



### **Twin Cities Campus**

## **Plant Biological Sciences Ph D**

*Plant and Microbial Biology*

### **College of Biological Sciences**

Link to a [list of faculty](#) for this program.

- **Students will no longer be accepted into this program after Spring 2018. Program requirements below are for current students only.**
- **Plant Biological Sciences is now Plant and Microbial Biology. Please refer to the Plant and Microbial Biology program for current admissions and program requirements.**

### **Contact Information:**

Plant and Microbial Biology Graduate Program, 140 Gortner Labs, 1479 Gortner Avenue, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)

Email: [pbio@umn.edu](mailto:pbio@umn.edu)

Website: <http://www.cbs.umn.edu/explore/departments/plantbio/gradprog>

- Program Type: Doctorate
- Requirements for this program are current for Spring 2019
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

## **Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

## **Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:

Prospective students are expected to have completed a year of coursework in at least three of the following four areas: differential and integral calculus; organic and inorganic chemistry; biology; and physics. For students with demonstrated ability, background deficiencies as determined by the admissions committee can be made up during the first year of graduate studies. All admitted students are assigned to an advisor in the graduate program before they begin their studies.

### **Special Application Requirements:**

Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by December 1st is required in order to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550



- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

## Program Requirements

13 to 18 credits are required in the major.  
12 to 17 credits are required outside the major.  
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Up to two 4xxx-level courses can be applied to the PhD degree.

### Required Coursework

Take the following required courses for a total of at least 13.5 credits. Take at least 1 credit each of PBIO 5960, PBS 8994, and PBS 8900 (Sec 01, Sec 02, and Sec 03).

- PMB 5960 ~~(Inactive)~~ (1.0 - 3.0 cr)
- PMB 8081 - Succeeding in Graduate School: Skills, Ethics, and Beyond (3.0 cr)
- PMB 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- PMB 8900 - Seminar (1.0 cr)
- PMB 8901 - Preparation of Research Proposals (2.0 cr)
- PMB 8994 - Research (1.0 - 5.0 cr)

### Required Teaching Experience

PSTL 5106 (Sec 001) can be substituted for GRAD 8101.

[GRAD 8101](#) - Teaching in Higher Education (3.0 cr)

### Thesis Credits

Take at least 24 thesis credits.

[PMB 8888](#) - Thesis Credit: Doctoral (1.0 - 24.0 cr)

### Electives

Take at least 12 supporting program credits. Courses can be selected from the following list, or other courses can be chosen in consultation with the advisor and advisory committee with approval of the director of graduate studies.

Take 12 or more credit(s) from the following:

- [AGRO 4505](#) - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
  - or [AGRO 4888](#) - Issues in Sustainable Agriculture (2.0 cr)
  - or [AGRO 5121](#) - Applied Experimental Design (4.0 cr)
  - or [AGRO 5321](#) - Ecology of Agricultural Systems (3.0 cr)
  - or [AGRO 8023](#) - Evolution of Crop Plants (3.0 cr)
  - or [AGRO 8202](#) - Breeding for Quantitative Traits in Plants (3.0 cr)
  - or [AGRO 8241](#) - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
- BIOL 3270 ~~(Inactive)~~ (3.0 cr)
  - or [BIOL 5272](#) - Applied Biostatistics (4.0 cr)
  - or [EEB 5407](#) - Ecology (3.0 cr)
  - or [EEB 5409](#) - Evolution (3.0 cr)
- [BIOC 4331](#) - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
  - or [BIOC 4332](#) - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
  - or [BIOC 4521](#) - Introduction to Physical Biochemistry (3.0 cr)
  - or [BIOC 5361](#) - Microbial Genomics and Bioinformatics (3.0 cr)
  - or [BIOC 8001](#) - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
  - or [BIOC 8002](#) - Molecular Biology and Regulation of Biological Processes (3.0 cr)
  - or [BIOC 5216](#) - Current Topics in Signal Transduction (2.0 cr)



- [EEB 5042](#) - Quantitative Genetics (3.0 cr)  
or [EEB 5221](#) *(Inactive)* (3.0 cr)  
or [EEB 5609](#) - Ecosystem Ecology (3.0 cr)
- [FNRM 5104](#) - Forest Ecology (4.0 cr)  
or [FNRM 5411](#) - Managing Forest Ecosystems: Silviculture (3.0 cr)  
or [FNRM 5462](#) - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)  
or [FNRM 5131](#) - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- [GCD 5036](#) - Molecular Cell Biology (3.0 cr)  
or [GCD 8131](#) - Advanced Molecular Genetics and Genomics (3.0 cr)  
or [GCD 8151](#) - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)  
or [GCD 8161](#) - Advanced Cell Biology and Development (2.0 cr)
- [HORT 4071W](#) - Applications of Biotechnology to Plant Improvement [WI] (3.0 cr)  
or [HORT 5071](#) - Ecological Restoration (4.0 cr)
- [PMB 8910](#) - Journal Club (1.0 cr)  
or [PMB 8993](#) - Directed Studies (1.0 - 5.0 cr)
- [PMB 4321](#) - Minnesota Flora (3.0 cr)  
or [PMB 4511](#) - Flowering Plant Diversity (3.0 cr)  
or [PMB 5412](#) - Plant Physiology and Development (3.0 cr)  
or [PMB 5516](#) *(Inactive)* (3.0 cr)
- [PLPA 5103](#) - Plant-Microbe Interactions (3.0 cr)  
or [PLPA 8103](#) - Plant-Microbe Interactions (3.0 cr)  
or [PLPA 5203](#) - Introduction to Fungal Biology (3.0 cr)
- [SOIL 5611](#) - Soil Biology and Fertility (4.0 cr)