

Undergraduate

	Course Description	Credits	Term	Frequency
<u>BEE 101 Ecological Engineering I</u>	Introduction to engineering at OSU and the emerging field of ecological engineering. Topics include engineering analysis and problem solving, professional ethics, the design process and teamwork.	3	Fall	Annually
<u>BEE 102 Ecological Engineering II</u>	Introduction to common problems and solutions in ecological engineering, emphasizing the multiplicity of approaches to constraining, analyzing, and resolving challenges of ecosystem management. Two overnight field trips to local ecological monitoring and engineering sites will be required.	3	Spring	Annually
<u>BEE 221 Ecological Engineering Fundamentals</u>	Introduction to the concepts and practice of ecological engineering including characteristics, classification, and modeling of ecosystems; ecosystem protection; and sustainable uses of ecosystems, including treatment wetlands, land treatment systems, and ecologically sensitive storm water management, to meet the needs of human societies. PREREQS.: One year of college biology and chemistry and MTH 256 or instructor approval required.	3	Winter	Annually
<u>BEE 222 Ecological Engineering Computation</u>	Programming methods relevant to ecological engineering, including hardware/software integration.	3	Spring	Annually
<u>BEE 311 Ecological Fluid Mechanics</u>	Fluid properties, fluid statics, fluid motion, conservation of mass, momentum and energy for incompressible fluids, dimensional analysis, ecological engineering applications. Lect./rec. PREREQS.: Consent of instructor.	4	Fall	Annually
<u>BEE 312 Ecohydraulics</u>	Theory and design of hydraulic systems for ecological engineering applications. Lect./rec. PREREQS.: BEE 311 or CE 311 or CHE 331 or CHE 331H	4	Winter	Annually
<u>BEE 313 Ecohydrology</u>	Provides quantitative description of fundamental hydrologic processes and the hydrologic cycle, the interactions of water between atmosphere, soils, and plants, and models for estimating the generation and transport of water in the environment. Lect./rec. PREREQS.: BEE 312	4	Spring	Annually

<u>BEE 320 Biosystems Analysis and Modeling</u>	An introduction to simulation modeling and analysis of a variety of biological and ecological systems. Systems approaches to describing ecological systems. PREREQS: MTH 256 and consent of instructor.	4	Fall	Annually
<u>BEE 322 EcoE Thermodynamics/Transfer Processes</u>	A study of the transport processes of fluid flow, heat transfer and mass transfer applied to biological organisms and ecological systems. PREREQS: BEE 320	4	Winter	Annually
<u>BEE 361 Ecological Engineering Laboratory</u>	Introduction to modern measurement methods for ecological applications, includes sensors and systems for measuring soil, water and atmospheric properties. Lect./lab. PREREQS: One year college physics.	3	Spring	Annually
<u>BEE 399 Design of Microbial Processes for Ecological Engineering Applications</u>	Application of ecological engineering principles to the modeling, analysis and design of microbial processes in the environment. PREREQS: See course page for details	4	Spring	Annually
<u>BEE 411 Global Environmental Change: Using Data to Inform Design (Ecampus)</u>	Empowers students interested in global change research to focus on the interactions between changes in human land use and climate. Using an innovative online data and mapping tool called Data Basin, students will explore topics accessing the highest quality datasets available in an all-in-one platform.	3		Annually
<u>BEE 433 Irrigation System Design</u>	Principles of soil physics and plant water use applied to irrigation system design. Design of gravity, pressurized, and trickle irrigation systems, improving on-farm water management, performance characteristics of pumps and other irrigation equipment. Lect./lab. Offered alternate years.	4	Winter	Biannually (Odd Years)
<u>BEE 439 Irrigation Principles and Practice (Ecampus)</u>	Survey of irrigation systems, system configurations, factors that influence irrigation efficiency, crop water requirements, energy requirements, pumps, irrigation scheduling. For non-engineers. Lect./lab/rec. PREREQS.: MTH 111	4	Spring	Annually
<u>BEE 446 River Engineering</u>	Multipurpose river use; natural physical processes in alluvial rivers; channel modification practices; river structures; design practices; impact of river modification; problem analysis; and impact minimization. Offered alternate years. PREREQS.: CE 313	4	Spring	Biannually (Odd Years)

<u>BEE 458 Nonpoint Source Pollution Assessment and Control</u>	Problem solving in nonpoint source pollution. Methods for evaluating the extent, rate, timing, and fate of Non-Point Source (NPS) pollutants in agricultural and urban environments. Offered yearly in Spring term, as a hybrid section for odd years and an Ecampus section for even years.	3	Spring	Annually
<u>BEE 468 Bioremediation Engineering</u>	Examines strategies for using a variety of biological processes for treating municipal, agricultural and industrial contaminants. This course is a Hybrid. PREREQS: MTH 251 and professional school standing.	3	Winter	Annually
<u>BEE 469 Ecological Engineering Design I</u>	Engineering design processes for ecological engineering applications, including specifications, performance criteria, timelines, and project logistics, principles and practices of working in engineering teams. (Writing Intensive Course) PREREQS: BEE 322 and (ENGR 391 or ENGR 391H), senior standing or consent of instructor.	4	Fall	Annually
<u>BEE 470 Ecological Engineering Design II</u>	Engineering design processes for ecological engineering applications, including specifications, performance criteria, timelines, and project logistics, principles and practices of working in engineering teams. PREREQS.: BEE 469, senior standing or consent of instructor.	4	Winter	Annually
<u>BEE 472 Intro to Food Engineering Principles</u>	This course is the first in a two-course sequence for non-engineering majors. BEE 472 provides principles of mass and energy conservation plus fundamentals of fluid flow dynamics as applied to food processing operations.	5	Fall	Annually
<u>BEE 473 Intro to Food Engineering Process Design</u>	This Course is the second in a two-course sequence for non-engineering majors. BEE 473 topics include conservation of mass and energy plus fundamentals of heat transfer as applied to food processing operations	3	Winter	Annually
<u>BEE 499 Small and Onsite Water Treatment Systems</u>	Create, specify in detail (in writing and/or in drawings), and justify the specific design of an onsite water supply system and an onsite water treatment system based on, and consistent with, the conditions and constraints of a given site, the advantages, disadvantages, and functions of alternative system components, and water quality conditions and requirements.	3	Fall	Annually

BEE 499 Sustainability Analysis

Assessing sustainability of biological and ecological systems is an integral part of ecological engineering practice. Various aspects of sustainability analysis include assessing technical feasibility, economic viability, environmental impacts, resource sustainability and social aspects of engineered systems. This course will provide an introduction to these aspects of sustainability with a focus on case studies that are relevant to biological and ecological engineers. This course will introduce tools to perform technical feasibility analysis, economic viability analysis, environmental risk assessment, resource sustainability assessment and life cycle assessment (LCA). This course will provide an introduction and overview of the LCA methodology, various tools to perform LCA and its use in assessing the environmental impacts. This course will also discuss the nexus of food-energy-water systems. Course will consist of lectures focusing on theory and case studies highlighting the use of these methods to assess sustainability. **PREREQS.:** ENGR 391 or BEE 322

Fall Annually

BEE 499 (formerly BEE 478) Biofuel Feedstocks Production

Bioethanol is one of the important alternatives to fossil fuels. This course will provide an overview of the biofuel feedstock for production of fuels, feed and industrially valuable chemicals. Issues in feedstock utilization such as suitability, availability, sustainability and economic viability will be addressed. This course will cover the preprocessing, post processing and fermentation technologies in ethanol production. Influence of feedstock composition and process technologies on ethanol and coproducts will be discussed.

3 Winter Annually