

AGRICULTURAL AND BIOLOGICAL ENGINEERING

Not all courses are offered every semester. Refer to the schedule of courses for each term's specific offerings.

More Info (<https://one.ufl.edu/soc/>)

Unless otherwise indicated in the course description, all courses at the University of Florida are taught in English, with the exception of specific foreign language courses.

Department Information

The Department of Agricultural and Biological Engineering is founded on developing, teaching, and applying engineering principles to improve and sustain agricultural and biological systems for current and future generations.

More Info (<https://abe.ufl.edu/>)

CONTACT

352.392.1864 (tel) | 352.392.4092 (fax)

P.O. Box 110570

Frazier Rogers Hall

1741 Museum Road, Bldg. 474

GAINESVILLE FL 32611-0570

Map (<http://campusmap.ufl.edu/#/index/0474>)

Curriculum

- Agricultural Operations Management
- Biological Engineering
- Combination Degrees
- Packaging Engineering Certificate
- Packaging Science Minor
- Precision Agriculture Minor

Courses

ABE 2012C Introduction to Biological Engineering 3 Credits

Grading Scheme: Letter Grade

Introduces the process of design along with approaches to solving engineering problems, manipulations and presentations of engineering data and applied engineering concepts. (WR)

Prerequisite: MAC 2311.

Attributes: Satisfies 2000 Words of Writing Requirement

ABE 3000C Applications in Biological Engineering 3 Credits

Grading Scheme: Letter Grade

Overview of the research and applications of biological engineering, such as bioprocessing, biotechnology, transport processes, biosensors, bioremediation, biological materials and biomedicine.

Prerequisite: BSC 2010 or equivalent.

ABE 3212C Land and Water Resources Engineering 4 Credits

Grading Scheme: Letter Grade

Introduces hydrology, flow through porous media, flood routing, grade control structures and erosion control.

Prerequisite: ENV 3040C or CGN 3421 or (COP 2271 and COP 2271L) and MAP 2302.

ABE 3612C Heat and Mass Transfer in Biological Systems 4 Credits

Grading Scheme: Letter Grade

Transport phenomena, steady and unsteady-state heat conduction, radiation, free and forced convection, mass transfer, psychometrics and thermodynamics of biological processes.

Corequisite: ENV 3040C or CGN 3421 or ESI 4327C or (COP 2271 and COP 2271L).

ABE 3652C Physical and Rheological Properties of Biological Materials 3 Credits

Grading Scheme: Letter Grade

Theory and use of physical and rheological properties of biological materials in agricultural engineering applications.

Prerequisite: CHM 2045 and MAC 2313 and PHY 2048.

ABE 4008 Control Methods in SmartAg Systems 3 Credits

Grading Scheme: Letter Grade

Design, analysis, simulation, and programming modern control methods for applications in production agriculture, biological and food engineering, land and water resources. Learn theoretical concepts, application programming, and simulation techniques using classical and modern control approaches, fuzzy logic, neural networks, and other intelligent learning algorithms.

Prerequisite: MAP 2302 and PHY 2048;

Corequisite: EGM 3400.

Attributes: Artificial Intelligence

ABE 4033 Fundamentals and Applications of Biosensors 3 Credits

Grading Scheme: Letter Grade

Provides a broad introduction to the field of biosensors, as well as an in-depth and quantitative view of biosensor design and performance analysis. Fundamental application of biosensor theory will be demonstrated, including: recognition, transduction, signal acquisition, and post processing/data analysis.

Prerequisite: MAP 2302 and BSC 2010 and CHM 2200.

ABE 4034 Remote Sensing in Engineering: Science, Sensors and Applications 3 Credits

Grading Scheme: Letter Grade

Develop an understanding of remote sensing theory, systems and applications using information obtained from the visible/near infrared, thermal infrared and microwave regions of the EM spectrum.

Prerequisite: MAP 2302 or the equivalent.

ABE 4042C Biological Engineering Design 1 2 Credits

Grading Scheme: Letter Grade

Design of engineered agricultural and biological systems and devices. Problem definition analysis, synthesis, project management, economic, environmental, and social impacts. Individual and team projects.

Prerequisite: ABE 2012C.

ABE 4043C Biological Engineering Design 2 2 Credits

Grading Scheme: Letter Grade

Senior capstone design project.

Prerequisite: senior standing (4EG), ABE 4042C and two courses in area of specialization.

ABE 4171 Power and Machines for Biological Systems 3 Credits

Grading Scheme: Letter Grade

Design and specification of power and machine elements applied to agricultural, biological and land and water resources or food engineering; fundamentals of power units, design of machine elements and power transmission.

Prerequisite: EGM 3520 and (EGM 3400 or EGM 3401).

ABE 4231C Irrigation and Drainage Engineering 4 Credits

Grading Scheme: Letter Grade

Irrigation and drainage systems design, including pump sizing and specification, water distribution systems, plant water requirement, drainage systems and flood control.

Prerequisite: ABE 3212C.

ABE 4320 Controlled Environment Agriculture Systems Design 3 Credits

Grading Scheme: Letter Grade

Introduces the engineering design of controlled-environment agriculture systems, including glazing materials selection, fan-sizing for mechanical ventilation, lighting distribution, cooling system design with fan-and-pad evaporative cooling, and heating system design with hot water floor heating.

Prerequisite: MAC 1147 and 3 credits of physics.

ABE 4413C Post-Harvest Operations Engineering 3 Credits

Grading Scheme: Letter Grade

Engineering principles and practices of post-harvest operations for the maintenance of quality of agricultural products. Design of systems and facilities.

Prerequisite: ABE 3612C.

ABE 4630 Life Cycle Assessment in Water-Energy-Food Systems 3 Credits

Grading Scheme: Letter Grade

Introduction and application of life cycle assessment (LCA) to evaluate the environmental impacts of various products, processes, or services related to the water-energy-food nexus. Additional topics include planetary boundaries, systems thinking, circular economy, mass and energy balances, life-cycle costing, social LCA and sensitivity and uncertainty analysis. This is an interdisciplinary course open to students from any major.

Prerequisite: MAC1147 with a minimum grade C and Junior Standing or higher.

ABE 4641 Modeling Coupled Natural-Human Systems 3 Credits**Grading Scheme:** Letter Grade

Explore approaches to modeling coupled natural-human systems, drawing from both natural and social sciences. Topics include regime shift from dynamical systems and basic concepts from game theory and social-ecological system literature. These are combined in models that operationalize a conceptual framework. With guidance, develop models for final projects.

Prerequisite: MAC 2312 or equivalent.**Attributes:** Artificial Intelligence**ABE 4655C Bio-Based Products from Renewable Resources 3 Credits****Grading Scheme:** Letter Grade

Provides the knowledge for the production of fuels, chemicals, and materials from renewable resources; includes the fundamental principles and practical applications of bio-based products: biorefinery and biobased products overview, fundamental concepts in understanding biorefinery and biobased products; materials, chemical platforms, and fuels from biomass.

Prerequisite: (CHM 2045 or CHM 2095) and (CHM 2046 or CHM 2096) or equivalent general chemistry courses or instructor permission.**ABE 4662 Quantification of Biological Processes 3 Credits****Grading Scheme:** Letter Grade

Quantitative description and analysis of biological processes pertaining to microbes, plants, animals and ecosystems. Biological transport phenomena, bioenergetics, enzyme kinetics, metabolism, bioregulation, circulatory and muscle systems, agroecosystems. Analytical and experimental laboratory for development of quantitative skills.

Prerequisite: (ABE 2062 or BSC 2010) and (EGN 3353C or CWR 3201).**Attributes:** Artificial Intelligence**ABE 4812 Food and Bioprocess Engineering Unit Operations 4 Credits****Grading Scheme:** Letter Grade

Analysis of thermal freezing, evaporation, dehydration, contact equilibrium and mechanical separation processes as governed by the reaction kinetics and rheology of processed foods.

Prerequisite: ABE 3612C or CWR 3201 or EGN 3353C.**ABE 4905 Individual Study in Biological Engineering 1-4 Credits****Grading Scheme:** Letter Grade

Selected problems of projects in the student's major field of engineering study.

Prerequisite: recommendation of department chair.**ABE 4912 Integrated Product and Processing Design 1 in Biological Engineering 3 Credits****Grading Scheme:** Letter Grade

First part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes on time and within budget.

Prerequisite: Junior standing or higher.**ABE 4913 Integrated Product and Process Design 2 in Biological Engineering 3 Credits****Grading Scheme:** Letter Grade

Second part of a two-course sequence in which multidisciplinary teams of engineering and business students partner with industry sponsors to design and build authentic products and processes on time and within budget.

Prerequisite: ABE 4912.**ABE 4931 Professional Issues in Agricultural and Biological Engineering 1 Credit****Grading Scheme:** Letter Grade

Current developments in agricultural and biological engineering, principles of agricultural and biological engineering practice, and professional standards and ethics.

Prerequisite: Junior standing or higher.**ABE 4932 Special Topics 1-4 Credits****Grading Scheme:** Letter Grade

Variable subjects provide content for the study of agricultural engineering topics not offered in other courses.

Prerequisite: instructor permission.**ABE 4935 Writing Grant Proposals for Scholarships and Fellowships 2 Credits****Grading Scheme:** Letter Grade

Introduces seniors in the Agricultural and Biological Engineering department to opportunities for obtaining scholarships, fellowships, internships, and teaching/research assistantships from federal funding agencies; includes funding sources and opportunities, provide guidelines for proposal writing. Requires preparing a proposal.

Prerequisite: Senior standing, must be pursuing a degree within the Agricultural and Biological Engineering department, and instructor permission.**ABE 4949 Work Experience in Biological Engineering 1-3 Credits****Grading Scheme:** S/U

Work experience in the biological engineering industry with advisor approval.

Prerequisite: Advisor approval

EGN 4912 Engineering Directed Independent Research 0-3 Credits

Grading Scheme: S/U

Provides firsthand, supervised research with a faculty advisor or postdoctoral or graduate student mentor. Projects may involve inquiry, design, investigation, scholarship, discovery, or application.

Prerequisite: Department permission.
