Sustainable Energy and Power Systems I

ECE 3040

Credit Hours: 3.00

Course Levels: Undergraduate (1000-5000 level)

Course Components: Lecture

Course Description: Introduction to electrical energy systems: history, current trends, renewable and non-renewable sources, rotating machines and their operation, and smart grid initiatives.

Prerequisites and Co-requisites: Prereq: 2100, 2100.02, 2105, 2020, 2021, 205, 292, or 294 (Spring 2011), and enrollment in ECE or EngPhysics major.

Course Goals / Objectives:
- Master analyzing single-phase and three-phase ac systems
- Be competent with electromechanical energy conversion
- Be exposed to the current trends and smart grid initiatives
Course Topics:
- Historical perspective of electrical energy systems
- Discussion of traditional and non-traditional energy sources including renewable and green
- Energy, power, volt-amp 1-phase & 3-phase relationships including "why 3-phase vs 1-phase"
- Transformers and variable speed drives with associated power electronics, i.e., constant voltage/frequency transformer and a variable voltage/frequency "transformer"
- Synchronous and induction machines physical and operational basics, including utilizing variable voltage/frequency "transformer"
- DC machine applications with variable speed drives
- The electric power industry
- Introduction to distributed generation systems and comparison with central station systems
- Introduction to the "smart grid"

Designation:
Required
Elective