Ecological Engineering - Technical Electives

Department	Course	Course Title	Hours	Course Description
AGSYSMT	5560	UAS and Remote Sensing in Agriculture	3	Introduction to the fundamentals of remote sensing within the framework of Geographic Information System, and Unmanned Aerial Systems (UAS), and their applications in production agriculture. Topics include remote sensing technologies, FAA regulations and rulemaking, UAS types, mission planning, image collection, processing and interpretation, and their applications in agriculture. Prereq: HCS 2260, AnimSci 2260, ENR 2000, AEDEcon 2005, ComLdr 3537, or Stat 1450; and Sr standing; or permission of instructor.
CIVILENG	3160	Water Resources Engineering	3	Pipe systems, introduction to open channel flow, basic hydrology, demographic studies, water supply, and wastewater flows. Prereq: 3130 and CSE 1221 or 1222 or Engr 1221 or 1222 or 1281H or Engineer; and enrollment in CivilEn or EnvEng major. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
CIVILENG	5130	Applied Hydrology	3	Hydrologic cycle, meterology, streamflow, evapotranspiration, hydrographs, runoff relations, runoff hydrographs, groundwater, unit hydrographs, flood routing, frequency and duration studies, and application of hydrologic techniques. Prereq: 3160. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
ENGR	4375	Inclusive Leadership Practice for Emerging Professionals	1	To provide engineering students with the tools and techniques that allow them to develop their confidence, leadership style, and community of support in their academic and professional careers. Prereq: None.
ENGR	4692.01	Service Learning in Engineering	1-3	Experimental education characterized by participation in an organized service activity connected to specific learning outcomes. Meets community needs and includes student reflection. Prereq: Permission of instructor.
ENGR	5797.XX	Engineering Study Abroad	1-15	Study Abroad. Locations vary. Must be related to engineering and/or your specialization. Faculty advisor approval needed to count for technical elective. This course is graded S/U.
ENR	5261	Environmental Soil Physics	3	Principally involves the state and transport of water, heat and gas within soil, and the associated soil physical properties. Prereq: None.
ENR	3000	Soil Science	3	Introduction to soil physical, chemical, and biological properties related to land use, environmental quality, and crop production. Prereq: None.
ENR	3001	Soil Science Laboratory	1	Observation and quantitative determination of soil properties. Prereq or concur: 3000.
ENVENG	3200	Fundamentals of Environmental Engineering	3	Quantitative assessment of water quality, air quality, and solid/hazardous waste management, with an emphasis on minimizing human health and environmental impacts through sustainable design. Prereq: Chem 1220 or 1250 and CivilEn or EnvEng major or EnvEng minor. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
ENVENG	3210	Environmental Engineering Unit Operations	3	Selection and Design of Unit Operations and Processes used in Environmental Engineering. Prereq: 413 or CivilEn 3130, and Chem 1220 or 1250, or permission of instructor. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
ENVENG	5110	Environmental Engineering Bioprocesses	3	Principles and design of biological processes in environmental engineering. Prereq: 3200. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
ENVENG	5170	Sustainability and Pollution Prevention Practices	3	An introduction to concepts of sustainability and pollution prevention with particular application to solid waste generation, disposal and management. Prereq: 3200 or permission of instructor. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.
ENVENG	5210	Advanced Physical Chemical Treatment Processes	3	Principles and design of physical and chemical processes for water and wastewater treatment including mixing, mass transfer, chemical kinetics, oxidation-reduction, disinfection, emerging contaminants, and water reuse. Prereq: 3210, or permission of instructor. Please Contact Barry at Tolchin.5@osu.edu if you do not meet the prereqs for this course.

FABENG	3200S	Engineering for Community Development in Ohio	3	Service-learning course applying engineering to address contemporary issues related to food security in Central Ohio. In consultation with local social organizations, students will merge best practices for community development with resilient and sustainable design toward a semester long engineering design project that addresses a need or an opportunity to alleviate poverty and hunger. Prereq: Engr 1181.01, 1181.02, 1186.01, 1187, 1188, 1281.01H, 1281.02H, or 1281.03H, or permission of instructor.
FABENG	5260.02	Safe Water on Tap	3	This problem-centered design course focuses on major water quality challenges both nationally and internationally. Human and context-driven design principles are applied to drinking water contaminants with global public health impact. We develop design algorithms from first principles whenever possible and explore novel solutions. Prereq: 2110, CivilEn 3130, CBE 2420, or MechEng 3503; and Engr 1221 or CSE 1222; or permission of instructor.
FABENG	5330	Environmental Biophysics	3	Environmental Biophysics provides an overview of the interactions between the physical microenvironment and the organisms that reside in that environment. This class will examine the roles of different environmental factors on the functioning of terrestrial vegetation, and scaling the exchange of heat and mass (i.e. water and carbon dioxide) from leaf to canopy scales. Prereq: Engr 1221 or CSE 1222 or 2021, or equiv.; or permission of instructor.
FABENG	5335	Advances in High Throughput Phenotyping	3	High-Throughput Phenotyping (HTP) is an emerging field that integrates remote sensing and simulation and modeling technologies to advance selection in plant breeding programs. Advances in High Throughput Phenotyping provides an overview of the sensing and modeling tools that are being integrated into modern HTP platforms. Prereq: CSE 1222 or Engr 1221 or 1181.xx or 1281.xx or 1187 or HCS 2260 or AnimSci 2260 or ENR 2000 or AEDEcon 2005 or ComLdr 3537 or Stat 1450, and Jr or Sr standing; or permission of instructor.
FABENG	5510	Introduction to Polymer Science: A Bio-based Approach	3	This course introduces polymer chemistry through polymers found in nature. It is designed as a unique introduction to the subject, which connects natural and synthetic polymers by exploring the chemistry of natural polymers from plants, animals and humans and self-assembled macromolecular structures. Chapters cover the basic concepts of polymer chemistry. Prereq: Chem 2310, or permission of instructor.
FABENG	5520	Phytotechnology and Phytoremediation	3	Engineering principles of using plants for remediation of contaminated sites and treating polluted soil and water. Traditional methods as well as new trends and current research in phytoremediation technologies will be presented. Prereq: 3510 or EnvEng 3200.
FABENG	5540	Biomass Conversion to Bioenergy	3	An exploration of the science and technologies used for energy production from bio-based materials, including agricultural biomass and solid waste sources. Prereq: 3130 or equiv.
FABENG	5760	Design of Urban Stormwater Control Measures	3	Fundamental and advanced hydrologic and water quality design of stormwater controls for urban areas. Students will be expected to solve multi-objective, real-world engineering problems in a team setting. Prereq: 2720 or CivilEn 3160, or permission of instructor.
ISE	5710	Behind Human Error: Safety and Complex Systems	3	Covers how complex systems fail and the human contribution to success and failure by studying actual disasters in diverse fields. Prereq: Sr standing, or permission of instructor.
STAT	3470.01/.02	Introduction to Probability and Statistics for Engineers	3	Introduction to probability, Bayes theorem; discrete and continuous random variables, expected value, probability distributions; point and interval estimation; hypotheses tests for means and proportions; least squares regression. Prereq: Math 1152, 1161.xx, 1172, 1181H, or equiv, or permission of instructor.