

Food 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.
BME	4210	Biotransport	3	Covers key transport concepts in biomedical engineering. Emphasis is put on mass and momentum transport with applications related to biology, medical science and biotechnology. Prereq: 2000 and Math 2174, or permission of instructor. Concur: MechEng 3500 or FABEng 3120.
BME	4310	Biomaterials	3	Principles of materials science; biocompatibility and biological reactions to implanted materials; natural biomaterials and synthetic materials used in biological applications. Prereq: 2000, MatScEn 2010, and Math 2177. Concur: EEOB 3510, or permission of instructor.
BME	4610	Biomedical Micro/Nanotechnology	3	Introduction to micro/nanotechnology in biomedical settings, including micro/nanotechnologies used to investigate biological systems, physiological responses to nanotherapeutics, and first principles of microfluidics and microfabrication. Prereq: 2000, MatScEn 2010, and Biochem 4511 or BiomedE 2200; or permission of instructor.
CBE	4760	Chemical and Biomolecular Engineering Process and Product Design Principles I	4	Process and product design concepts encompassing a broad spectrum of fundamental engineering principles including safety, industrial practices and heuristics, flowsheet synthesis, heat integration, process/product development concepts, economic evaluations, and optimization concepts. Prereq: 3521, 3610, and enrollment in CBE or EngPhysics major; or permission of instructor.
CBE	5766	Biotechnology and Bioprocess Engineering	3	Fundamentals of biotechnology and their applications to bioprocessing with emphasis on fermentation and bioseparation. Completion of Bio 1113 or 2100 is recommended. Prereq: Jr standing in CBE, or permission of instructor.
CBE	5772	Principles of Sustainable Engineering	3	Introduces the principles, techniques, and challenges of environmentally conscious decision making in chemical engineering. A study of systematic methods for the analysis and development of sustainable industrial products and processes. Prereq: 3508 or equivalent, or permission of instructor.
CBE	5775	Rheology of Fluids	3	Principles of rheology, including the characterization of non-Newtonian materials, rheological equations of state, viscometric flows, measurements, and applications to the flow of industrial materials. Prereq: 2420, or permission of instructor.
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	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	5695	Engineering Teamwork Seminar	1-2	Interactive training seminar that teaches communications and interpersonal skills vital to success as an engineer in industry. Sponsored by Tau Beta Pi National Engineering Honor Society. This course is graded S/U.
ENGR	5797	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.

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	5200	Appropriate Technology for Developing Countries	3	Introduction to Appropriate Technology product design and development for people in developing countries and the business related topics necessary for commercialization. The focus will be on market driven solutions that help ensure the long term sustainability of the solutions developed. Prereq: Engr 1182.01, 1182.02, 1182.03, 1282.01H, 1282.02H, 1282.03H, or 1282.04H; 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	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	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.
FDSCTE	5320	Food Laws and Regulations	2	Major food laws/regulations, food regulatory agencies, good manufacturing practices, HACCP, ingredients, labeling regulations, adulteration and misbranding, compliance/investigations/enforcements, crisis management, recall, Ohio State food laws. Prereq: 2400, or permission of instructor.
FDSCTE	5330	Food Plant Management	2	Covers the essentials of food plant operations from a business and management, rather than a scientific or technical, perspective. Prereq: 2400 and Stat 1350 or equivalent.
FDSCTE	5410	Fruit and Vegetable Processing	3	Composition of fruits and vegetables, how this affects quality during processing, principles, equipment and quality changes during common processing methods, including juicing, drying, freezing, canning, and jelly manufacture. Prereq: 2400.

FDSCTE	5450	Food Packaging	3	A discussion of terminology and literature of commercial packaging, principal methods of packaging, and principles of selecting packaging materials. Prereq: 2400.
FDSCTE	5720	Food Product Development	3	Development of a new food product including generation of concepts, consumer panel testing, development of prototypes, process optimization and consumer testing. Prereq: 2400, and Sr standing
FDSCTE	5730	Technical Problem Solving	3	Analysis of technical problems in food science; fostering creative thinking to the approach and solution of problems; preparation and oral presentation of paper. Prereq: 5600 or 5710, and 5536 or 4536, and 5400, 5410, 5420, 5430, or AnimSci 4500, and Sr standing.
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.
MECHENG	2010	Statics	2	Vector concepts of static equilibrium for isolated and connected bodies, centroids, inertia, truss, frame and machine analysis, and friction. Prereq: Engr 1181 or 1187 or 1281H, and Physics 1250 or 1260, and Math 1151 or 1161. Not open to students with credit for 2010H or 2040.
MECHENG	2020	Introduction to Mechanics of Materials	3	Stress and strain analysis of deformable structural components subjected to unidirectional and combined loads; pressure vessels; stress transformations (Mohr's Circle); beam deflections; column buckling. Prereq: 2010 or 2010H. Not open to students with credit for 2040.
MECHENG	2030	Dynamics	3	Dynamics of particles and rigid bodies; linear and angular motion; work and energy; and single degree of freedom vibration analysis. Prereq: 2010 or 2010H or 2040.
MECHENG	2040	Statics and Introduction to Mechanics of Materials	4	Vector concepts of static equilibrium, truss, frame and machine analysis. Stress and strain analysis of deformable structural components; stress transformations; beam deflections; column buckling. Prereq: Engr 1181 or 1187 or 1281H, and Physics 1250 or 1260, and Math 1152 or 1161 or 1172 or 1181H. Not open to students with credit for 2020.
MECHENG	2850	Numerical Methods in Mechanical Engineering	3	Numerical solutions of nonlinear equations, systems of linear equations, interpolation, curve-fitting, ordinary differential equations. Prereq: Enrollment as MechEng-BS student (No ME pre-majors can enroll in this course), or permission of instructor. Prereq or concur: Math 2174 or 2415, or equiv.
STAT	3450.01/.02	Basic Statistics for Engineers	2	Introduction to probability; Normal distribution; Confidence intervals for means; Hypothesis tests for means; Multi-factor experiments; Experiments with blocking. Prereq: Math 1152, 1161.xx, 1172, or 1181, or equiv, 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.