

# Agricultural and Biological Engineering

Agricultural and biological engineering (ABE) applies engineering principles to the biological sciences to produce biofuels, food and fiber products and other agricultural commodities from renewable bio-resources. It also aims to protect the environment and conserve and replenish our natural resources.

## About This Major

- **Colleges:** Engineering and Agricultural and Life Sciences cooperatively
- **Degree:** Bachelor of Science in Agricultural and Biological Engineering
- **Hours for Degree:** 128
- **Specializations:** Agrisystems Engineering, Biological Engineering, Land and Water Resources Engineering
- **Minor:** No
- **Combined-Degree Program:** Yes
- [www.abe.ufl.edu](http://www.abe.ufl.edu)

## Overview

Agricultural and biological engineers pioneer new techniques in areas such as agricultural robotics, remote sensing, bioprocessing, precision agriculture and plant space biology.

Graduates are educated in the biological and environmental sciences, as well as in engineering. They will address critical problems involving land and water resources, biological systems and production agriculture. Individual selection of electives allows the student to focus on academic and career interests.

In addition to abundant job opportunities in Florida's large agricultural industry, graduates have career opportunities in biotechnology and those related to Florida's water quality and water resources, including water management districts, environmental companies, consulting firms, equipment manufacturers, bio-energy and food engineering.

The ABE curriculum can fulfill requirements for admission to pre-professional programs, as well as graduate programs such as biomedical engineering, civil engineering and mechanical engineering.

## Educational Objectives

Graduates from the University of Florida's undergraduate degree program in Agricultural and Biological Engineering will be prepared for at least one of the following:

- Successful careers in practicing the profession of agricultural and biological engineering within an increasingly complex, global and multidisciplinary setting;
- Gaining admission to and completing a graduate and/or professional degree program at competitive graduate and professional schools of their choice; and
- Effectively contributing to society by engaging in ethical or professional engineering practice, and communicating a sense of professional and societal responsibility with an awareness of related contemporary issues.

## Goals

To develop agricultural and biological engineering professionals with technical proficiency and societal responsibility.

## Mission

The department will develop professionals, create and disseminate knowledge, and promote the application of engineering and management principles to meet societal needs with respect to agricultural, biological, and land and water resource systems.

## Critical Tracking

**To graduate with this major, students must complete all university, college and major requirements.**

Equivalent critical tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

### Semester 1

- 2.0 UF GPA required for semesters 1-5
- 2.5 GPA on all critical-tracking coursework for semesters 1-5
- Complete 1 of 8 tracking courses with a minimum grade of C within two attempts:  
CHM 2045 or CHM 2095, CHM 2045L, CHM 2046 or CHM 2096, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048/2048L, PHY 2049/2049L

### Semester 2

- Complete 1 additional tracking course with a minimum grade of C within two attempts

### Semester 3

- Complete 2 additional tracking courses with minimum grades of C within two attempts

### Semester 4

- Complete 2 additional tracking courses with minimum grades of C within two attempts

### Semester 5

- Complete all 8 critical-tracking courses with minimum grades of C in each course within two attempts

## Recommended Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold.

Semester 1	Credits
If you do not place out of ENC 1101, take it in the fall.	
<b>CHM 2045 and 2095 General Chemistry 1 (GE-P) or CHM 2095 Chemistry for Engineers 1</b>	4
<b>CHM 2045L General Chemistry 1 Laboratory (GE-P)</b>	1
<b>MAC 2311 Analytic Geometry and Calculus 1 (GE-M)</b>	4
Humanities (GE-H)	3
Social and Behavioral Sciences (GE-S)	3
Total	14
Semester 2	Credits
<b>CHM 2046 or 2096 General Chemistry 2 (3) or CHM 2096 Chemistry for Engineers 2 (3)</b> (biological engineering specialization also requires CHM 2046L)	3-4
ENC 2210 Technical Writing (GE-C) or ENC 3254 Professional Writing in the Discipline (GE-C)	3
<b>MAC 2312 Analytic Geometry and Calculus 2 (GE-M)</b>	4
Humanities (GE-H)	3
Total	13-14
Semester 3	Credits
ABE 2012C Introduction to Agricultural and Biological Engineering	3
<b>MAC 2313 Analytic Geometry and Calculus 3</b>	4
<b>PHY 2048 and 2048L Physics with Calculus 1 (GE-P) (3) and Physics with Calculus 1 Laboratory (1)</b>	4
Social and Behavioral Sciences (GE-S)	3
Total	14
Semester 4	Credits
EGM 2511 Engineering Mechanics: Statics	3
EML 3007 Elements of Thermodynamics and Heat Transfer	3
<b>MAP 2302 Elementary Differential Equations (GE-M)</b>	3
<b>PHY 2049 Physics with Calculus 2 (GE-P)</b>	3
PHY 2049L Physics with Calculus 2 Laboratory (GE-P)	1
Humanities (GE-H) or Social and Behavioral Sciences (GE-S)	3
Total	16

## Agrisystems Engineering

Agrisystems engineering focuses on areas such as structural and environmental design, energy conservation, computer modeling, equipment design and plant protection systems. Students study how to design renewable energy systems, create agricultural robotics, develop environmentally friendly pest-control methods, design environmental control systems for plant and animal facilities and apply engineering design to food production systems.

Students choose electives from an approved list.

Semester 5	Credits
ABE 3612C Heat and Mass Transfer in Biological Systems	4
CGN 3421 Computer Methods in Civil Engineering or ESI 4567C Matrix/Numerical Methods in Systems Engineering	4
EGM 3400 Elements of Dynamics	2

EGN 3353C Fluid Mechanics (3) or CWR 3201 Hydrodynamics (4)	3-4
Biological Science (ABE 2062, BSC 2007, BSC 2010 or BOT 2010; GE-B)	3
	<b>Total 16-17</b>
	<b>Credits</b>
<b>Semester 6</b>	
ABE 3212C Land and Water Resources Engineering	4
ABE 3652C Physical and Rheological Properties of Biological Materials (3) or CGN 3501C Civil Engineering Materials (4)	3-4
ABE 4303C Structural and Environmental Design	3
EML 2023 Computer Aided Graphics and Design or CGN 2328 Technical Drawing and Visualization	3
Technical science elective	3
	<b>Total 16-17</b>
	<b>Credits</b>
<b>Semester 7</b>	
CGN 3710 Experimentation and Instrumentation in Civil Engineering or EEL 3003 Elements of Electrical Engineering	3
EGM 3520 Mechanics of Materials	3
Engineering electives	6
	<b>Total 12</b>
	<b>Credits</b>
<b>Semester 8</b>	
ABE 3042C Agricultural and Biological Engineering Design 1	2
ABE 4171C Power and Machines for Biological Systems	4
ABE 4931 Professional Issues in Agricultural and Biological Engineering	1
SWS 3022 and 3022L Introduction to Soils in the Environment (3) and Introduction to Soils in the Environment Laboratory (1)	4
Technical science elective (adviser approved)	3
	<b>Total 14</b>
	<b>Credits</b>
<b>Semester 9</b>	
ABE 4043C Agricultural and Biological Engineering Design 2	2
ABE 4413C Post Harvest Operations Engineering	3
Engineering elective (adviser approved)	3
Engineering or technical science electives	5
	<b>Total 13</b>

## Biological Engineering

Biological engineering includes designing microbes to clean the environment, converting raw biological materials into useful products such as biofuels, evaluating gene expression of biological systems and applications to space biosystems.

In addition, this specialization provides an excellent background for advanced studies in biomedical, bioprocess, food and agricultural engineering and also fulfills requirements for admission to professional programs in UF's colleges of medicine, dentistry, veterinary medicine and pharmacy.

Students choose electives from an approved list.

	<b>Semester 5</b>	<b>Credits</b>
ABE 3612C Heat and Mass Transfer in Biological Systems		4
ABE 4931 Professional Issues in Agricultural and Biological Engineering		1
CGN 3421 Computer Methods in Civil Engineering or ESI 4567C Matrix/Numerical Methods in Systems Engineering		4
CHM 2210 Organic Chemistry 1		3
Biological Science (BSC 2010 or BSC 2011; GE-B)		3
	<b>Total 15</b>	
	<b>Credits</b>	
<b>Semester 6</b>		
ABE 3000C Applications in Biological Engineering		3
ABE 3652C Physical and Rheological Properties of Biological Materials		3
CHM 2211 and 2211L Organic Chemistry 2 (3) and Organic Chemistry 2 Laboratory (2)		5
EGM 3400 Elements of Dynamics		2
Engineering elective (adviser approved)		2
	<b>Total 15</b>	
	<b>Credits</b>	
<b>Semester 7</b>		
BCH 4024 Introduction to Biochemistry and Molecular Biology or BCH 3025 Fundamentals of Biochemistry		4
CGN 3710 Experimentation and Instrumentation in Civil Engineering		3
EGN 3353C Fluid Mechanics (3) or CWR 3201 Hydrodynamics (4)		3-4

EML 2023 Computer Graphics and Design or CGN 2328 Technical Drawing and Visualization	3
	Total 13-14
<b>Semester 8</b>	<b>Credits</b>
ABE 3042C Agricultural and Biological Engineering Design 1	2
ABE 4662 Quantification of Biological Processes	3
ABE 4812 Food and BioProcess Engineering Unit Operations	4
Biological science electives	5
	Total 14
<b>Semester 9</b>	<b>Credits</b>
ABE 4043C Agricultural and Biological Engineering Design 2	2
EGM 3520 Mechanics of Materials	3
Biological science electives	5
Engineering elective	3
	Total 14

## Land and Water Resources Engineering

Land and water resources is concerned with all aspects of water and natural resource management, including irrigation, water conservation, drainage, water control and structures, soil erosion, waste and recycling, water quality, ecosystems preservation and environmental quality.

Students choose electives from an approved list.

<b>Semester 5</b>	<b>Credits</b>
ABE 3612C Heat and Mass Transfer in Biological Systems	4
EGM 3400 Elements of Dynamics	2
ENV 3040C Computer Methods in Environmental Engineering	3
SUR 3103C Geomatics	3
SWS 3022 Introduction to Soils in the Environment	3
	Total 15
<b>Semester 6</b>	<b>Credits</b>
ABE 3212C Land and Water Resources Engineering	4
ABE 3652C Physical and Rheological Properties of Biological Materials (3) or CGN 3501C Civil Engineering Materials (4)	3-4
ABE 4931 Professional Issues in Agricultural and Biological Engineering	1
CWR 3201 Hydrodynamics	4
Technical elective (adviser approved)	3
	Total 15-16
<b>Semester 7</b>	<b>Credits</b>
CGN 3710 Experimentation and Instrumentation in Civil Engineering or EEL 3003 Elements of Electrical Engineering	3
EGM 3520 Mechanics of Materials	3
Biological science (ABE 2062, BSC 2007, BSC 2010 or BOT 2010; GE-B)	3
Technical science elective	3
	Total 12
<b>Semester 8</b>	<b>Credits</b>
ABE 3042C Agricultural and Biological Engineering Design 1	2
ABE 4231C Irrigation and Drainage	4
CWR 4202 Hydraulics	3
EML 2023 Computer Aided Graphics and Design or CGN 2328 Technical Drawing and Visualization	3
Engineering elective	3
	Total 15
<b>Semester 9</b>	<b>Credits</b>
ABE 4043C Agricultural and Biological Engineering Design 2	2
Engineering electives	6
Engineering or technical science electives	6
	Total 14