

# AGRICULTURAL AND BIORENEWABLE SYSTEMS MANAGEMENT, B.S.

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Program Description

The Agricultural and Biorenewable Systems Management Major is an applied major that intertwines the study of engineering technology, natural resources, and agriculture with fundamentals of sustainability, business, operations, and management. Administered through the Department of Agricultural and Biological Engineering, the Agricultural and Biorenewable Systems Management (ABSM) program uniquely prepares students to solve 21st century problems and attain careers relating to the emerging circular bioeconomy. Students in this program will secure: (1) knowledge of fundamental and applied sciences related to resources, processes, and products in ag and biorenewable systems; (2) communication and managerial skills relevant to careers in product development, technology, sales, marketing and management; and (3) the ability to apply systems analysis skills, positioning them for effective problem solving and leadership in the agricultural and bioproducts industries.

Graduates find employment as technical consultants, quality assurance personnel, sustainability specialists, and sales and field representatives, in renewable bioproducts or related agricultural sectors such as: power and machinery systems, forest products, food production, bioprocessing, environmental systems, bioenergy, and co-product development.

Graduates may continue their education in a graduate program with a science, engineering, or business orientation.

## What is Agricultural and Biorenewable Systems Management?

The Agricultural and Biorenewable Systems Management major integrates the study of engineering technology, applied sciences, and systems analysis with fundamentals of sustainability, business, operations, and management. Administered through the Department of Agricultural and Biological Engineering, the Agricultural and Biorenewable Systems Management (ABSM) program uniquely prepares students to solve 21st century problems and attain careers relating to the emerging circular bioeconomy.

### You Might Like this Program If...

- You want to make a difference in the world by developing more efficient and sustainable technologies and systems.
- You want to engage in testing, development, and improvement of equipment, processes, or green (food and other bio-based) products.
- You want to demonstrate features, advantages, and benefits of new technologies or products and train service personnel.
- You are interested in systems management, business applications, or technical sales, with a focus on biorenewable and agricultural industries.

## 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 at least third-semester classification (<https://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 Agricultural and Biorenewable Systems Management, a minimum of 121 credits is required:**

Requirement	Credits
General Education	45
Requirements for the Major	106-108

**30 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; 6 credits of GS courses; 9 credits of GWS courses.**

## 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>).

Code	Title	Credits
<b>Prescribed Courses</b>		
ABSM 300	Introduction to Agricultural and Biorenewable Products	3
ABSM 350	Introduction to Life Cycle Assessment	3
ABSM 422	Energy Analysis in Agricultural and Biorenewable Systems	3
ABSM 426	Safety and Health in Agriculture and Biorenewable Industries	3
ABSM 428	Electric Power and Instrumentation	3
ABSM 429	Agricultural and Biorenewable Systems Analysis and Management	3
ABSM 430W	Agricultural and Biorenewable Systems Management Capstone 1	1
ABSM 431W	Agricultural and Biorenewable Systems Management Capstone 2	2
ABSM 490	Agricultural and Biorenewable Systems Management Colloquium	1
ACCTG 211	Financial and Managerial Accounting for Decision Making	4
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
<i>Prescribed Courses: Require a grade of C or better</i>		
ABSM 301	Engineering Principles of Agricultural and Biorenewable Systems	3
ABSM 391	Communication Skills for BE and ABSM Students	2
ABSM 392	Leadership and Ethics for BE and ABSM Students	2

AGBM 106	Agribusiness Problem Solving	3
EDSGN 100	Cornerstone Engineering Design	3
ENGL 15	Rhetoric and Composition	3

**Additional Courses**

AGBM 101	Economic Principles of Agribusiness Decision Making	3
or ECON 102	Introductory Microeconomic Analysis and Policy	
BA 303	Marketing	3
or AGBM 302	Food Product Marketing	
BIOL 11 & BIOL 12	Introductory Biology I and Introductory Biology II	4
or BIOL 110	Biology: Basic Concepts and Biodiversity	
EBF 200	Introduction to Energy and Earth Sciences Economics	3
or ECON 104	Introductory Macroeconomic Analysis and Policy	
PHYS 211	General Physics: Mechanics	4
or PHYS 250	Introductory Physics I	
Select one of the following:		3-4
BA 241 & BA 242	Legal Environment of Business and Social and Ethical Environment of Business	
BA 243	Social, Legal, and Ethical Environment of Business	
BLAW 243	Legal Environment of Business	

*Additional Courses: Require a grade of C or better*

CAS 100A	Effective Speech	3
or CAS 100B	Effective Speech	
MATH 110	Techniques of Calculus I	4
or MATH 140	Calculus With Analytic Geometry I	
STAT 200	Elementary Statistics	3-4
or STAT 240	Introduction to Biometry	
or STAT 250	Introduction to Biostatistics	

**Supporting Courses and Related Areas**

Select 12 credits of ABSM courses from the following:		12
ABSM 310	Power Transmission in Agriculture	
ABSM 320	Combustion Engines for Mobile Equipment	
ABSM 327	Soil and Water Resource Management	
ABSM 402	Foundations of Sustainable Business	
ABSM 411	Bioproducts Science and Technology	
ABSM 417	Processing and Manufacturing Systems for Bioproducts	
ABSM 420	Principles of Off-Road Machines	
ABSM 423	Deterioration and Protection of Bioproducts	
ABSM 424	Precision Agriculture Technology	
ABSM 496	Independent Studies	
Select 18 credits of supporting courses from department list		18

**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 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.

## Program Learning Objectives

- Demonstrate knowledge of engineering technologies, sales, marketing, management and safety principles as they pertain to agricultural and biorenewable systems.
- Graduates will be able to analyze and interpret data using relevant software, and demonstrate an ability to draw sound conclusions from data.
- Apply technical methodology and systems analysis skills to identify and solve problems for effective decision making in the operations and management of agricultural and biorenewable resource industries.
- Graduates will be able to communicate, both orally and in writing, business and technical concepts within the context of agricultural and biorenewable industries.
- Graduates will demonstrate knowledge of ethics and social justice issues including issues of race and equity and be able to practice ethical decision making.

## 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 2024-25 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.

### Agricultural and Biorenewable Systems Management, 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
ABSM 100	1 CHEM 111 <sup>†</sup>	1
CHEM 110 <sup>†</sup>	3 ACCTG 211	4
EDSGN 100 <sup>*</sup>	3 ENGL 15 <sup>††</sup>	3
MATH 110 or 140 <sup>††</sup>	4 PHYS 250 or 211 <sup>†</sup>	4
General Education Course (GHW)	1.5 General Education Course	3
ECON 104 <sup>†</sup>	3 General Education Course (GHW)	1.5
	<b>15.5</b>	<b>16.5</b>

#### Second Year

Fall	Credits Spring	Credits
AGBM 101 or ECON 102 <sup>†</sup>	3 BLAW 243, BA 243, or BA 241 <b>and</b> BA 242	3
BIOL 110 or 11 <b>and</b> 12 <sup>†</sup>	4 General Education Course	3
CAS 100A or 100B <sup>††</sup>	3 General Education Course	3
STAT 200 or 240 <sup>††</sup>	3 Additional Specialization	3
General Education Course	3 Additional Specialization	3
	<b>16</b>	<b>15</b>

#### Third Year

Fall	Credits Spring	Credits
AGBM 106 <sup>*</sup>	3 ABSM 392 <sup>††</sup>	2
ABSM 300 <sup>*</sup>	3 BA 303 or AGBM 302	3
ABSM 301 <sup>*</sup>	3 ABSM Selection	3
ABSM 350 <sup>*</sup>	3 ABSM Selection	3
ABSM 391 <sup>††</sup>	2 Additional Specialization	3
	ABSM 490	1
	<b>14</b>	<b>15</b>

#### Fourth Year

Fall	Credits Spring	Credits
ABSM 428	3 ABSM 426	3
ABSM 430W	1 ABSM 431W	2
ABSM 422	3 ABSM Selection	3
ABSM 429	3 Additional Specialization	3
Additional Specialization	3 Additional Specialization	3

ABSM Selection	3	
	<b>16</b>	<b>14</b>

**Total Credits 122**

- \* 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 Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

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 satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

**Advising Note:**

A list of 'selection' courses can be found in the BRS Advising Manual (<https://abe.psu.edu/undergraduate/resources/advising/brs-manual/options/>). Students should consult with an academic adviser to discuss appropriate course selection.

## Agricultural and Biorenewable Systems Management, 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
CHEM 110 <sup>†</sup>	3 CHEM 111 <sup>†</sup>	1
EDSGN 100 <sup>*</sup>	3 ACCTG 211	4
MATH 110 or 140 <sup>††</sup>	4 ENGL 15 <sup>††</sup>	3
General Education Course (GHW)	1.5 PHYS 250 or 211 <sup>†</sup>	4
ECON 104 <sup>†</sup>	3 General Education Course	3
	General Education Course (GHW)	1.5
	<b>14.5</b>	<b>16.5</b>

### Second Year

Fall	Credits Spring	Credits
AGBM 101 or ECON 102 <sup>†</sup>	3 BLAW 243, BA 243, or BA 241 <i>and</i> BA 242	3
BIOL 110 or 11 <i>and</i> 12 <sup>†</sup>	4 Additional Specialization	3
CAS 100A or 100B <sup>††</sup>	3 Additional Specialization	3
STAT 200 or 240 <sup>††</sup>	3 General Education Course	3
General Education Course	3 General Education Course	3
	<b>16</b>	<b>15</b>

### Third Year

Fall	Credits Spring	Credits
AGBM 106 <sup>*</sup>	3 ABSM 392 <sup>††</sup>	2
ABSM 300 <sup>*</sup>	3 BA 303 or AGBM 302	3
ABSM 301 <sup>*</sup>	3 ABSM Selection	3
ABSM 350 <sup>*</sup>	3 ABSM Selection	3
ABSM 391 <sup>††</sup>	2 Additional Specialization	3
	ABSM 490	1
	<b>14</b>	<b>15</b>

### Fourth Year

Fall	Credits Spring	Credits
ABSM 428	3 ABSM 426	3
ABSM 430W	1 ABSM 431W	2
ABSM 422	3 ABSM Selection	3
ABSM 429	3 Additional Specialization	3
ABSM Selection	3 Additional Specialization	3
Additional Specialization	3	
	<b>16</b>	<b>14</b>

**Total Credits 121**

\* 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 Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

### Advising Note:

A list of 'selection' courses can be found in the BRS Advising Manual (<https://abe.psu.edu/undergraduate/resources/advising/brs-manual/options/>). Students should consult with an academic adviser to discuss appropriate course selection.

## Career Paths

The Agricultural and Biorenewable Systems Management major provides a broad background in applied sciences, engineering technology, systems analysis, and business management that can help you succeed in industry or a graduate degree program. With companies, stakeholders, and consumers invested in sustainable and efficient systems, career opportunities are diverse, and the demand for graduates is strong.

### Careers

Graduates find employment as technical consultants, quality assurance personnel, sustainability specialists, equipment evaluators and managers, and sales and field representatives, in renewable bioproducts or related agricultural sectors such as: power and machinery systems, forest products, food production, bioprocessing, environmental systems, bioenergy, and co-product development.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE AGRICULTURAL AND BIORENEWABLE SYSTEMS MANAGEMENT PROGRAM (<https://agsci.psu.edu/academics/undergraduate/majors/biorenewable-systems/>)

### Opportunities for Graduate Studies

Graduates may continue their education in a graduate program with a science, engineering, or business orientation. The Department of Agricultural and Biological Engineering at Penn State offers M.S. and Ph.D. degrees in BioRenewable Systems.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDY (<https://abe.psu.edu/graduate/brs/>)

### Professional Resources

- American Society of Agricultural and Biological Engineers (<https://www.asabe.org>)

## Contact

### University Park

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