture)	8400 (Plant-Host Interaction), 8999 (Seminar)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level
LO#8: Know and characterize major mechanisms of plant disease resistance and host-pathogen interactions at the cellular and molecular levels;	*5603 (Dis. Mgt.), 8899 (Seminar)	*5010 (Bacteriology), *5030 (Nematology), *7003 (Ag. Genomics)	8400 (Plant-Host Interaction), 8999 (Research)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level
LO#9: Know the principles of plant disease management and how to deploy integrated plant health management strategies;	8400 (Plant-Host Interaction)	*5030 (Nematology), 5120 (Dis. of Ornamentals), 8902 (Extension)	5110 (Forest Health Protect.), 5130 (Turf Dis.), 5140 (Dis. of Field Crops), 5150 (Fruit and Veg Dis.), *5603 (Dis. Mgt), 5604 (Capstone), *6001 (Adv. Plant Path), *7002 (Epidemiology), *8300 (Current Topics)	Depending on discipline of the student: PhD: candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level

Learning Outcomes for each Program	Course that achieves this goal at a beginning level	Course that achieves this goal at an intermediate level	Course that achieves this goal at an advanced level	OTHER means of assessment
LO#10: Know the basic tenets and applications of genetic and genomic-based studies as they relate to plant pathology;	*5020 (Virology), *6001 (Adv. Plant Path), 8899 (Seminar)	*5010 (Bacteriology), *5030 (Nematology), *5040 (Mycology Lecture), *7003 (Ag. Genomics)	8400 (Plant-Host Interactions), 8999 (Research)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level
SKILLS				
Plant Pathology	LO#11: Be able to diagnose plant diseases (and use Koch's Postulates) and explain pathogen-induced changes on plant anatomy and physiology;	*5020 (Virology), 5110 (Forest Health Protect.), 5120 (Dis. of Ornamentals), *6001 (Adv. Plant Path)	*5010 (Bacteriology), *5030 (Nematology), 5130 (Turf Dis.), 5150 (Fruit and Veg Dis.), *5603 (Dis. Mgt.), 8899 (Seminar)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level
Research	LO#12: Be able to isolate and identify plant-associated microbes that affect plant health and know classical, biochemical and molecular characterization methods;	*5020 (Virology), 5120 (Dis. of Ornamentals), *5603 (Dis. Mgt.)	*5010 (Bacteriology), *5041 (Mycology Lab), *5685 (Dis. Diagnosis), 8999 (Research)	Depending on discipline of the student: PhD candidacy examination. PhD final oral examination. Beginning to advanced levels. PhD dissertation; advanced level

Learning Outcomes for each Program	Course that achieves this goal at a beginning level	Course that achieves this goal at an intermediate level	Course that achieves this goal at an advanced level	OTHER means of assessment
LO#13: Be able to generate and test hypotheses on a central research question using the scientific method;	*5020 (Virology), *5040 (Mycology Lecture)	*5010 (Bacteriology), 5140 (Dis. of Field Crops), *7002 (Epidemiology), 8899 (Seminar)	*8300 (Current Topics), 8400 (Plant-Host Interaction), 8999 (Research)	Written research proposal and defense (administered by advisor and SAC); advanced level. Annual student evaluation by faculty advisor; advanced level. Public seminar and final seminar requirements; intermediate-advanced level. Publications; advanced level. PhD candidacy examination (written and oral); advanced level. PhD final oral examination; advanced level. PhD dissertation; advanced level
LO#14: Be able to conduct experiments using good laboratory/field practices and standard operating procedures;	*5020 (Virology), *5041 (Mycology Lab), *6001 (Adv. Plant Path)	*5010 (Bacteriology), 5140 (Dis. Of Field Crops), *7002 (Epidemiology), 8400 (Plant-Host Interaction), 8899 (Seminar)	8999 (Research)	PhD dissertation; advanced level Annual student evaluation by faculty advisor; advanced level. PhD dissertation; advanced level
Communication				
LO#15: Be able to communicate with diverse audiences in both written and oral forms and describe, interpret and present a disease related topic; and	*5020 (Virology), *5040 (Mycology Lecture), 6193 (Forest Health.), Stud.)	*5010 (Bacteriology), 5120 (Dis. Of Field Ornamentals), 5130 (Turf Dis.), *5603 (Dis. Mgt.), 5604 (Capstone), *5685 (Dis. Diagnosis), *6001 (Adv. Plant Path), *7002 (Epidemiology), 8400 (Plant-Host Interaction)	5140 (Dis. Of Field Crops), *8300 (Current Topics), 8899 (Seminar), *8901 (Teaching)/*8902 (Extension)	Written research proposal (administered by advisor and SAC); Oral presentation of research proposal. Beginning-intermediate level. Annual student evaluation by faculty advisor; advanced level. PhD candidacy examination (written and oral); advanced level.

Learning Outcomes for each Program	Course that achieves this goal at a beginning level	Course that achieves this goal at an intermediate level	Course that achieves this goal at an advanced level	OTHER means of assessment
<p>PROFESSIONALISM</p> <p>LO#16: Demonstrate professional behavior that is consistent with the highest ethical and moral standards.</p>	<p>*5020 (Virology)</p>	<p>*5010 (Bacteriology), *5030 (Nematology), 5110 (Forest Health Protect.), 5120 (Dis. of Ornamentals), *5685 (Dis. Diagnosis)</p>	<p>5140 (Dis. Of Field Crops), 5604 (Capstone), *8300 (Current Topics), 8899 (Seminar), *8901 (Teaching) or *8902 (Extension), 8999 (Research)</p>	<p>Public seminar and final seminar requirements; intermediate-advanced level.</p> <p>Publications; advanced level.</p> <p>Participation in professional meetings; intermediate-advanced.</p> <p>PhD candidacy examination (written and oral); advanced level.</p> <p>PhD final oral examination; advanced level.</p> <p>PhD dissertation; advanced level.</p> <p>PhD candidacy examination (written and oral); advanced level.</p> <p>PhD final oral defense; advanced level.</p> <p>PhD dissertation; advanced level.</p> <p>Publications; advanced level.</p> <p>Annual student evaluation by faculty advisor; advanced level.</p>

I. MEANS TO EVALUATE ACHIEVEMENT OF PROGRAM GOALS

A. Evaluation of students

1. Classroom-based assessments - Learning Outcomes

LO #1-16 will be assessed through classroom examinations, quizzes, laboratory reports, written, and oral assignments. The required plant pathology (PP) core of classes encompasses all LOs. Classroom examinations, quizzes, laboratory reports, written and oral assignments will also be used as assessments in elective classes.

Grade point average is monitored quarterly by the Graduate School and the Plant Pathology Graduate Program. To be in good standing in the Graduate School, a student must maintain a graduate cumulative point-hour ratio (CPHR) of 3.0 or better in all graduate credit courses and must maintain reasonable progress toward Graduate School or graduate program requirements.

2. Evaluation of LO #13 and 15 is also assessed by preparation of a research proposal.

Plant Pathology Students pursuing the Ph.D. degree must prepare a written proposal to be used as the basis for the Ph.D. dissertation within the first year of their program. The SAC members review and approve the proposal.

All first-year students present their research proposals to the department in an oral seminar of 20 minutes in length and answer questions pertaining to the proposed work or base knowledge of the field.

All first-year students must present their research proposal to their SAC and defend the proposal in an oral exam administered by the committee (1-2 hours). This oral defense is intended to be a means by which the committee can determine the student's proficiency and further needs for development in coursework or research.

3. Evaluation of LO #1, 3, 4, 13, 14, 15 and 16 is assessed in part by the candidacy examination.

Depending on the student's discipline, the student may also be evaluated for LO# 5, 6, 7, 8, 9, and 10 at various levels of depth. The candidacy examination is a test of the student's comprehension of plant pathology and allied areas of biology and agricultural science, and the ability to engage in critical thinking and express ideas clearly. Critical thinking may be evaluated, for example, by asking the candidate hypothetical questions, or by requiring the candidate to read a paper from the primary literature and demonstrate comprehension of the paper by placing the ideas expressed in the paper into a wider context, e.g. in relation to the candidate's own work. The Candidacy Examination is comprehensive and consists of both written and oral parts. The exam is given after the student has completed all or nearly all of the required course work. The written portion of the Ph.D. Candidacy Examination shall be in the form of either questions submitted by each of the committee members or a research proposal. In Plant Pathology it is expected that the student demonstrates research ability and aptitude before scheduling the exam. The student is considered to have completed the Candidacy Examination successfully

only when the decision of the Candidacy Examination Committee is unanimously affirmative.

4. Evaluation of LO #13 and 15 is assessed in part by a seminar requirement.
Graduate students are required to present one seminar per year at a public venue. This includes the minimum of two presentations for the Ph.D. degree in PLNTPTH 8899. Participation in regional or national professional meetings, including oral or poster presentation of research, is encouraged and expected of graduate students.
5. Evaluation of LO #15 and 16 is assessed in part by a Mentored Teaching/Extension requirement. Ph.D. students are expected to develop skills related to teaching and professionalism during his/her graduate program. For students seriously interested in teaching, the department offers two mentored teaching courses - PLNTPTH 8901 (Mentored Teaching in Plant Pathology) and PLNTPTH 8902 (Mentored Extension/Outreach Teaching in Plant Pathology) - designed to provide professional classroom and extension/outreach teaching opportunities, respectively.
6. LO #13, 15 and 16 is assessed in part by written publications.
Graduate students are expected to work with their major advisors to prepare manuscripts for publication in professional journals. Ph.D. students are required to have at least one manuscript submitted to a peer reviewed journal prior to the dissertation defense; students are strongly encouraged to have at least one manuscript accepted prior to graduation.
7. Evaluation of LO #1, 2, 3, 4, 13, 14, 15, and 15 is assessed in part by the written Ph.D. dissertation requirement. Ph.D. dissertation must be approved by faculty advisor and Ph.D. SAC members.
8. Evaluation of LO #1, 3, 4, 13, 14, 15 and 16 is assessed in part by the final oral examination.
Defense of the dissertation is administered by the SAC. Depending on the student's discipline, the student may also be evaluated for LO# 5, 6, 7, 8, 9, and 10 to varying levels. For Ph.D. students, the final oral examination will include a Graduate School Representative selected by the Graduate School.
9. Evaluation of LO# 1, 3, 4, 13, 14 and 15 is documented yearly by the faculty advisor in an annual student evaluation process. The faculty advisor completes a "Graduate Student Evaluation, Goal Setting and Progress Report" that includes assessment and performance of the student in the following categories: Knowledge of Field; Productivity; Communication, Technical Skills, Intellectual Skills and Professionalism. The evaluation is discussed with the student and the student has the opportunity to provide feedback in writing.

B. Evaluation of the courses

1. Student feedback

Student feedback will be collected through the Student Evaluation of Instruction and narrative evaluations administered towards the end of each term in each course.

Narrative evaluations, which are anonymous, ask for student feedback on the course content, delivery method and the effectiveness of the instructor. Student feedback is also sought informally through discussions with students.

2. Instructor feedback

Department chair meets with faculty and instructors to discuss course outcomes, teaching methods and related issues. For faculty, this is part of the annual program review process.

3. Staggered course reviews

On a staggered rolling schedule, each course will be evaluated by the Department of Plant Pathology Academic Affairs Committee with regard to content, quality of instruction, and course structure. Each course will receive a review once every 4 years. The committee will consider student written reviews, faculty self assessment of course, and student interviews. Specific attention will be given to how each course accomplishes the learning objectives they are prescribed (see table above). Courses that do not cover the expected learning objectives will be asked to alter the curriculum to do so, or work with the committee to insure that the objective is covered in another required course.

C. Evaluation of the program and curriculum

1. Several types of data are collected and monitored annually and reported to CFAES and other institutions. These data are used to guide program changes.

Total Graduate Enrollment, Diversity in ethnicity and gender, Time to Degree, Percent Completion, Credit Hours Generated, Career Placement, Graduate School Quality Parameters of GRE (Quantitative, verbal, and analytical writing), Undergraduate GPA (low GPA waivers for students with undergraduate GPA < 3.0 or equivalent), Master's degree GPA (if applicable), Publications - Peer-reviewed journal articles (number of student authors), Presentations at professional meetings, and Honors and recognition at local and national levels

2. Alumni Review

Following successful completion of their doctoral degree, each student spends time with the Department Chair to discuss the program as a whole, individual courses, and the quality of education. These discussions are key points of assessment that are used to guide future development of the program. Following the exit interview, the Department Chair will either make incremental changes or charge the Academic Affairs Committee to research issues and develop an ongoing plan for program enhancement.

Within four years of graduation, the graduate coordinator will send alumnus a questionnaire. The questionnaire will assess how the graduate feels the program enabled them to obtain a position in the field, prepared them for their careers, and changes that should be made. Results of the questionnaire will be shared with the Department Chair and the Academic Affairs Committee to identify key strengths to keep and challenges to address.

II. USES OF THE ASSESSMENT DATA

A. Students

Instructors assess student performance on the classroom assignments, provide feedback and make suggestions for improvement. Additional assistance and resources are also made available to students as appropriate. Graduate students regularly meet with their advisor, the Graduate Studies Chair and the Department Chair. The Department Chair or the faculty advisor conducts an exit interview with Ph.D. graduates to gather feedback on the program. Graduate students have a formal opportunity to document concerns or issues during the Annual Graduate Student Evaluation.

Following Graduate School guidelines, a student with fewer than 15 earned hours of graduate credit whose Cumulative Point Hour Ratio (CPHR) is below 3.0 will receive a “poor performance” letter from the Graduate School. A student whose graduate CPHR falls below 3.0 after 15 graduate credit hours have been attempted is placed on probation by the Dean of the Graduate School. In both cases, consultations are scheduled between the student, faculty advisor, and in some cases, the Graduate Studies Chair.

B. Courses

1. Student feedback

Each instructor uses the student evaluations/narrative comments to self assess course content and delivery methods, and to guide changes. Areas of strength and weakness are identified and adjustments are made accordingly. The department chair monitors evaluations and course enrollment trends and engages faculty in discussion about the course.

2. Instructor feedback

All faculty and instructors in the department are evaluated. For each P&T eligible faculty member, the department assigns a Teaching Evaluation (TE) Committee, composed of two faculty members of senior rank. Professors do not have a TE Committee but the department continually evaluates graduate student advising and Extension-Outreach teaching through informal discussions with graduate students.

A formal evaluation process for lecturers is being developed. In recent years, lecturers have been utilized more regularly to teach general education courses in the department. In 2009, the department chair began to implement a more formal evaluation of instructors, which include one-on-one meetings with each instructor. Feedback from faculty and the instructors was sought and will be incorporated into the evaluation process.

3. Evaluation of course enrollment

Department Chair and the Departmental Academic Affairs Committee make 4-year rolling assessments based on changes and trends in course enrollment. Instructors evaluate course enrollment annually and make adjustments in scheduling and related

areas as needed. Changes can include discontinuing courses with low enrollment, adding course sections to accommodate growing enrollment, or adding courses based on student interest and need to cover learning outcomes.

C. Program/Curriculum

1. Institutional Assessments (Department, CFAES, and University)

The Plant Pathology Graduate Studies Committee works with the Department Chair and the faculty to assess the graduate program, including overall student performance, enrollment, time to degree, program quality and other aspects. The Graduate Studies Committee provides updates and summaries at quarterly department meetings.

The Doctoral Program Assessment and Plan (April 2008) administered by the Graduate School classified the university's graduate programs into one of six groups: High Quality, Strong, Good, New and/or Developing, Reassess and/or Restructure, and Divestment or Elimination. The Plant Pathology Graduate program was classified as *Good*: Doctoral programs that are doing reasonably well and appear to have viable plans for moving ahead.

Based on feedback from the Graduate School and CFAES, the Department of Plant Pathology submitted a Plan for Enhancing Doctoral Program Quality to CFAES. The plan was devised by the Graduate Studies Committee with extensive input from faculty, academic staff and graduate student representatives. Areas needing improvement are low GRE scores (particularly low verbal scores) and the number of low GPA petitions to the Graduate School for doctoral students. Progress in these areas is reported annually to CFAES as part of the Annual Program Review (Academic Programs).

Diversity in gender, ethnicity and sexual orientation is documented in the department's annual Diversity Report to CFAES. The plan, which addresses diversity in graduate and undergraduate student enrollment, faculty and staff, includes demographics, actions and future plans pertaining to recruitment and retention, target goals, and identification of strengths, barriers and opportunities.

2. External Reviews

NSF/NIH Survey of Graduate Students and Post-doctorates in Science and Engineering
This is an annual survey of academic institutions in the United States. Ohio State and the Department of Plant Pathology provide data on the number and characteristics of graduate students, postdoctoral appointees, and doctorate-holding non-faculty researchers. NSF uses the results of this survey to assess shifts in graduate enrollment and postdoctoral (postdoc) appointments and trends in financial support, MS/PhD enrollment; gender; domestic/international; underrepresented minorities; funding of graduate students, funding source by category. These data are similar to the metrics that are monitored by our program in Part A and assessed and evaluated on an annual basis.

Assessment of Research Doctoral Programs (National Research Council)

Data collected in (2006/2007). Final report was released in September 2010 and is under assessment.

The assessment will offer data about program characteristics that will be of interest to policymakers, researchers, university administrators, and faculty, as well as students considering doctoral study. The assessment analyzes and combines these data to create ranges of rankings that allow the comparison of different doctoral programs within a field (A Guide to the Methodology of the National Research Council Assessment of Doctorate Programs, 2009, www.nap.edu/catalog/12676.html) (Coordinated by Institutional Research and Planning, Ohio State)

National Study of Instructional Costs and Productivity (University of Delaware)
Data on 2009 FY budgets and AU 2008 course enrollments/credit hours submitted; final report not yet released. Study to provide benchmark comparisons of teaching workloads, instructional costs and productivity. (Coordinated by Institutional Research and Planning)

Doctorate of Philosophy in Plant Pathology

Learning Outcomes

AREAS	Upon successful completion of the Plant Pathology Doctorate Program, students should:
Foundational Knowledge	<i>Global Perspectives</i>
	1. Understand the importance of the history, principles, and practices of plant pathology;
	2. Understand social and global issues pertinent to plant pathology, including economic, political, scientific and ethical perspectives that pertain to international development and commerce;
	<i>Core Science and Mathematics</i>
	3. Know the basic core foundation in biology (including general plant anatomy and physiology), chemistry, mathematics, and statistics;
	<i>Plant Pathology</i>
	4. Understand the fundamental biology of the major pathogen groups and plant-associated microbes that affect plant health, including fungi, oomycetes, bacteria, viruses, and nematodes;
	5. Understand how plant diseases develop temporally and spatially in plant populations using simple mathematical models;
	6. Understand the basic ecology of plant-associated microbes including means of transmission, dissemination and survival;
	7. Know the molecular basis for disease development and suppression as it relates to pathogenesis, host resistance, and biological control;
8. Know and characterize major mechanisms of plant disease resistance and host-pathogen interactions at the cellular and molecular levels;	
9. Know the principles of plant disease management and how to deploy integrated plant health management strategies;	
10. Know the basic tenets and applications of genetic and genomic-based studies as they relate to plant pathology;	
Skills	<i>Plant Pathology</i>
	11. Be able to diagnose plant diseases (and use Koch's Postulates) and

	explain pathogen-induced changes on plant anatomy and physiology;
	12. Be able to isolate and identify plant-associated microbes that affect plant health and know classical, biochemical and molecular characterization methods;
	<i>Research</i>
	13. Be able to generate and test hypotheses on a central research question using the scientific method;
	14. Be able to conduct experiments using good laboratory/field practices and standard operating procedures;
	<i>Communication</i>
	15. Be able to communicate with diverse audiences in both written and oral forms and describe, interpret and present a disease related topic;
Professionalism	16. Demonstrate professional behavior that is consistent with the highest ethical and moral standards.