

PLANT SCIENCES, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

The Plant Sciences Major is an applied biological science program designed for students seeking careers in agronomic and horticultural crop production systems and enterprise management, agroecology, sustainable and organic managed and natural ecosystems, crop protection, applied plant physiology, plant science research, and plant biotechnology. Students will secure:

1. a working knowledge of basic plant biology, soils, pests, and pathogens with emphasis on growth, development, and physiology in an ecological and agricultural context,
2. the scientific, technical, and computational approaches to problem solving in an ecological and agricultural context, individually and in teams,
3. the ability to analyze ethical issues regarding ecosystem sustainability, business practices and plant science, and critically evaluate and respect different viewpoints in making management decisions, and
4. a high level of proficiency in written and oral communication, particularly with regard to critical evaluation of scientific issues.

There are five options in the major, providing flexibility for concentrations in areas including production and management systems related to agronomic and horticultural crops, plant biotechnology and breeding, crop physiology, ecology, agroecology, and other aspects of general plant science. Students can choose from diverse course offerings in designing a program of study suited to their needs and professional goals.

Agroecology Option

This option applies an ecological approach to understanding and managing cropping systems to meet societies' needs while enhancing environmental protection and resource conservation. Students will develop skills to manage agroecosystems for sustainable productivity, profitability and environmental protection by studying plant and soil sciences, ecology, and pest management from a systems perspective. The curriculum prepares students for a wide range of careers in agricultural and ecological fields, sustainable food production, and for graduate studies.

Crop Production Option

This option provides students with practical and field-related skills in Agronomy (field crop production and soil management). Students will focus on techniques and knowledge necessary to efficiently and economically manage soils, crops and other farm resources with additional emphasis on pest management and commodity marketing. Courses stress the skills and information needed to work with current production technologies such as seed traits, crop protection chemicals, and fertilizers to improve yield and productivity.

Horticulture Option

This option prepares students to enter the horticultural industry by providing a broad background in courses related to production and physiology of horticultural crops. Additional courses in pest management and business are required. Graduates may work as orchard, greenhouse,

garden center, nursery or farm managers, with horticultural and landscape service providers, suppliers, and brokers, with cooperative extension and other government and non-governmental agencies and public and private gardens, or continue with graduate studies.

Plant Genetics and Biotechnology Option

This option is a combination of basic science and technology-based classes designed for students who are seeking careers in agricultural sciences, plant breeding, plant molecular genetics and plant biotechnology based industries. It provides students with maximum flexibility in selecting a program of study suited to their needs and to achieve professional goals related to advanced degrees or immediate job placement in the industry. The option provides theoretical and practical skills of plant genetic manipulation relevant to plant biotechnology, plant breeding and genome research.

Plant Science Option

This option emphasizes the application of the biological sciences to problem-solving in agronomic and horticultural ecosystems. Topic areas include plant biology, plant pathology, plant microbiology, plant biotechnology, plant-insect interactions, horticulture, crop science, plant ecology, and bioenergy. Graduates may find employment in industry, government and academic research programs as technicians and research assistants, or pursue graduate degrees.

What is Plant Sciences?

Plant Science is the study of plant growth, development and physiology that focuses on the production, use, improvement, management and protection of plants and plant-based products. Plant Scientists seek ways to improve the yield and quality of agronomic and horticultural crops for food, fiber, fuel and ornamental purposes.

MORE INFORMATION ABOUT PLANT SCIENCES (<http://plantscience.psu.edu>)

You Might Like this Program If...

- You enjoy hands-on learning in labs, greenhouses, and in the field. Our teaching and learning facilities include more than 30,000 square feet of greenhouse space, more than 700 acres of research and teaching farms, a one-acre student farm, and a hydroponics and aquaponics system.
- You have an interest in sustainable and conventional food, fuel, and fiber production systems

MORE INFORMATION ABOUT WHY STUDENTS CHOOSE TO STUDY PLANT SCIENCES (<http://plantscience.psu.edu/majors/plantsciences/>)

Entrance to Major

In order to be eligible for entrance to this major, a student must:

1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have third-semester classification (<http://www.registrar.psu.edu/enrollment/semester-classification.cfm>).

READ SENATE POLICY 37-30: ENTRANCE TO AND CHANGES IN MAJOR PROGRAMS OF STUDY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/37-00-entrance-to-a-college-or-major/>)

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 (<http://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
<i>Prescribed Courses: Require a grade of C or better</i>		
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 or ENT 316	Management of Insect Pests of Ornamentals Field Crops Entomology	1
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	
<i>Additional Courses: Require a grade of C or better</i>		
ENGL 202C or ENGL 202D	Effective Writing: Technical Writing Effective Writing: Business Writing	3
Select 3-5 credits from the following:		3-5
MATH 22	College Algebra II and Analytic Geometry	
MATH 26	Plane 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
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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
<i>Prescribed Courses: Require a grade of C or better</i>		
AGECO 201	Introductory Agroecology	3
Additional Courses		
BIOL 222 or HORT 407	Genetics Plant Breeding	3
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
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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
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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	
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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
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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
<i>Prescribed Courses: Require a grade of C or better</i>		
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
Additional Courses		
AGRO 28 or HORT 101	Principles of Crop Management Horticultural Science	3
CHEM 113 or CHEM 113B	Experimental Chemistry II Experimental Chemistry II–Bioscience	1
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
<i>Prescribed Courses: Require a grade of C or better</i>		
PPEM 405	Microbe-Plant Interactions: Plant Disease and Biological Control	3
Additional Courses		
AGRO 28 or HORT 101	Principles of Crop Management Horticultural Science	3
CHEM 113 or CHEM 113B	Experimental Chemistry II Experimental Chemistry II–Bioscience	1
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-](https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/)

[education/baccalaureate-degree-general-education-program/](https://bulletins.psu.edu/undergraduate/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.)

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

Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 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 (<http://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.

Program Learning Objectives

- Students will be able to explain concepts in plant biology, soils, pests, and pathogens with emphasis on growth, development, and physiology.
- Students will be able to choose scientific, technical, and computational approaches and solve problems in an ecological and agricultural context.
- Students will be able to explain and analyze ethical issues in plant science regarding ecosystems, sustainability, and socioeconomic contexts, and evaluate and respect different viewpoints.
- Students will be able to critically evaluate plant science issues through written and oral communication.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

University Park

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2022-23 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Agroecology Option: Plant Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If**

report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year		
Fall	Credits Spring	Credits
BIOL 110 [†]	4 CHEM 110 [†]	3
AG 150	2 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 AGECO 295	1
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 SOILS 101 ^{††}	3
AGRO 28 or HORT 101 [*]	3 SOILS 102	1
	AGECO 201 [*]	3
	CAS 100, 100A, 100B, or 100C ^{††}	3
	15-17	15

Second Year		
Fall	Credits Spring	Credits
PLANT 200	3 ENT 313	2
ENGL 202C or 202D ^{††}	3 ENT 314 or 316	1
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3 SOILS 402	3
STAT 200, 240, or 250 ^{††}	3-4 General Education Course	3
AGECO 122, 134, AGECO 144, AGECO 154, or AGECO 496 (Agroecology Selection)	3 AG 160, GEOG 30N, PHIL 13, PHIL 103, or PHIL 132 (Ethics Selection)	3
	General Education Course (GHW)	1.5
	15-16	13.5

Third Year		
Fall	Credits Spring	Credits
AGECO 457 [*]	3 SOILS 401	3
PPEM 405	3 AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3
BIOL 222 or HORT 407 (Plant Breeding/Genetics Selection)	3 Supporting Course	3
AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3 Supporting Course	3
Supporting Course	3 General Education Course	3
General Education Course (GHW)	1.5	
	16.5	15

Fourth Year		
Fall	Credits Spring	Credits
AGECO 438	4 PLANT 461 [*]	3
AGECO 495	1 Supporting Course	3
Supporting Course	3 Supporting Course	3
AGRO 410W, HORT 412W, or SOILS 412W (Writing Across the Curriculum)	3-4 General Education Course	3

General Education Course	3 Elective	4
	14-15	16

Total Credits 120-124

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Crop Production Option: Plant Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
BIOL 110 [†]	4 CHEM 110 [†]	3
AG 150	2 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 AGECO 295	1
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 SOILS 101 ^{*††}	3
AGRO 28 or HORT 101 [*]	3 SOILS 102	1
	AGECO 201	3
	General Education Course	3
	15-17	15

Second Year

Fall	Credits Spring	Credits
PLANT 200	3 ENT 313	2
ENGL 202C or 202D ^{††}	3 ENT 314 or 316	1
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3 STAT 200, 240, or 250 ^{††}	4
AG 160, PHIL 13, PHIL 103, or PHIL 132 (Ethics Selection) [†]	3 AEE 201, 360, 460, or 465 (Leadership Selection)	3
CAS 100, 100A, 100B, or 100C ^{††}	3 AGBM 102, 106, 200, or 407 (Business Selection)	3
AGECO 154 (or Supporting Course)	2 General Education Course	3
	17	16

Third Year

Fall	Credits Spring	Credits
AGRO 423	3 SOILS 401	3
AGECO 429	2 SOILS 402	3
AGECO 438	4 AGRO 425	3
Supporting Course	3 AGRO 410W, HORT 412W, or SOILS 412W (Writing Across the Curriculum)	3-4
General Education Course	3 AGECO 418, ANSC 201, GEOG 160, or SOILS 450 (Special Interest Selection)	3-4
	15	15-17

Fourth Year

Fall	Credits Spring	Credits
AGECO 495 or AGRO 496	1 HORT 407	3
AGECO 457 [*]	3 PLANT 461 [*]	3
PPEM 405	3 General Education Course	3
SOILS 403 (or Supporting Course)	2 General Education Course (GHW)	1.5
Supporting Course	3 Elective	4

Supporting Course	3
General Education Course (GHW)	1.5
	16.5
	14.5

Total Credits 124-128

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Horticulture Option: Plant Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
BIOL 110 [†]	4 CHEM 110 [†]	3
AG 150	2 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 CAS 100, 100A, 100B, or 100C ^{††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3
HORT 101 [*]	3 HORT 202 [*]	3
	General Education Course	3
15-17		16

Second Year

Fall	Credits Spring	Credits
ENGL 202C or 202D ^{††}	3 ENT 313	2
SOILS 101 ^{††}	3 ENT 314 or 316	1
STAT 200, 240, or 250 ^{††}	3-4 HORT 232	3
HORT 101, 137, 138, 431, 432, or 433 (HORT Plant Materials Selection)	3 HORT 315 [*]	3
General Education Course	3 AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	3-4
General Education Course (GHW)	1.5 General Education Course	3
16.5-17.5		15-16

Third Year

Fall	Credits Spring	Credits
PLANT 200	3 HORT 412W [*]	3
HORT 455	3 HORT 408, 431, 432, 433, or 453 (HORT Production Selection)	3-4
HORT 238 or AGRO 438	3-4 AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	3-4
HORT 408, 431, 432, 433, or 453 (HORT Production Selection)	3-4 General Education Course	3
Elective	3 General Education Course	3
15-17		15-17

Fourth Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 HORT 407	3

PPEM 405 or 300	3 PLANT 461 [*]	3
HORT 445	3 HORT 402W	3
AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	3-4 HORT 495 or 496	1
Elective or Supporting Course	3-6 General Education Course (GHW)	1.5
	Elective or Supporting Course	1-6
15-19		12.5-17.5

Total Credits 120-137

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Plant Genetics and Biotechnology Option: Plant Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
AG 150	2 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 SOILS 101 ^{*††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 CAS 100, 100A, 100B, or 100C ^{††}	3
AGRO 28 or HORT 101	3 General Education Course	3
	General Education Course	3
	15-17	16

Second Year

Fall	Credits Spring	Credits
CHEM 112	3 STAT 200, 240, or 250 ^{††}	3-4
CHEM 113	1 CHEM 210	3
PLANT 200	3 BIOL 230W, 240W, BMB 211 <i>and</i> BMB 212, MICRB 201 <i>and</i> MICRB 202, or MICRB 251 <i>and</i> MICRB 252 (Microbiology, Molecular Biology and Biochemistry Selection)	4-5
BIOL 222	3 General Education Course	3
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3 General Education Course (GHW)	1.5
PHYS 250	4	
	17	14.5-16.5

Third Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 AGRO 410W	4
CHEM 212	3 HORT/BIOTC/BIOL 459	3
HORT 407	3 ENT 313	2
AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3 ENT 314 or 316	1
General Education Course	3 ENGL 202C or 202D ^{††}	3
	Elective	3
	15	16

Fourth Year

Fall	Credits Spring	Credits
PPEM 405 [*]	3 AGRO/BIOTC 460	3
BMB 400	2 PLANT 461 [*]	3

AGECO 495, AGRO 495, HORT 495, or HORT 496	1 BIOL 407, 424, 441, HORT 402W, HORT 412W, or 420 (General Plant Science Selection)	3
BIOL 412, 414, 427, 428, 436, 448, ENT 420, HORT 445, or PPEM 425 (Plant Ecology, Evolution and Systematics Selection)	3 ENT 402W, 410, PPEM 416, or PPEM 425 (Plant Microbiology and Entomology Selection)	3-4
BIOL 439, BIOTC 479, or HORT 497 (Plant Genetics and Biotechnology Selection)	2-3 General Education Course (GHW)	1.5
General Education Course	3	
	14-15	13.5-14.5

Total Credits 121-127

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Plant Science Option: Plant Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
AG 150	2	CHEM 110 [†]	3
BIOL 110 [†]	4	CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3	SOILS 101 ^{*††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5	CAS 100, 100A, 100B, or 100C ^{††}	3
AGRO 28 or HORT 101	3	General Education Course	3
		General Education Course	3
	15-17		16

Second Year

Fall	Credits	Spring	Credits
CHEM 112	3	STAT 200, 240, or 250 ^{††}	3-4
CHEM 113	1	CHEM 210	3
PLANT 200	3	ENGL 202C or 202D ^{††}	3
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3	BIOL 230W, 230W, BMB 211 and BMB 212, MICRB 201 and MICRB 202, MICRB 251, or MICRB 252 (Microbiology Selection)	4-5
PHYS 250	4	General Education Course	3
General Education Course	3		
	17		16-18

Third Year

Fall	Credits	Spring	Credits
AGECO 457 [*]	3	BIOL 222	3
CHEM 212	3	CHEM 213	2
AGRO 410W, 460, BIOL 407, BIOL 441, BIOL 424, HORT 402W, HORT 407, HORT 412W, 420, or PPEM 430 (General Plant Science Selection)	3-4	AGRO 410W, HORT 412W, or SOILS 412W (Writing Across the Curriculum Selection)	3-4
General Education Course	3	General Education Course	3
Elective	3	Elective	3
	15-16		14-15

Fourth Year

Fall	Credits	Spring	Credits
PPEM 405 [*]	3	PLANT 461 [*]	3
AGECO 495	1	AGRO 410W, 460, BIOL 407, BIOL 441, BIOL 424, HORT 402W, HORT 407, HORT 412W, 420, or PPEM 430 (General Plant Science Selection)	3-4

ENT 313	2 BIOL 439, ENT 402W, ENT 410, or PPEM 425 (Plant Microbiology and Entomology Selection)	3
ENT 314	1 AGRO 460, BIOL 439, HORT 407, or HORT 459 (Plant Genetics and Biotechnology Selection)	3
BIOL 412, 414, 427, 428, 436, 448, ENT 402W, ENT 420, HORT 445, or PPEM 425 (Plant Ecology, Evolution and Systematics Selection)	3 Elective	2-3
Elective	3	
	13	14-16

Total Credits 120-128

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

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W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and replace both ENGL 30H and CAS 100. Each course is 3 credits.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Agroecology Option: Plant Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
First Year Seminar	1-3 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 AG 160, GEOG 30N, PHIL 13, PHIL 103, or PHIL 132 (Ethics Selection)	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 Elective	3
General Education Course	3 General Education Course	3
	General Education Course (GHW)	1.5
	14-18	14.5

Second Year

Fall	Credits Spring	Credits
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3 ENGL 202C or 202D ^{††}	3
CAS 100 ^{††}	3 Supporting Course or Elective	3
STAT 200, 240, or 250 ^{††}	3-4 Supporting Course	4
General Education Course	3 General Education Course	3
General Education Course	3 General Education Course (GHW)	1.5
	15-16	14.5

Third Year

Fall	Credits Spring	Credits
SOILS 101 ^{††}	3 ENT 313	2
SOILS 102	1 ENT 316	1
PPEM 405	3 AGECO 201 [*]	3
PLANT 200	3 AGRO 410W, HORT 412W, or SOILS 412W (Writing Across the Curriculum)	3-4
AGRO 28 or HORT 101 [*]	3 AGECO 122, 134, AGECO 144, AGECO 154, or AGECO 496 (Agroecology Selection)	3
AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3 AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3
	16	15-16

Fourth Year

Fall	Credits Spring	Credits
AGECO 295	1 PLANT 461 [*]	3
AGECO 457 [*]	3 SOILS 401	3
AGECO 438	4 SOILS 402	3

BIOL 222 or HORT 407 (Plant Breeding/Genetics Selection)	3 AGECO 495 (or Elective)	1
Supporting Course	4 Supporting Course	3
	Supporting Course	3
	15	16

Total Credits 120-126

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

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GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Crop Production Option: Plant Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
First Year Seminar	1-3 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 ^{††}	1
ENGL 15, 30H, or ESL 15 ^{††}	3 Supporting Course	3-4
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 General Education Course	3
Elective	3 General Education Course (GHW)	3
	14-18	13-14

Second Year

Fall	Credits Spring	Credits
AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3 ENGL 202C or 202D ^{††}	3
AG 160, PHIL 13, PHIL 103, or PHIL 132 (Ethics Selection) [†]	3 CAS 100 ^{††}	3
General Education Course	3 STAT 200, 240, or 250 ^{††}	3-4
General Education Course	3 AGRO 28 or HORT 101 [*]	3
Elective	4 Supporting Course	3
	16	15-16

Third Year

Fall	Credits Spring	Credits
SOILS 101 ^{*††}	3 AGECO 201	3
SOILS 102	1 ENT 313	2
PLANT 200	3 ENT 314 or 316	1
AGECO 438	4 AGRO 410W, SOILS 412W, or HORT 412W (Writing Across the Curriculum)	3-4
AGRO 423	3 AGRO 425	3
AGECO 154 (or Supporting Course)	2 AGECO 418, ANSC 201, GEOG 160, or SOILS 450 (Special Interest Selection)	3
	16	15-16

Fourth Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 PLANT 461 [*]	3
AEE 201, 360, 460, or 465 (Leadership Selection)	3 SOILS 401	3
AGBM 102, 106, 200, or 407 (Business Selection)	3 SOILS 402	3
AGECO 429	2 AGECO 295 (or Supporting Course)	1-3
AGECO 495 or AGRO 495	1 HORT 407	3

PPEM 405	3 Supporting Course	3
	15	16-18

Total Credits 120-129

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

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W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Horticulture Option: Plant Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
First Year Seminar	1-3 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 CAS 100, 100A, 100B, or 100C ^{††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 AGBM 101, ECON 14, ECON 102, or ECON 104 [†]	3
General Education Course (GHW)	1.5 AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	3-4
	General Education Course	3
12.5-16.5		16-17

Second Year

Fall	Credits Spring	Credits
ENGL 202C or 202D ^{††}	3 AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	3-4
STAT 200, 240, or 250 ^{††}	3-4 Elective or Supporting Course	3
AGBM 200, 407, BLAW 243, BA 301, BA 303, SPAN 1, SPAN 2, SPAN 3, or SPAN 105 (Business/Spanish Selection)	4 General Education Course	3
General Education Course	3 General Education Course	3
General Education Course	3 General Education Course (GHW)	1.5
16-17		13.5-14.5

Third Year

Fall	Credits Spring	Credits
HORT 101 [*]	3 HORT 202 [*]	3
SOILS 101 ^{*††}	3 HORT 232	3
PLANT 200	3 HORT 315 [*]	3
HORT 455	3 ENT 313	2
HORT 238 or AGRO 438	3-4 ENT 314 or 316	1
	HORT 408, 431, 432, 433, or 453 (HORT Production Selection)	3-4
15-16		15-16

Fourth Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 HORT 407	3
PPEM 405 or 300	3 PLANT 461 [*]	3
HORT 445	3 HORT 402W	3
HORT 408, 431, 432, 433, or 453 (HORT Production Selection)	4 HORT 495 or 496	1
HORT 131, 137, 138, 431, 432, or 433 (HORT Plant Materials Selection)	3 HORT 412W [*]	3
	Elective or Supporting Course	3
16		16

Total Credits 120-129

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Plant Genetics and Biotechnology Option: Plant Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
First Year Seminar	1-3 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 CAS 100, 100A, 100B, or 100C ^{††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 General Education Course	3
General Education Course	3 General Education Course	3
14-18		13

Second Year

Fall	Credits Spring	Credits
CHEM 112	3 ENGL 202C or 202D ^{††}	3
CHEM 113	1 STAT 200, 240, or 250 ^{††}	3-4
AGBM 101, ECON 14, ECON 102, or ECON 104 ^{††}	3 BIOL 230W, 240W, BMB 211 and BMB 212, MICRB 201 and MICRB 202, or MICRB 251 and MICRB 252 (Microbiology, Molecular Biology and Biochemistry Selection)	4-5
PHYS 250	4 General Education Course	3
General Education Course	3 General Education Course (GHW)	1.5
General Education Course (GHW)	1.5	
15.5		14.5-16.5

Third Year

Fall	Credits Spring	Credits
BIOL 222	3 AGRO 410W	4
CHEM 210	3 HORT/BIOTC/BIOL 459	3
AGRO 28 or HORT 101	3 CHEM 212	3
PPEM 405 [*]	3 ENT 313	2
PLANT 200	3 ENT 314 or 316	1
AGRO 423, 425, HORT 202, HORT 315, HORT 431, HORT 432, HORT 433, or SOILS 418 (Production Selection)	3 SOILS 101 ^{††}	3
18		16

Fourth Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 AGRO/BIOTC 460	3
BMB 400	2 PLANT 461 [*]	3

HORT 407	3 BIOL 407, 424, 441, HORT 402W, HORT 412W, or 420 (General Plant Science Selection)	3
AGECO 495, AGRO 495, HORT 495, or HORT 496	1 ENT 402W, 410, PPEM 416, or PPEM 425 (Plant Microbiology and Entomology Selection)	3
BIOL 412, 414, 427, 428, 436, 448, ENT 420, HORT 445, or PPEM 425 (Plant Ecology, Evolution and Systematics Selection)	3-4 Elective	3-4
BIOL 439, BIOTC 479, or HORT 497 (Plant Genetics and Biotechnology Option)	2-3	
14-16		15-16

Total Credits 120-129

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Plant Science Option: Plant Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
First Year Seminar	1-3 CHEM 110 [†]	3
BIOL 110 [†]	4 CHEM 111 [†]	1
ENGL 15, 30H, or ESL 15 ^{††}	3 SOILS 101 ^{*††}	3
MATH 22, 26, 40, 41, 110, or 140 ^{††}	3-5 General Education Course	3
General Education Course	3 General Education Course	3
	General Education Course (GHW)	1.5
	14-18	14.5

Second Year

Fall	Credits Spring	Credits
CHEM 112	3 STAT 200, 240, or 250 ^{††}	3-4
CHEM 113	1 CHEM 210	3
AGBM 101, ECON 14, ECON 102, or ECON 104 ^{††}	3 ENGL 202C or 202D ^{††}	3
PHYS 250	4 Elective	3
CAS 100 ^{††}	3 General Education Course	3
General Education Course	3 General Education Course (GHW)	1.5
	17	16.5-17.5

Third Year

Fall	Credits Spring	Credits
AGECO 457 [*]	3 BIOL 222	3
PPEM 405 [*]	3 CHEM 213	2
CHEM 212	3 AGRO 410W, HORT 412W, or SOILS 412W	3-4
PLANT 200	3 BIOL 230W, 240W, BMB 211 and BMB 212, MICRB 201 and MICRB 202, MICRB 251, or MICRB 252 (Microbiology Selection)	3-4
AGRO 28 or HORT 101	3 Elective	3
	15	14-16

Fourth Year

Fall	Credits Spring	Credits
AGECO 495	1 PLANT 461 [*]	3
ENT 313	2 AGRO 410W, 460, BIOL 407, BIOL 441, BIOL 424, HORT 402W, HORT 407, HORT 412W, 420, or PPEM 430 (General Plant Science Selection)	4

ENT 314	1 AGRO 460, BIOL 439, HORT 407, or HORT 459 (Plant Genetics and Biotechnology Selection)	3
BIOL 412, 414, 427, 428, 436, 448, ENT 402W, ENT 420, HORT 445, or PPEM 425 (Plant Ecology, Evolution and Systematics Selection)	3-4 Elective	3
BIOL 439, ENT 402W, ENT 410, PPEM 416, or PPEM 425 (Plant Microbiology and Entomology Selection)	3-4 Elective	3
AGRO 410W, 460, BIOL 407, BIOL 441, BIOL 424, HORT 402W, HORT 407, HORT 412W, 420, or PPEM 430 (General Plant Science Selection)	4	
	14-16	16

Total Credits 121-130

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

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Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Advising Note:

Please consult with your academic adviser regarding the appropriate selection of elective and supporting courses. Supporting courses must be selected from the "Approved List of Additional Courses".

Career Paths

Careers opportunities exist in agronomic and horticultural crop production systems, sustainable agriculture and ecosystem science, crop protection, applied plant physiology, plant science research, and plant biotechnology. Students may also pursue graduate studies; however, most students find fulfilling careers upon graduation and do not pursue graduate studies.

Careers

Careers are available in plant science research, marketing and sales, plant health and protection, sustainable agriculture and food systems, public gardens and arboretums, greenhouse and nursery production and management, cooperative extension, plant biotechnology, resource protection, farm management, and with government or non-government agencies.

Opportunities for Graduate Studies

Students may pursue graduate studies in areas related to ecology, plant pathology, soil science, horticulture, agronomy, international agriculture, and entomology, or in other biological areas.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES
(<http://plantscience.psu.edu/graduateprograms/>)

Contact

University Park

DEPARTMENT OF PLANT SCIENCE
101 Tyson Building
University Park, PA 16802
814-865-2571

<http://plantscience.psu.edu/contact> (<http://plantscience.psu.edu/contact/>)