THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Advanced Topics in Sustainable Energy and Power Systems

ECE 6541

Credit Hours:
3.00 - 3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Advanced topics in sustainable energy and power systems; basic issues and solutions to sustainable energy; the concept of smart grid; cyber control and security.

Prerequisites and Co-requisites:
Prereq: 5025 (624) or 724.

Course Goals / Objectives:
- Be familiar with different means of integrating solar and wind energy into the electric power grid
- Master different techniques to control the power converters in solar and wind based electricity generation
- Be competent with the common issues for grid-tied inverters
- Be competent with the basic principles of energy conversion by different types of electric machines for wind energy
- Master Matlab/Simulink Power Systems Toolbox or other modern simulation tools for electric power

Course Topics:

- Energy composition in historical prospective
- Discussion of energy consumption and environmental impact
- Solutions to energy sustainability: fossil and green energy
- Modeling of micro-grids and distributed generation system
- Energy source and energy yield of photovoltaic modules
- Modeling of PV power plants with smart grid connection
- Control and grid-connection of PV power plants in mega-watts
- Energy source and energy yield of wind turbine generators (WTG)
- Doubly-fed induction machine and direct-driven PM machine WTGs
- Modeling of WTG power plants with smart grid connection
- Control and grid-connection of WTG farms in mega-watts
- Interfacing issues of renewable energy system to conventional power grid
- Energy storage systems
- Case studies on energy storage system in smart grid system
- Cyber control and cyber security issues/solutions to energy systems

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Designation:

Elective