University of Nicosia, Cyprus

Course Code	**Course Title**	**ECTS Credits**
ECE-566	Electric Power Generation, Transmission and Distribution	8
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	None
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
2nd Cycle	1st	Dr Andreas Michaelides
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

This course aims at providing a qualified understanding of the electrical power system starting from the generation of electricity, its transmission and distribution up to its final utilization. The assessment of the network is essential for its design to support the required function and choice of the devices constituting the power system. The course shall lead through the extensive analysis of single and three-phase circuits, simulating transmission lines, transformers, power switches, and various types of AC and DC machines, through the introduction of some basic power electronics concepts of converting and controlling electrical power by semiconductor devices.

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 line 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 Contents:

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 accompanied by various functioning model power devices in class, independent work, and project.

Assessment Methods:

Homework, project, mid-term exam, independent work, final exam

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
L.L. Grigsby	Electric Power Generation,	CRC Press	2007	9780849392924

	Transmission, and Distribution			

Recommended Textbooks/Reading:

Authors	**Title**	**Publisher**	**Year**	**ISBN**
P. Schavemaker, L. Van Der Sluis	Electric Power Systems Essentials	John Wiley & Sons	2008	9780470510278
M.E. El-Hawary	Introduction to Electrical Power Systems	John Wiley & Sons	2008	9780470408636