ENERGY SYSTEMS MINOR

Energy Systems 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 380 and EE 351 **OR** ME 433). *Note that credit for both EE 351 and ME 433 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 380	Energy, Environmental and Resource Economics	3
E E 351	Analysis of Energy Systems	3
or M E 433	Alternative Energy	
Electives: Choose from list of approved courses as outlined below		9
Total Credits		**15**

Approved list of electives are as follows:

A B E 325 Biorenewable Systems
A B E 342 Agricultural Tractor Power
A B E 363 Agri-Industrial Applications of Electric Power and Electronics
A B E 380 Principles of Biological Systems Engineering
A B E 413 Fluid Power Engineering
A B E 472 Controlled Environments for Animals and Plants
A B E 480 Engineering Analysis of Biological Systems
A B E 572 Controlled Environments for Animals and Plants
A B E 580 Engineering Analysis of Biological Systems
AER E 381 Introduction to Wind Energy
AER E 481 Advanced Wind Energy: Technology and Design
AER E 570 Wind Engineering
CH E 356 Transport Phenomena I
CH E 357 Transport Phenomena II
CH E 358 Separations
CH E 381 Chemical Engineering Thermodynamics
CH E 382 Chemical Reaction Engineering
CH E 415 Biochemical Engineering
CH E 515 Biochemical Engineering
CH E 554 Integrated Transport Phenomena
CH E 583 Advanced Thermodynamics
CH E 587 Advanced Chemical Reactor Design
CON E 352 Mechanical Systems in Buildings
CON E 353 Electrical Systems in Buildings
CON E 354 Building Energy Performance
E E 303 Energy Systems and Power Electronics
E E 448 Introduction to AC Circuits and Motors
E E 452 Electrical Machines and Power Electronic Drives
E E 455 Introduction to Energy Distribution Systems
E E 456 Power System Analysis I
E E 457 Power System Analysis II
E E 458 Economic Systems for Electric Power Planning
E E 459 Electromechanical Wind Energy Conversion and Grid Integration
E E 552 Energy System Planning
E E 553 Steady State Analysis
E E 554 Power System Dynamics
E E 555 Advanced Energy Distribution Systems
E E 556 Power Electronic Systems
E E 559 Electromechanical Wind Energy Conversion and Grid Integration
E M 570 Wind Engineering
ENGR 340 Introduction to Wind Energy: System Design & Delivery
ENSCI 480 Engineering Analysis of Biological Systems
I E 543 Wind Energy Manufacturing

M E 332 Engineering Thermodynamics II
M E 335 Fluid Flow
M E 413 Fluid Power Engineering
M E 436 Heat Transfer
M E 437 Introduction to Combustion Engineering
M E 441 Fundamentals of Heating, Ventilating, and Air Conditioning
M E 442 Heating and Air Conditioning Design
M E 444 Elements and Performance of Power Plants
M E 448 Fluid Dynamics of Turbomachinery
M E 449 Internal Combustion Engines
M E 501 Fundamentals of Biorenewable Resources
M E 530 Advanced Thermodynamics
M E 532 Compressible Fluid Flow
M E 535 Thermochemical Processing of Biomass
M E 536 Advanced Heat Transfer
M E 538 Advanced Fluid Flow
M E 542 Advanced Combustion
M E 545 Thermal Systems Design
MAT E 311 Thermodynamics in Materials Engineering
M S E 520 Thermodynamics and Kinetics in Multicomponent Materials
POL S 515 Biorenewables Law and Policy
WESEP 501 Wind Energy Resources
WESEP 502 Wind Energy Systems

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