Environmental Resources Engineering

LOWER DIVISION

ENGR 114. Whole Earth Engineering (2). Apply engineering and science concepts and methods to self-sufficient habitat systems: housing, energy, water and food supply. [CR/NC. Not allowed for credit toward major in engineering.]  

ENGR 115. Introduction to Environmental Resources Engineering (3). Case studies in water quality, water resources, energy resources, and geotechnical resources. [Preq: MATH 115 or equivalent (C). Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 210. Solid Mechanics: Statics (3). Particle and rigid body equilibrium; vector concepts; equivalent systems of forces; centroids; moments of inertia; friction. [Preq: MATH 109 or completed Calculus I. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 211. Solid Mechanics: Dynamics (3). Kinetics and kinematics of particles; work and energy; impulse and momentum; kinematics and plane motion of rigid bodies. Engineering design applications. [Preq: MATH 110, ENGR 210, ENGR 215. For engineering majors, this is prerequisite to PHYX 110. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 215. Introduction to Design (3). Engineering design process, including critical analysis of problems, teamwork, Internet, word processing, spreadsheets, computer-aided drawing. Engineering design applications. [Preq: ENGR 115, and MATH 109 or completed Calculus I (C). Weekly: 2 hrs lect, 3 hrs lab.]


ENGR 280. Selected Topics in Engineering (1-3). Selected topics offered at the lower division level as demand warrants. Lect/lab as appropriate. [Preq: vary with topics. Rep with different topics.]

ENGR 299. Directed Study (1-3). Directed (independent) undergraduate study or research at the lower division level. [Rep; multiple enrollments in term.]

ENGR 305. Appropriate Technology (3). Engineering technology principles. Energy, waste disposal, food production technologies. Lab exercises involve working systems at Campus Center for Appropriate Technology. [Preq: lower division science GE and ENGR 114 or PHYX 106 or PHYX 109. Not allowed for credit toward engineering majors: 2 hrs lect, 3 hrs lab. GE.]

ENGR 308. Technology & the Environment (3). Environmental and resource-related case studies applying technology to supply society’s needs and demands. [Preq: completed lower division science GE. Weekly: 2 hrs lect, 2 hrs activity. GE.]


ENGR 322. Environmental Data Modeling & Analysis (4). Introduction to probability theory, probabilistic models, and stochastic processes. Parameter estimation and model evaluation for environmental systems models with applications in environmental engineering. [Preq: MATH 210 and ENGR 325 (C).] Weekly: 3 hrs lect, 3 hrs lab.]

ENGR 325. Computational Methods for Environmental Engineering II (3). Introduction to numerical methods for environmental engineering analysis, design and resource management using the Fortran 95 programming language. [Preq: ENGR 225 and MATH 110. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 326. Computational Methods for Environmental Engineering III (3). Numerical methods for linear and differential equations used in environmental engineering analysis, design and resource management problems. [Preq: ENGR 325, and ENGR 331 or ENGR 333. Weekly: 2 hrs lect, 3 hrs lab.]


ENGR 331. Thermodynamics & Energy Systems I (3). Thermodynamics’ 1st and 2nd laws; thermodynamic properties of materials; thermodynamic processes; system and control volume applications to energy systems. [Preq: CHEM 109, MATH 210, ENGR 211. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 332. Fluid Mechanics (4). Fluid properties; fluid statics; flow concepts; control volume analysis; continuity; energy and momentum concepts; boundary layer concepts; drag theory, flow measurements; flow in pipes/ducts; open channel flow; dimensional analysis and similarity. Engineering design applications. [Preq: ENGR 211, MATH 210, ENGR 325. Weekly: 3 hrs lect, 3 hrs lab.]


ENGR 371. Energy Systems & Technology (3). Intro to key topics and technologies associated with modern energy systems. Covers principles of thermodynamics and electricity and their application to energy systems. [Preq: MATH 105, CHEM 107 or CHEM 109, PHYX 107 or PHYX 110.]

ENGR 399. Supplemental Work in Engineering (1-3). Directed study for transfer student whose prior coursework isn’t equivalent to corresponding courses at HSU. [Preq: DA. Rep; multiple enrollments in term.]

ENGR 410. Environmental Impact Assessment (3). Enabling legislation that established environmental impact statements; EIS preparation and review; preparing data and evaluating its adequacy and accuracy; interpreting data; predicting impacts associated with proposed activities. Design applications. [Preq: ENGR 313, ENGR 351 or ENGR 350, ENGR 440 (C).]

ENGR 416. Transport Phenomena (3). Heat and mass transfer; Pollutant transport and assimilation in the environment. Engineering design applications. [Preq: ENGR 322 or ENGR 324, ENGR 326, ENGR 331, ENGR 333, ENGR 351 or ENGR 350. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 418. Applied Hydraulics (3). Pipe networks; transient pipe flow; open channel flow; irrigation, drainage, and flood control; numerical methods for hydraulic analysis. Engineering design applications. [Preq: ENGR 326 and ENGR 333. Weekly: 2 hrs lect, 3 hrs lab.]


ENGR 434. Air Quality Management (3). Nature, causes, and effects of air pollution; air quality standards, their measurement and control; Gaussian Plume model; particulate and gaseous pollutant control devices. Engineering design applications. [Preq: CHEM 110, ENGR 416. Weekly: 2 hrs lect, 3 hrs lab.]


ENGR 440. Hydrology I (3). Hydrologic cycle; math models of rainfall runoff; surface and ground water hydrology; probabilistic design concepts. [Preq: ENGR 313, ENGR 322 or ENGR 324, ENGR 326, ENGR 333. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 441. Hydrology II (3). Rainfall runoff processes; infiltration and groundwater vadose

DDC diversity & common ground; d domestic, n non-domestic; disc discussion; F Fall, Sp spring, Su summer; GE general ed; IA instructor approval; Lect lecture; preq prerequisite; nc recommended preparation; rep repeatable
zone; water quality models and operational (stochastic) hydrology; groundwater quality. Engineering design applications. [Prereq: ENGR 440. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 443. Groundwater Hydrology [3]. Groundwater and vadose zone hydrology; well hydraulics; introduction to groundwater planning, management, and remediation; large-scale flow and mass transport simulation models. [Prereq: ENGR 313 and ENGR 325. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 445. Water Resources Planning & Management [3]. Engineering applications of economics, risk analysis, and mathematical simulation and optimization models to water resource planning; multiobjective and sequential decision problems in reservoir operation and water quality management. Engineering design applications. [Prereq: ENGR 440. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 448. River Hydraulics [3]. River morphology; water and sediment transport; channel formation; river restoration. Design applications. [Prereq: ENGR 351 or ENGR 350, ENGR 440. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 451. Water & Wastewater Treatment Engineering (4). Water and wastewater treatment systems; bench-scale treatment operations. Engineering design applications. [Prereq: ENGR 351 or ENGR 350, and ENGR 416 [C]. Weekly: 3 hrs lect, 3 hrs lab.]

ENGR 455. Engineered Natural Treatment Systems [3]. Use and design of free surface constructed wetlands and vegetated gravel beds for treating wastewater. For design engineers and wetland scientists involved in the planning, sizing, designing, and/or management of wetlands used to treat a wide range of wastewater problems. [Prereq: BIOL 105, ENGR 115, ENGR 451; or IA.]


ENGR 477. Solar Thermal Engineering [3]. Analyze and design solar thermal systems. Availability of solar radiation; collector operation; system performance; simulation models. Engineering design applications. [Prereq: PHYX 110, ENGR 322 or ENGR 324, ENGR 331, ENGR 333. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 480. Selected Topics in Engineering [1-3]. Offered as demand warrants. Lect/lab as appropriate. [Prereq: vary with topic. Rep with different topics.]

ENGR 481. Selected Topics with Engineering Design [3]. Selected topics as demand warrants. [Prereq: ENGR 322 or ENGR 323. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 492. Capstone Design Project [3]. Culminating ERE design experience based on knowledge gained from previous coursework. Application of the engineering design process to develop a system, process or management plan to solve a significant, open-ended ERE problem. [To be taken final senior semester [within 16 units of graduation]. Open to Senior and Grad level ERE students only. Prereq: ENGR 313, ENGR 322, ENGR 326, ENGR 330, ENGR 331, ENGR 333, ENGR 351.]


ENGR 498. Directed Design Project [1-3]. Directed (independent) application of engineering design process to develop a system, process or management plan. May be taken only once for credit. [Prereq: IA.]

ENGR 499. Directed Study [1-3]. Directed (independent) undergraduate study or research. [Prereq: IA.]

GRADUATE


ENGR 532. Energy, Environment & Society [4]. This interdisciplinary graduate level course emphasizes technical, environmental, and socioeconomic dimensions of energy utilization in contemporary society. Covers technology and policy issues related to conventional and alternative energy resources. [Prereq: graduate standing; working knowledge of introductory physics, chemistry, and statistics; or IA.]

ENGR 533. Energy & Climate Change [4]. This interdisciplinary graduate level course provides a rigorous introduction to the science and policy dimensions of global climate change, as well as the prospects for climate change mitigation. [Prereq: graduate standing and ENGR 532, or IA.]

ENGR 534. Air Quality Management [3]. Nature, causes, and effects of air pollution; air quality standards, their measurement and control; Gaussian Plume model; particulate and gaseous pollutant control devices. Engineering design applications. [Prereq: CHEM 110 and ENGR 416. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 535. Development Technology [4]. Technologies important in international development, including energy production, habitat design, waste recovery, water acquisition, and agriculture. [Weekly: 3 hrs lect, 3 hrs lab.]

ENGR 541. Hydrology II [3]. Rainfall runoff processes; infiltration and groundwater vadose zone; water quality models and operational (stochastic) hydrology; groundwater quality. Engineering design applications. [Prereq: ENGR 440. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 543. Groundwater Hydrology [3]. Groundwater and vadose zone hydrology; well hydraulics; introduction to groundwater planning, management, and remediation; large-scale flow and mass transport simulation models. [Prereq: ENGR 313 and ENGR 325. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 545. Water Resources Planning & Management [3]. Engineering applications of economics, risk analysis, and mathematical simulation and optimization models to water resource planning; multiobjective and sequential decision problems in reservoir operation and water quality management. Engineering design applications. [Prereq: ENGR 440. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 548. River Hydraulics [3]. River morphology; water and sediment transport; channel formation; river restoration. Design applications. [Prereq: ENGR 351 and ENGR 416. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 551. Water & Wastewater Treatment Engineering [4]. Water and wastewater treatment systems; bench-scale treatment operations. Engineering design applications. [Prereq: ENGR 351 and ENGR 416; both with passing grades of C. Weekly: 3 hrs lect, 3 hrs lab.]

ENGR 555. Engineered Natural Treatment Systems [3]. Use and design of free surface constructed wetlands and vegetated gravel beds for treating wastewater. For design engineers and wetland scientists involved in the planning, sizing, designing, and/or management of wetlands used to treat a wide range of wastewater problems. [Prereq: ENGR 351 or ENGR 350, BIOL 105, ENGR 115; or IA.]


ENGR 574. Advanced Numerical Methods for Engineers II [3]. Finite difference and finite element methods for linear and nonlinear partial differential equations; simulation of flow, mass and energy transport in environmental systems; large-scale parameter estimation methods. Engineering design applications. [Prereq: ENGR 331 or ENGR 333. Weekly: 2 hrs lect, 3 hrs lab.]

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ENGR 577. Solar Thermal Engineering [3]. Analyze and design solar thermal systems. Availability of solar radiation; collector operation; system performance; simulation models. Engineering design applications. [Prereq: ENGR 322, ENGR 331, ENGR 333; all with passing grades of C. Weekly: 2 hrs lect, 3 hrs lab.]

ENGR 680. Selected Topics in Environmental Systems [1-3]. [Rep.]


ENGR 700. Professional Development in Engineering [1-3]. Directed study for engineering professionals desiring advanced or specialized instruction, especially that leading to credentialing/certification. [Prereq: IA. Rep.]