



Sample Brief Course Description

Course title	Economics of energy systems
Course code	ECE 430
College	Engineering
Department / Program	Electrical Engineering/Renewable Energy
Year/ Level	4/8
Course Type	A. <input type="checkbox"/> University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others b. <input type="checkbox"/> Required <input checked="" type="checkbox"/> Elective
Credited Hours	3
Contact Hours	(LT:3, LB:0, TR:0)
Pre-requisites (if any)	MATH 353
Co-requisites (if any)	---
Course description	Fundamentals of system economics. Sustainable energy system operation and optimization. Formulation and solution to economic dispatch, unit commitment, and linear optimal power flow. Overview of electricity market designs. Pricing, trading, and settlement of electric energy and ancillary services. Market models and economics for alternative energy resources and energy storage. Optimal planning and operation of sustainable energy systems.



Course Main Objectives	<ol style="list-style-type: none">1. Transitioning into a sustainable energy system is not only a technical challenge but also an economical one.2. Teaches students fundamentals of power system economics over which current electricity markets are designed.3. Examines challenges and opportunities in future sustainable energy systems such as carbon tax, renewable energy, demand response, and energy storage. Covers mixed-integer linear programming and demonstrates how mathematical optimizations are integrated into energy system operations.4. Provides overview of current energy system research topics. Includes a project using mathematical tools to solve real-world problems in the energy system
Learning Outcomes	<p>Knowledge and Understanding Upon completing this course, the student should be able to:</p> <ul style="list-style-type: none">• Define and discuss the major problems in power system economics• Formulate these problems as optimization problems• Solve simple power system optimization problem by hand• Describe the various types of electricity markets and discuss their purposes <p>Skills:</p> <ul style="list-style-type: none">• Discuss bidding strategies in electricity markets with perfect and imperfect competition• Explain and calculate locational marginal prices <p>Values:</p> <ul style="list-style-type: none">• Optimization packages to solve more complex problems• Explain and the economic pros and cons of different energy resources• Discuss the factors that affect energy system investments