

# Energy Systems Engineering (ESE)

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## Courses

### **ESE 401 Energy Generation 3 Credits**

This course provides an overview of the different methods of generating electricity, such as turbine driven electrochemical generators, fuel cells, photovoltaics, and thermoelectric devices. Topics include the combustion of fossil fuels (coal, natural gas, and oil), nuclear fission and fusion, and renewable resources (solar, wind, hydro, tidal, and geothermal sources). Sustainability, energy efficiency issues, as well as public interest and policy drivers are also addressed.

### **ESE 402 Transmission & Distribution: Smart Grid 3 Credits**

This course provides an overview of modern power transmission and distribution systems. Topics include transformer technology, transmission grids, load management, distribution optimization, power supply reliability, and infrastructure systems. Security and deregulation issues are also addressed.

### **ESE 403 Energy And The Environment 3 Credits**

This course provides an overview of the direct and indirect impact of energy generation and transmission technologies on the environment. Topics include global climate change, clean energy technologies, energy conservation, air pollution, water resources, and nuclear waste issues.

### **ESE 405 Energy Systems Project Management 3 Credits**

This course introduces students to the basics of project management in the field of energy systems, which includes the broad spectrum of empirical, theoretical and policy issues of managing the electric power grid, its generation facilities and equipment. This focuses on the key elements of case studies in engineering that focus on the effective project management of tomorrow's intelligent energy system.

### **ESE 460 Energy Systems Engineering Project 3-6 Credits**

A collaborative and intensive study in an area of energy systems over 2 semesters on an industry-sponsored project worth 6 credits. The selected project consider themes of current interest: the use of renewable energy, and efficient planning and development of energy communities to reduce carbon footprint. The student applies principles of energy project management in the planning, execution and completion. The student presents their results at the end of each semester to an audience of peers, faculty & industry personnel.

**Repeat Status:** Course may be repeated.

### **ESE 461 Energy Seminars and Field Trips 3 Credits**

This course provides a rich mix of presentations and field trips from industry experts in current energy technologies and challenges as the industry strives to decarbonize. The topics include the role of central generation facilities—the bulwark and working horse for over a century—over the next decade, how climate change targets would require decarbonizing some key industries and exploration of alternative clean fuels, and the role of the utility customer who is increasingly a partner of the modern grid.