

# 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.

All M.S. candidates take a core curriculum comprising courses recommended from the following four categories, attend research seminars, research credits (PLBIO 699 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.

A total of 36 credits including a minimum of 16 course credits are required for a M.S.

(1) Complete the following core courses:

STAT 587	Statistical Methods for Research Workers	4
BBMB 316	Principles of Biochemistry	3
or BBMB 404	Biochemistry I	
or		
BBMB 504	Amino Acids and Proteins	
BBMB 505	Bioenergetics and Metabolism	
GDCB 513	Plant Metabolism	2
Two seminar presentations *		
GDCB 545	Plant Molecular, Cell and Developmental Biology	3
Take additional courses from the following		
AGRON 516	Crop Physiology	
GR ST 529	Preparing Publishable Thesis Chapters	
AGRON 625	Genetic Strategies in Plant Breeding	
BBMB 405	Biochemistry II	

BBMB 645	Molecular Signaling
BBMB 675	Nucleic Acid Structure and Function
BBMB 676	Biochemistry of Gene Expression in Eucaryotes
BIOL 454	Plant Anatomy
BIOL 474	Plant Ecology
EEOB 563	Molecular Phylogenetics
EEOB 566	Molecular Evolution
GDCB 510	Transmission Genetics
EEOB 553	Agrostology
GDCB 511	Advanced Molecular Genetics
GDCB 528	Advances in Molecular Cell Biology
GDCB 545	Plant Molecular, Cell and Developmental Biology

\* enroll each term in the Interdepartmental Plant Biology seminar PLBIO 696 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.

All Ph.D. candidates take a core curriculum comprising courses recommended from the following four categories, attend research seminars, research credits (PLBIO 699 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.

A total of 72 credits including a minimum of 24 course credits are required for a Ph.D.

STAT 587	Statistical Methods for Research Workers	4
BBMB 404	Biochemistry I	3
or		4
BBMB 504	Amino Acids and Proteins	
BBMB 505	Bioenergetics and Metabolism	
GDCB 513	Plant Metabolism	2
Four seminar presentations *		
One of the following		
BBMB 405	Biochemistry II	
GDCB 511	Advanced Molecular Genetics	
GDCB 545	Plant Molecular, Cell and Developmental Biology	
Take additional courses from the following		
AGRON 516	Crop Physiology	
GR ST 529	Preparing Publishable Thesis Chapters	
PLBIO 513	Plant Metabolism	2
PLBIO 545	Plant Molecular, Cell and Developmental Biology	3
PLBIO 696	Research Seminar	1

PLBIO 699	Research	arr †
AGRON 625	Genetic Strategies in Plant Breeding	
BBMB 405	Biochemistry II	
BBMB 645	Molecular Signaling	
BBMB 675	Nucleic Acid Structure and Function	
BBMB 676	Biochemistry of Gene Expression in Eucaryotes	
BIOL 454	Plant Anatomy	
BIOL 474	Plant Ecology	
EEOB 563	Molecular Phylogenetics	
EEOB 566	Molecular Evolution	
GDCB 510	Transmission Genetics	
GDCB 511	Advanced Molecular Genetics	
GDCB 528	Advances in Molecular Cell Biology	
GDCB 545	Plant Molecular, Cell and Developmental Biology	

† Arranged with instructor.

- \* enroll each term in the Interdepartmental Plant Biology seminar PLBIO 696 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.

Requirements for students seeking Plant Biology as Minor:

STAT 587	Statistical Methods for Research Workers	4
BBMB 404	Biochemistry I	3
or		4
BBMB 504	Amino Acids and Proteins	
BBMB 505	Bioenergetics and Metabolism	
9 credits from the following		
AGRON 516	Crop Physiology	
GDCB 513	Plant Metabolism	
GDCB 545	Plant Molecular, Cell and Developmental Biology	

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

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

**PLBIO 513: Plant Metabolism**

(Cross-listed with GDCB). (2-0) Cr. 2. Alt. F., offered even-numbered years.

*Prereq: BIOL 330, PHYS 111, CHEM 331; one semester of biochemistry recommended*

Photosynthesis, respiration, and other aspects of plant metabolism.

**PLBIO 545: Plant Molecular, Cell and Developmental Biology**

(Cross-listed with GDCB, MCDB). (3-0) Cr. 3. Alt. F., offered odd-numbered years.

*Prereq: Biol 313, BIOL 314, BIOL 330 or BBMB 405*

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.

**Courses for graduate students:**

**PLBIO 696: Research Seminar**

(Cross-listed with AGRON, BBMB, FOR, GDCB, HORT). Cr. 1. Repeatable.

F.S.

Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only.

**PLBIO 699: Research**

Cr. arr. Repeatable.