UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-362	Power System Analysis	6
Prerequisites	**Department**	**Semester**
ECE-102	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	3rd
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Analyze the electric power system to assess significant parameters indicative for the quality and reliability of operation.
- Use the concept of presenting the three-phase power system as a usual single phase AC circuit.
- Apply conventional and specific methods, algorithms for network analysis to determine technical parameters.
- Present Voltages, currents at any point or component of the circuit corresponding to a topological location or device in the power system.
- Model 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.
- Employ as 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.
- Apply the optimal dispatch of operation concept for economical assessments and decisions of the power system.

Learning Outcomes:

After completion of the course students are expected to:

- Comprehend the per-unit system, its impact on transformers extending to general three-phase systems and their per-unit scaling.
- Apply the symmetrical components principle for the power system analysis.
- Perform the power flow analysis, formulate bus admittance matrices up to powerflow equations and asses the generalized power flow development.
- Conduct a general fault analysis in the power system (example: short currents).
- Use computational methods for electric power systems for optimal power flow and the individual locations' state assessment.
- 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 Content:

- 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
- Optimal dispatch of operation
- Z-bus Methods in Contingency Analysis
- Power System Stability

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises. Presentation of functioning model systems in class

Assessment Methods:

Homework, semester project, midterm exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Power System Analysis	Hadi Saadat	McGraw Hill	2004	9780071239554
Power System Analysis	Arthur, Berger, Vijay Vittal	Prentice Hall	2000	9780136919902

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Power System Analysis Design	J.Duncan Glover, Mulukutla S.Sarma	Cengage-Engineering	2001	9780534953676