

ENERGY AND MINERAL ENGINEERING (EME)

EME 210: Data Analytics for Energy Systems

3 Credits

Data Analytics for Energy Systems merges introductory statistics with coding through simulation-based inference. Class lectures are split between discussing the concepts and illustrating their application through coding examples. The course is highly data-centric, using mostly datasets pertaining to the energy industry or grand challenges related to energy and sustainability (although some data are generated through fun in-class exercises). The course starts by discussing different types of data and introducing students to basic coding skills to manipulate datasets and extract summary statistics. The course then moves into data visualization, discussing common types of graphical tools and the types of data for which they are appropriate. Simulation-based inference then begins around the third week with bootstrapping in the context of finding confidence intervals, which then moves into hypothesis testing through randomization distributions. The concepts from hypothesis testing carry over into chi-square tests, ANOVA, and regression, which also delves into prediction. Neural Networks and Random Forests are covered at a conceptual and applied level (not getting into the theory) towards the end of the course. The course concludes with some topics in basic probability that weren't covered earlier in the semester.

Enforced Prerequisite at Enrollment: MATH 22 or higher
 General Education: Quantification (GQ)
 GenEd Learning Objective: Effective Communication
 GenEd Learning Objective: Crit and Analytical Think

EME 301: Thermodynamics in Energy and Mineral Engineering

3 Credits

Treatment of classical thermodynamics targeted to the needs of students in the Department of Energy and Mineral Engineering.

Enforced Prerequisite at Enrollment: CHEM 112 and PHYS 212 and (MATH 250 or MATH 251)

EME 303: Fluid Mechanics in Energy and Mineral Engineering

3 Credits

Treatment of fluid mechanics targeted to the needs of students in the Department of EME.

Enforced Prerequisite at Enrollment: (MATH 250 or MATH 251) and PHYS 211

EME 407: Electrochemical Energy Storage

3 Credits

Electrochemical concepts in energy storage devices, cell construction and materials involved in batteries and capacitors, electrochemical testing methods and applications.

Enforced Prerequisite at Enrollment: (EME 301 or ME 300 or CHE 220) and (EME 303 or ME 320 or CHE 330)

EME 432: Energy Policy

3 Credits

Analysis, formulation, implementation, and impacts of energy-related policies, regulations, and initiatives.

Enforced Prerequisite at Enrollment: EBF 200 and EGEE 120 and PLSC 490
 Cross-listed with: GEOG 432

EME 444: Global Energy Enterprise

3 Credits

Global Energy Enterprise provides in-depth insight into the role that public and private nonmarket actors and actions play in contemporary energy markets through a variety of artifacts and case studies. Students perform a nonmarket analysis of a current energy policy case study through series of guided steps using a well-regarded analytical framework. The course also provides an overview of technical, environmental, economic, and sociopolitical aspects of modern energy sources, as well as an overview of international energy and policy regimes.

Enforced Prerequisite at Enrollment: ECON 104 and EGEE 102 and EGEE 120

EME 450: Energy Crisis Leadership

3 Credits

Energy Crisis Leadership prepares students to lead in high-pressure, high-stakes environments. This is an interactive class that utilizes case studies to help students solve open-ended and complex problems. The case studies are from rare, but significant events with challenges that students are likely to experience someday in the energy and natural resource industries. In addition to the case studies, we will have guest speakers from the energy industry discuss their experiences with various operational upsets and their roles in addressing them. The culmination of the class is a competition where teams of students must formulate a plan to deal with a major crisis.

Enforced Prerequisite at Enrollment: 7th Semester standing or higher

EME 460: Geo-resource Evaluation and Investment Analysis

3 Credits

The course covers engineering evaluation of geo-resources, present value and rate of return analysis, mineral property and reserve estimation, and cost estimation and engineering economy concepts applied to geo-resources including energy and minerals.

Enforced Prerequisite at Enrollment: 5th semester or higher

EME 466: Energy and Sustainability in Society

3 Credits

EME 466 provides the culminating experience for Energy and Sustainability Policy majors through an individualized inquiry-based capstone project in which students tackle the wicked problems of sustainability they see and experience in their own communities. Students identify, organize, execute, and reflect on a local issue related to energy, the environment, or sustainability with particular emphasis on policy-based solutions.

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Enforced Prerequisite at Enrollment: GEOG 30N and CAS 100 and
GEOG 432