PLANT SCIENCES, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Degree Requirements

For the Bachelor of Science degree in Plant Sciences, a minimum of 120 credits are required:

Requirement	Credits
General Education	45
Electives	0-13
Requirements for the Major	83-102

21-24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses and 3 credits of GWS courses; plus 3 GH in Crop Production.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
BIOL 110	Biology: Basic Concepts and Biodiversity	4
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
ENT 313	Introduction to Entomology	2
PLANT 200	Introduction to Agricultural Crop Growth, Form, and Function	3
Prescribed Courses: Require a grade of C or better		
AGECO 457	Principles of Integrated Pest Management	3
PLANT 461	Emerging Issues in Plant Sciences	3
SOILS 101	Introductory Soil Science	3
Additional Courses		
ENT 314	Management of Insect Pests of Ornamentals	1
or ENT 316	Field Crops Entomology	
Select 3 credits from the following:		3
AGBM 101	Economic Principles of Agribusiness Decision Making	
ECON 14	Principles of Economics	
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
Select 1 credit from the following:		1
AGECO 495	Agroecology Internship	
AGRO 495	Internship	
HORT 495	Internship	
HORT 496	Independent Studies	
Additional Courses: Require a grade of C or better		
ENGL 202C	Effective Writing: Technical Writing	3
or ENGL 202D	Effective Writing: Business Writing	
Select 3-5 credits from the following:		3-5
MATH 22	College Algebra With Analytic Geometry and Applications II	
MATH 26	Plane Trigonometry and Applications of Trigonometry	
MATH 40	Algebra, Trigonometry, and Analytic Geometry	
MATH 41	Trigonometry and Analytic Geometry	
MATH 110	Techniques of Calculus I	
MATH 111	Techniques of Calculus II	
MATH 140	Calculus With Analytic Geometry I	
MATH 141	Calculus with Analytic Geometry II	
MATH 141B	Calculus and Biology II	
Select 3-4 credits from the following:		3-4
STAT 200	Elementary Statistics	
STAT 240	Introduction to Biometry	
STAT 250	Introduction to Biostatistics	
Requirements for the Option		
Select an option		47-63

Requirements for the Option

Agroecology Option (57-58 credits)

Code	Title	Credits
Prescribed Courses		
AGECO 295	Agroecology Internship	1
AGECO/AGRO 438	Principles of Weed Management	4
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
SOILS 102	Introductory Soil Science Laboratory	1
SOILS 401	Soil Composition and Physical Properties	3
SOILS 402	Soil Nutrient Behavior and Management	3
Prescribed Courses: Require a grade of C or better		
AGECO 201	Introductory Agroecology	3
Additional Courses		
BIOL 222	Genetics	3
or HORT 407	Plant Breeding	
Select 3 credits from the following:		3
AGECO/ METEO 122	Atmospheric Environment: Growing in the Wind	
AGECO 134		
AGECO 144	Principles and Practices of Organic Agriculture	
AGECO 154	Principles of Agronomic Field Operations	
AGECO 496	Independent Studies	
Select 3 credits from the following:		3
AG 160	Introduction into Ethics and Issues in Agriculture	
GEOG 30N	Environment and Society in a Changing World	
PHIL 13	Nature and Environment	
PHIL 103	Ethics	
PHIL 132/ BIOET 100	Bioethics	
Select 6 credits from the following:		6
AGRO 423	Forage Crop Management	
AGRO 425	Field Crop Management	

HORT 202	Plant Propagation	
HORT 315	Environmental Effects on Horticultural Crops	
HORT 431	Small Fruit Culture	
HORT 432	Deciduous Tree Fruits	
HORT 433	Vegetable Crops	
SOILS 418	Nutrient Management in Agricultural Systems	
Select 3-4 credits from the following:		3-4
AGRO 410W	Physiology of Agricultural Crops	
HORT 412W	Post-Harvest Physiology	
SOILS 412W	Soil Ecology	
Additional Courses: Require a grade of C or better		
AGRO 28	Principles of Crop Management	3
or HORT 101	Horticultural Science	
Supporting Courses and Related Areas		
Select 18 credits of supporting courses in consultation with adviser		18

Crop Production Option (58-60 credits)

Code	Title	Credits
Prescribed Courses		
AGECO 295	Agroecology Internship	1
AGECO 429	Crop Scouting	2
AGECO/AGRO 438	Principles of Weed Management	4
AGRO 423	Forage Crop Management	3
AGRO 425	Field Crop Management	3
HORT 407	Plant Breeding	3
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
SOILS 102	Introductory Soil Science Laboratory	1
SOILS 401	Soil Composition and Physical Properties	3
SOILS 402	Soil Nutrient Behavior and Management	3
Prescribed Courses: Require a grade of C or better		
AGECO 201	Introductory Agroecology	3
Additional Courses		
AGECO 154	Principles of Agronomic Field Operations	2
or SOILS 403	Soil Morphology Practicum	
Select 3 credits from the following:		3
AG 160	Introduction into Ethics and Issues in Agriculture	
PHIL 13	Nature and Environment	
PHIL 103	Ethics	
PHIL 132/ BIOET 100	Bioethics	
Select 3 credits from the following:		3
AGBM 102	Economics of the Food System	
AGBM 106	Agribusiness Problem Solving	
AGBM 200	Introduction to Agricultural Business Management	
AGBM 407	Farm Planning and Financial Management	
Select 3 credits from the following:		3
AEE 201	Interpersonal Skills for Tomorrow's Leaders	
AEE 360	Leadership Development for Small Groups	
AEE 460	Foundations in Leadership Development	
AEE 465	Leadership Practices: Power, Influences, and Impact	
Select 3-4 credits from the following:		3-4
AGECO/ANSC/ SOILS 418	Nutrient Management in Agricultural Systems	
ANSC 201	Animal Science	
GEOG 160	Mapping Our Changing World	
SOILS 450	Environmental Geographic Information Systems	
Select 3-4 credits from the following:		3-4
AGRO 410W	Physiology of Agricultural Crops	
HORT 412W	Post-Harvest Physiology	
SOILS 412W	Soil Ecology	
Additional Courses: Require a grade of C or better		
AGRO 28	Principles of Crop Management	3
or HORT 101	Horticultural Science	
Supporting Courses and Related Areas		
Select 9 credits of supporting courses in consultation with adviser		9

Horticulture Option (51-54 credits)

Code	Title	Credits
Prescribed Courses		
HORT 232	Horticultural Systematics	3
HORT 402W	Plant Nutrition	3
HORT 407	Plant Breeding	3
HORT 445	Plant Ecology	3
HORT 455	Retail Horticulture Business Management	3
Prescribed Courses: Require a grade of C or better		
HORT 101	Horticultural Science	3
HORT 202	Plant Propagation	3
HORT 315	Environmental Effects on Horticultural Crops	3
HORT 412W	Post-Harvest Physiology	3
Additional Courses		
AGRO 438	Principles of Weed Management	3-4
or HORT 238	Turf and Ornamental Weed Control	
PPEM 300	Horticultural Crop Diseases	3
or PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	
Select 3 credits from the following:		3
HORT 131	Herbaceous Perennial and Annual Identification	
HORT 137	Ornamental Plant Materials	
HORT 138	Ornamental Plant Materials	
HORT 431	Small Fruit Culture [1]	
HORT 432	Deciduous Tree Fruits [1]	
HORT 433	Vegetable Crops [1]	
Select 6-7 credits from the following:		6-7
HORT 408	Landscape Plant Establishment and Maintenance	
HORT 431	Small Fruit Culture	
HORT 432	Deciduous Tree Fruits	
HORT 433	Vegetable Crops	
HORT 453	Flower Crop Production and Management	
Select 9-10 credits from the following:		9-10
AG 301		
AGBM 200	Introduction to Agricultural Business Management	
AGBM 407	Farm Planning and Financial Management	
BA 301	Finance	

BA 303	Marketing
BLAW 243	Legal Environment of Business
SPAN 1	Elementary Spanish I
SPAN 2	Elementary Spanish II
SPAN 3	Intermediate Spanish
SPAN 105	Elementary Spanish I for Students in the Agricultural Sciences

[1] Students cannot use the same course more than once as an additional course

Plant Genetics and Biotechnology Option (56-63 credits)

Code	Title	Credits
Prescribed Courses		
AGRO 410W	Physiology of Agricultural Crops	4
AGRO/BIOTC 460	Advances and Applications of Plant Biotechnology	3
BIOL 222	Genetics	3
BMB 400	Molecular Biology of the Gene	2-3
CHEM 112	Chemical Principles II	3
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
HORT 407	Plant Breeding	3
HORT/BIOL/ BIOTC 459	Plant Tissue Culture and Biotechnology	3
PHYS 250	Introductory Physics I	4
Prescribed Courses: Require a grade of C or better		
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
Additional Courses		
AGRO 28	Principles of Crop Management	3
or HORT 101	Horticultural Science	
CHEM 113	Experimental Chemistry II	1
or CHEM 113B	Experimental Chemistry II--Bioscience	
Select 4-6 credits from the following:		4-6
BIOL 230W	Biology: Molecules and Cells	
BIOL 240W	Biology: Function and Development of Organisms	
BMB 211 & BMB 212	Elementary Biochemistry and Elementary Biochemistry Laboratory	
MICRB 201 & MICRB 202	Introductory Microbiology and Introductory Microbiology Laboratory	
MICRB 251/BMB 251 & MICRB 252/BMB 252		
Select 3-4 credits from the following:		3-4
BIOL 414	Taxonomy of Seed Plants	
BIOL 427	Evolution	
BIOL 428	Population Genetics	
BIOL 436	Population Ecology and Global Climate Change	
BIOL 448	Ecology of Plant Reproduction	
ENT 420	Introduction to Population Dynamics	
HORT 445	Plant Ecology	
PPEM/BIOL 425	Biology of Fungi	
Select 2-3 credits from the following:		2-3
BIOL 439	Practical Bioinformatics	
BIOTC 479	Methods in Biofermentations	
HORT 497	Special Topics	
MCIBS 571	Current Issues in Biotechnology	
MCIBS 593	Molecular Biology Laboratory	
Select 3-4 credits from the following:		3-4
ENT/VBSC 402W	Biology of Animal Parasites	
ENT 410	Insect Structure and Function	
PPEM 416	Plant Virology: Molecules to Populations	
PPEM/BIOL 425	Biology of Fungi	
Select 3-4 credits from the following:		3-4
BIOL 407	Plant Developmental Anatomy	
BIOL 424	Seeds of Change: The Uses of Plants	
BIOL 441	Plant Physiology	
HORT 402W	Plant Nutrition	
HORT 412W	Post-Harvest Physiology	
HORT 420		
MCIBS 591	Ethics, Rigor, Reproducibility and Conduct of Research in the Life Sciences	
PPEM 417W	Mechanisms of Bacterial Pathogenesis in Plants	
PPEM/ERM 430	Air Pollution Impacts to Terrestrial Ecosystems	
Select 3 credits from the following:		3
AGRO 423	Forage Crop Management	
AGRO 425	Field Crop Management	
HORT 202	Plant Propagation	
HORT 315	Environmental Effects on Horticultural Crops	
HORT 431	Small Fruit Culture	
HORT 432	Deciduous Tree Fruits	
HORT 433	Vegetable Crops	
SOILS/ AGECO/ANSC 418	Nutrient Management in Agricultural Systems	

Plant Science Option (47-53 credits)

Code	Title	Credits
Prescribed Courses		
BIOL 222	Genetics	3
CHEM 112	Chemical Principles II	3
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2
PHYS 250	Introductory Physics I	4
Prescribed Courses: Require a grade of C or better		
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
Additional Courses		
AGRO 28	Principles of Crop Management	3
or HORT 101	Horticultural Science	
CHEM 113	Experimental Chemistry II	1
or CHEM 113B	Experimental Chemistry II--Bioscience	
Select 4-6 credits of the following:		4-6
BMB 211 & BMB 212	Elementary Biochemistry and Elementary Biochemistry Laboratory	

BIOL 230W	Biology: Molecules and Cells	
BIOL 240W	Biology: Function and Development of Organisms	
MICRB 201 & MICRB 202	Introductory Microbiology and Introductory Microbiology Laboratory	
MICRB 251	Molecular and Cell Biology I	
MICRB 252	Molecular and Cell Biology II	
Select 3-4 credits of the following:		3-4
BIOL 439	Practical Bioinformatics [1]	
ENT 402W	Biology of Animal Parasites	
ENT 410	Insect Structure and Function	
PPEM 416	Plant Virology: Molecules to Populations	
PPEM 417W	Mechanisms of Bacterial Pathogenesis in Plants [1]	
PPEM 425	Biology of Fungi [1]	
Select 3-4 credits of the following:		3-4
BIOL 412	Ecology of Infectious Diseases	
BIOL 414	Taxonomy of Seed Plants	
BIOL 427	Evolution	
BIOL 428	Population Genetics	
BIOL 436	Population Ecology and Global Climate Change	
BIOL 448	Ecology of Plant Reproduction	
ENT/VBSC 402W	Biology of Animal Parasites	
ENT 420	Introduction to Population Dynamics	
HORT 445	Plant Ecology	
PPEM 425	Biology of Fungi	
Select 3 credits of the following:		3
AGRO 460	Advances and Applications of Plant Biotechnology	
BIOL 439	Practical Bioinformatics	
HORT 407	Plant Breeding [1]	
HORT 459	Plant Tissue Culture and Biotechnology	
Select 6-7 credits of the following:		6-7
AGRO 410W	Physiology of Agricultural Crops	
AGRO 460	Advances and Applications of Plant Biotechnology	
BIOL 407	Plant Developmental Anatomy	
BIOL 441	Plant Physiology	
BIOL 424	Seeds of Change: The Uses of Plants	
HORT 402W	Plant Nutrition	
HORT 407	Plant Breeding [1]	
HORT 412W	Post-Harvest Physiology	
HORT 420		
PPEM 417W	Mechanisms of Bacterial Pathogenesis in Plants [1]	
PPEM/ERM 430	Air Pollution Impacts to Terrestrial Ecosystems	
Select 3-4 credits of the following:		3-4
AGRO 410W	Physiology of Agricultural Crops	
HORT 412W	Post-Harvest Physiology	
SOILS 412W	Soil Ecology	

[1] Students cannot use the same course more than once as an additional course

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN,** may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher**:** 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.