

Department	Electrical and Computer Engineering
Course Number	EELE 455
Course Title	Alternative Energy Power Gen
Total Credit Hours and Format	3 Credits. (3 Lec) S, alternate years; to be offered even years
Catalog Description	PREREQUISITE: EELE 355 or equivalent Exploration and analysis of alternative power generation sources and systems such as wind, solar, microturbine, and fuel cells, combined sources and their design, power electronic interfacing, and energy storage systems.
Faculty Coordinator	Hashem Nehrir
Course Designation	Elective
Textbook	Wind and Solar Power Systems, M.R. Patel, CRC, 2006 + Several scholarly papers related to the course topics
Course Learning Outcomes	At the conclusion of EELE 455, students are expected to be able to: <ol style="list-style-type: none"> 1. Identify wind and solar resources and interpret wind/solar energy profiles. 2. Estimate the probability density function of a wind site and estimate maximum annual energy production of a wind turbine generator for the wind site. 3. Select a proper wind turbine for a given wind site. 4. Estimate the maximum power generation point and control features of wind generation systems. 5. Identify the different type of electrical generators used in wind-turbine-generators (WTGs). 6. Identify the different solar photovoltaic (PV) cell technologies. 7. Understand peak power tracking system for PV panels. 8. Understand the need for energy storage for variable renewable energy (RE) system and identify suitable battery technologies for such systems. 9. Design a standalone hybrid RE system for a given site. 10. Estimate the cost and payback period of a hybrid RE system.
Program Outcomes	a, c, e, g, k
Topics Covered	Man and energy, Alternative energy: Opportunities and challenges, Wind energy capture and power generation, Wind energy capture and power generation, Wind speed and energy distribution, Wind turbine generator components, Electrical generator for WTG, machine dynamics, Fixed and variable speed WTG, Wind integration to the grid, Solar cells and photovoltaic power generation, PV power systems and their control, Energy storage, Power electronic interfacing, stand-alone and grid-connected systems, Plant economy, Emerging renewable energy technologies.
Prepared by	Hashem Nehrir (05/01/2015)