UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-466	Electric Power Generation, Transmission, and Distribution	6
Prerequisites	**Department**	**Semester**
ECE-362	Engineering	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Andreas Michaelides	4th
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Provide a qualified understanding of the electrical power system starting from the generation of electricity, its transmission and distribution up to its final utilization.
- Assess the network essential for its design to support the required function and choice of the devices constituting the power system.
- lead through the extensive analysis of single and three-phase circuits, simulating the transmission lines, transformers, power switches, and various types of AC and DC machines
- Introduce some basic power electronics concepts of converting and controlling electrical power by semiconductor devices.
- Assess different energy cycles with respect to economic application for cheap production and transmission.

Learning Outcomes:

After completion of the course students are expected to:

- Classify most common methods of electric power generation as hydroelectric power plants with all its stages and devices as turbines and synchronous generators.
- Assess usual concepts of non-conventional power generation as wind energy and photovoltaic units.
- Perform calculations of the electric transmission system using specific transmission lines models that consider a wide range of functional parameters.
- Apply specific models of distribution systems, to design, analyze and control them.
- Optimize electric power utilization based on load modeling and other methods.
- Analyze the cause of the parameters influencing the power quality (the sinusoidal shape of the power signal) as harmonic modulations and sudden voltage drops and consequent measures to counter them.

Course Content:

1. Power Generation:
   - The synchronous machine; Preliminaries
   - Synchronous machine fields
   - Equivalent circuit
   - Principle steady-state characteristics
   - Power-angle characteristics
   - The infinite bus concept
   - Accounting for saliency
   - Salient-pole machine power angle characteristics
   - Operating limits
   - Induction generator
2. Electric Power Transmission:
   - Electric transmission line parameters
   - Line inductance
   - Line capacitance
   - Balancing loads
   - Delta and Wye connection
   - Two-port networks
   - Transmission line
3. Electric Power Distribution:
   - Primary distribution configurations
   - Urban networks
   - Primary voltage levels
   - Distribution substations

- Sub-transmission systems
- Loads
- Overhead lines
- Line impedance
- Conductor sizing
- Fault withstand capability
- Radio frequency interference
- Underground distribution
- Residential distribution

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises. Synchronizing electric machine with grid supply.

Assessment Methods:

Homework, semester project, midterm exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Electric Power Generation, Transmission, Distribution	L.L. Grigsby	CRC Press	2007	9780849392924
Electric Power Systems Essentials	P. Schavemaker, L. Van Der Sluis	John Wiley & Sons	2008	9780470510278

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Electrical Power Systems	M.E. El-Hawary	John Wiley & Sons	2008	9780470408636