

# PLANT BIOLOGY

(Interdepartmental Graduate Major)

The Interdepartmental Plant Biology major (IPB) coordinates graduate education and research in the areas of plant biology including but not limited to plant biochemistry, plant cellular and molecular biology and plant physiology. Graduate study in IPB, leading to the M.S. and Ph.D. Degrees, is offered through eight participating departments: Agronomy, Biochemistry, Biophysics & Molecular Biology, Chemical and Biological Engineering, Chemistry, Ecology, Evolution and Organismal Biology, Genetics Development & Cell Biology, Horticulture, and Plant Pathology.

Research conducted by the faculty and students of the major represents both basic and applied aspects of plant physiology, biochemistry and molecular biology. The experimental approaches represented in the major span the range of complexity from molecular studies, to cellular, organismal and the ecological level (crop monocultures and natural populations). Graduates have a broad understanding of basic, functional plant biology with emphases on fundamental biology, biochemistry, and molecular biology. They are able to address complex research and policy problems in agriculture, biotechnology, and basic plant biology.

## M.S. Program

A total of 36 credits, which includes a minimum of 16 course credits and at least a B grade or better, are required for an M.S.

All M.S. candidates take a core curriculum comprising courses recommended from the following four categories, attend research seminars (PLBIO 6960), take research credits (PLBIO 6990 Research), and attend the annual Loomis Distinguished Lecture and mini-symposium and retreats. Students will take additional courses of interest as directed by their Program of Study (POS) Committee members.

Required: Complete the following core courses:

STAT 5870	Statistical Methods for Research Workers	4
BBMB 3160	Principles of Biochemistry	3-6
	or BBMB 4040 Biochemistry I & BBMB 4050 and Biochemistry II	
	or BBMB 5040 Amino Acids and Proteins & BBMB 5050 and Bioenergetics and Metabolism	
GDCB 5130	Plant Metabolism	2
GDCB 5450	Plant Molecular, Cell and Developmental Biology	3
GRST 5650	Responsible Conduct of Research in Science and Engineering	1
PLBIO 6960	Research Seminar *	1
PLBIO 6990	Research	1-30

Optional Courses

AGRON 5160	Crop Physiology
AGRON 6250	Genetic Strategies in Plant Breeding
BBMB 5310	Plant Biochemistry
BBMB 5450	Molecular Signaling
BBMB 6750	Nucleic Acid Structure and Function
BIOL 4540	Plant Anatomy
BIOL 4740	Plant Ecology
EEOB 5530	Agrostology
EEOB 5630	Molecular Phylogenetics
EEOB 5660	Molecular Evolution
GDCB 5100	Transmission Genetics
GDCB 5110	Advanced Molecular Genetics
GDCB 5280	Advances in Molecular Cell Biology
STAT 5810	Analysis of Gene Expression Data for the Biological Sciences

\* Required enrollment each semester; must present 2 talks; a maximum of 2 credits of 6960 seminars are counted toward MS degree POSC. Make two seminar presentations and enroll each term in the Interdepartmental Plant Biology seminar PLBIO 6960 Research Seminar. The first seminar must be during the student's first year and is a 20-minute seminar. The last presentation must be an exit seminar. In addition to the required core courses, a wide selection of courses is available to IPB graduate students for broadening their scientific education, and increasing knowledge in topics related to their research. Decisions about which courses are taken and when they are taken are made by the student, initially in consultation with their temporary advisor, and then with their major advisor and eventually with POS Committee, which also serves as the Thesis or Dissertation Committee.

## Ph.D. Program

A total of 72 credits, which includes a minimum of 24 course credits and at least a B grade or higher, are required for a Ph.D.

All Ph.D. candidates take a core curriculum comprising courses recommended from the following four categories, attend research seminars, research credits (PLBIO 6990 Research), annual Loomis Distinguished Lecture in Plant Biology and mini-symposium and retreats. Students will take additional courses of interest as directed by their Program of Study (POS) Committee members.

Required: Complete the following core courses:

STAT 5870	Statistical Methods for Research Workers	4
BBMB 3160	Principles of Biochemistry	3-6
	or BBMB 4040 Biochemistry I & BBMB 4050 and Biochemistry II	

or BBMB 5040 Amino Acids and Proteins  
& BBMB 5050 and Bioenergetics and Metabolism

GDCB 5130	Plant Metabolism	2
GDCB 5450	Plant Molecular, Cell and Developmental Biology	3
GRST 5650	Responsible Conduct of Research in Science and Engineering	1
PLBIO 6960	Research Seminar *	1
PLBIO 6990	Research	1-30

Optional Core Courses: Must take one of the following

GDCB 5100	Transmission Genetics
GDCB 5110	Advanced Molecular Genetics
EEOB 5510	Plant Evolution and Phylogeny
EEOB 5660	Molecular Evolution

Optional Courses

AGRON 5160	Crop Physiology
AGRON 6250	Genetic Strategies in Plant Breeding
BBMB 5310	Plant Biochemistry
BBMB 5450	Molecular Signaling
BBMB 6750	Nucleic Acid Structure and Function
BIOL 4540	Plant Anatomy
BIOL 4740	Plant Ecology
EEOB 5530	Agrostology
EEOB 5630	Molecular Phylogenetics
EEOB 5660	Molecular Evolution
GDCB 5100	Transmission Genetics
STAT 5810	Analysis of Gene Expression Data for the Biological Sciences

\* Required enrollment each semester; must present 4 talks; up to 5 credits of 6960 seminars are counted toward Ph.D. Enroll each term in the Interdepartmental Plant Biology seminar PLBIO 6960 Research Seminar or its listed equivalent. The first seminar must be during the student's first year and is a 20-minute seminar. The last presentation must be an exit seminar.

In addition to the required core courses, a wide selection of courses is available to IPB graduate students for broadening their scientific education, and increasing knowledge in topics related to their research. Decision about which courses to take and when they are to be taken are made by the student, initially in consultation with their temporary advisor, and then with their major advisor and eventually with their POS Committee, which also serves as the Thesis or Dissertation Committee.

## Requirements for students seeking a Minor in Plant Biology:

Ph.D. and M.S. candidates in other programs who desire a graduate minor in Plant Biology must take the required courses listed below, achieving a grade of B or better. One member of the student's POS committee must have IPB faculty membership.

Prerequisite Courses:

STAT 5870	Statistical Methods for Research Workers	4
BBMB 4040	Biochemistry I	3

9 credits from the following:

AGRON 5160	Crop Physiology
BIOL 4540	Plant Anatomy
GDCB 5130	Plant Metabolism
GDCB 5450	Plant Molecular, Cell and Developmental Biology

**Courses primarily for graduate students, open to qualified undergraduates:**

### PLBIO 5130: Plant Metabolism

(Cross-listed with GDCB 5130).

Credits: 2. Contact Hours: Lecture 2.

Photosynthesis, respiration, and other aspects of plant metabolism.

Offered even-numbered years. (Typically Offered: Fall)

### PLBIO 5450: Plant Molecular, Cell and Developmental Biology

(Cross-listed with MCDB 5450/ GDCB 5450).

Credits: 3. Contact Hours: Lecture 3.

Plant nuclear and organelle genomes; regulation of gene expression; hormone signaling; organization, function, and development of plant cells and subcellular structures; regulation of plant growth and development.

Offered odd-numbered years. (Typically Offered: Fall)

**Courses for graduate students:**

### PLBIO 6960: Research Seminar

(Cross-listed with AGRON 6960/ BBMB 6960/ FOR 6960/ GDCB 6960/ HORT 6960).

Credits: 1. Contact Hours: Lecture 1.

Repeatable.

Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

### PLBIO 6990: Research

Credits: 1-30. Repeatable.