Power Systems - Analysis and Operation

ECE 5043

Credit Hours: 3.00

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

Course Components:
Lecture

Course Description:
Power systems analysis and operations, including steady-state analysis, state estimation, and economic operation.

Prerequisites and Co-requisites:
Prereq: 3040, Sr standing, and ECE major; or Sr standing and ISE major; and Math 2568; or Grad standing in engineering or biological sciences or math and physical sciences.

Course Goals / Objectives:
- Students learn how power systems operate in steady-state (solving systems of nonlinear equations).
- Students learn how to estimate the state of a power system (solving unconstrained optimization problems).
- Students learn how to perform a security analysis of a power system (solving a large number of interrelated systems of linear equations).
- Students learn how electricity markets operate (solving linear optimization problems).
- Students learn how generating units are scheduled for production (solving mixed-integer linear optimization problems).
Course Topics:
- Introduction: Power systems and how they work
- Power system steady-state analysis: power flow equations, Newton solution, DC power flow
- Power system state estimation: observability, estimation, bad data detection and identification
- Power system security: contingency analysis, optimal power flow, security-constrained optimal power flow
- Power system economic operation: market clearing, unit commitment

Designation:
Elective