ENERGY SYSTEMS MINOR

Energy Systems Engineering Minor

Energy systems are pervasive in our society. A list of energy-related subjects and applications in the engineering curriculum would be nearly endless, but here are some examples:

- Mechanical engineers have a core area in thermo-fluids where courses in thermodynamics, fluid mechanics, and heat transfer form a base for energy systems.
- Electrical engineers address power transmission and distribution as well as electric motors and power systems.
- Civil engineers develop structures for wind turbines and hydroelectric dams.
- Construction engineers need to understand how building systems impact energy utilization.
- Chemical engineers develop alternative fuels and clean burning technologies.
- Material engineers develop new materials for batteries and fuel cells.
- Aerospace engineers develop wind turbines.
- Industrial engineers address manufacturing efficiency and energy reduction.
- Agricultural engineers develop biorenewable energy sources.

Energy systems are also a significant focus of the grand challenges of engineering (http://www.engineeringchallenges.org/), and this minor will help our students address these issues in their engineering careers.

The goal of the minor in energy systems is to provide ISU engineering students with focused educational opportunities in the broad area of energy systems. Successful energy systems minor students will understand broad energy perspectives, the language of energy systems, and the economic, environmental, and policy issues related to energy in the two required courses (six credits) for the minor (ECON 3800 and EE 3510 **OR** ME 4330). *Note that credit for both EE 3510 and ME 4330 is no longer accepted.* The remaining nine credits in the minor can be selected from a list of approved engineering courses related to energy systems to give students the opportunity to extend their knowledge.

The Energy Systems minor is administered by the mechanical engineering department and is open to all undergraduates in the College of Engineering. The minor may be earned by completing 15 credits from the following course list. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement. A complete list of approved elective courses can be found below.

Required Courses		
ECON 3800	Energy, Environmental and Resource Economics	3
EE 3510	Analysis of Energy Systems	3
or ME 4330	Alternative Energy	
Electives: Choose from list of approved courses as outlined below		9
Total Credits		**15**

Approved list of electives are as follows:

ABE 3250 Biorenewable Systems
ABE 3420 Agricultural Tractor Power
ABE 3630 Agri-Industrial Applications of Electric Power and Electronics
ABE 3800 Principles of Biological Systems Engineering
ME 4130 Fluid Power Engineering
ABE 4720 Controlled Environments for Animals and Plants
ABE 4800 Engineering Analysis of Biological Systems
ABE 5720 Controlled Environments for Animals and Plants
ABE 5800 Engineering Analysis of Biological Systems
AERE 3810 Introduction to Wind Energy
AERE 5700 Wind Engineering
CHE 3560 Transport Phenomena I
CHE 3570 Transport Phenomena II
CHE 3580 Separations
CHE 3810 Chemical Engineering Thermodynamics
CHE 3820 Chemical Reaction Engineering
CHE 4150 Biochemical Engineering
CHE 5150 Biochemical Engineering
CHE 5540 Integrated Transport Phenomena
CHE 5830 Advanced Thermodynamics
CHE 5870 Advanced Chemical Reactor Design
CONE 3520 Mechanical Systems in Buildings
CONE 3530 Electrical Systems in Buildings
CONE 3540 Building Energy Performance
EE 3030 Energy Systems and Power Electronics
EE 4480 Introduction to AC Circuits and Motors
EE 4520 Electrical Machines and Power Electronic Drives
EE 4550 Introduction to Energy Distribution Systems
EE 4560 Power System Analysis I
EE 4570 Power System Analysis II
EE 4580 Economic Systems for Electric Power Planning
EE 4590 Electromechanical Wind Energy Conversion and Grid Integration
EE 5520 Energy System Planning
EE 5530 Steady State Analysis
EE 5540 Power System Dynamics
EE 5550 Advanced Energy Distribution Systems
EE 5560 Power Electronic Systems
EE 5590 Electromechanical Wind Energy Conversion and Grid Integration
EM 5700 Wind Engineering
ENSCI 4800 Engineering Analysis of Biological Systems

ME 3320 Engineering Thermodynamics II
ME 3350 Fluid Flow
ME 4130 Fluid Power Engineering
ME 4360 Heat Transfer
ME 4370 Introduction to Combustion Engineering
ME 4410 Fundamentals of Heating, Ventilating, and Air Conditioning
ME 4420 Heating and Air Conditioning Design
ME 4440 Elements and Performance of Power Plants
ME 4480 Fluid Dynamics of Turbomachinery
ME 4490 Internal Combustion Engines
ME 5010 Fundamentals of Biorenewable Resources
ME 5300 Advanced Thermodynamics
ME 5320 Compressible Fluid Flow
ME 5350 Thermochemical Processing of Biomass
ME 5360 Advanced Heat Transfer
ME 5380 Advanced Fluid Flow
ME 5420 Advanced Combustion
ME 5450 Thermal Systems Design
MATE 3110 Thermodynamics in Materials Engineering
MSE 5200 Thermodynamics and Kinetics in Multicomponent Materials
WESEP 5010 Wind Energy Resources
WESEP 5020 Wind Energy Systems

http://www.me.iastate.edu/energy-systems-minor/