

Fall 2023

ECE 442 - POWER SYSTEMS

Walid Hubbi

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**Helen and John C. Hartmann Department of Electrical and Computer Engineering
New Jersey Institute of Technology**

Course number and name: **ECE 442 – Power Systems; 3 credit hours,
3 contact hours**

Instructor's or course coordinator's name: Walid Hubbi

Text book, title, author and year: "Power System Analysis and Design," by Glover, Sarma, and Overbye, ISBN 978-1-111-42577-7, 5th ed., Publisher: Cengage Learning.

Course Catalog Description: Introduction to power plants and power networks. Topics include transmission line parameters, system modeling, economic operations of power systems, load flow studies, short circuit analysis, and power system stability.

Prerequisites: ECE 341

Course Learning Outcomes:

Students will be able to

- a. Acquire a basic understanding of the important components of modern power systems and how they work together to give a high-performance system
- b. Understand how to compute series impedance and shunt capacitance of transmission lines for balanced three-phase operation including bundled and parallel circuits.
- c. Assess the performance of a power line in terms of power transfer limit and voltage profile.
- d. Determine the stability and operating limits of synchronous generators and transmission lines connected to large power systems.
- e. Evaluate what compensation is required to improve the stability and the voltage profile.
- f. Determine most economic generation schedule among power stations.
- g. Determine fault current levels under different fault conditions.

ABET Criterion 3 Relevant Students Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (a-g).
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (c-f).
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies (a-e).

Brief list of topics to be covered

- a. Balanced three phase circuit theory and associated grounding.
- b. Synchronous generator - performance on an infinite busbar system.
- c. Transformer models.

- d. Transmission line parameters. e. Transmission line modelling. f. Power flow analysis.
- g. Economic operation of power systems
- h. Balanced and unbalanced faults - the method of Symmetrical Components.

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Office Hours: Mondays, Tuesdays and Wednesdays 1:00-2:00 or by appt.

