UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
ECE-362	Power System Analysis	6
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	ECE-360
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	3rd	Dr Andreas Michaelides
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The course engages in the analysis of the electric power system. The concept lies in the presentation of the three-phase power system as a usual single phase AC circuit and apply conventional methods and algorithms for network analysis to determine voltages, currents etc. at any point or component of the circuit corresponding to a topological location or device in the power system. Hence objective of the course is the modeling of the devices constituting the power system starting from the generator through to transformers, transmission lines up to the industrial and domestic loads as R, L, C components on the one, and further calculating characteristic features as phase shift, power factor, fault currents, distortion of the signal through harmonic modulations etc. on the other. A vital tool for the analysis of the three phase power system is the symmetric components method as it provides essential information about the state of symmetry in the three phases, leakage and short currents.

Learning Outcomes:

After completion of the course students are expected to:

1. Comprehend the per-unit system, its impact on transformers extending to general three-phase systems and their per-unit scaling.
2. Apply the symmetrical components principle for the power system analysis.
3. Perform the power flow analysis, formulate bus admittance matrices up to power flow equations and asses the generalized power flow development.
4. Conduct a general fault analysis in the power system (example: short currents).
5. Use computational methods for electric power systems for optimal power flow and state estimation.
6. Analyze a regional power system network diagram, use the provided parameters of the devices constituting the power network, derive the equivalent of the network and perform qualified calculations to determine functional conditions in the power system.

Course Contents:

- Three-Phase System
- The Synchronous Machine
- Series Impedance of Transmission Lines
- Capacitance of Transmission Lines
- Current and Voltage Relation on a Transmission Line
- The Admittance Model and Network Calculations
- The Impedance Model and Network Calculations
- Power-Flow Solutions
- Symmetrical Faults
- Symmetrical Components and Sequence Networks
- Unsymmetrical Faults
- Economic Operation of Power Systems
- Zbus Methods in Contingency Analysis
- Power System Stability

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises

Assessment Methods:

Homework, project, mid-term exam, final exam

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Hadi Saadat	Power System Analysis	McGraw Hill	2004	9780071239554

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Arthur R. Berger and Vijay Vittal	Power System Analysis	Prentice Hall	1999	9780136919902
J. Duncan Glover, Mulukutla S.Sarma	Power System Analysis and Design	Cengage-Engineering	2001	9780534953676