UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-468	Power System Protection	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:

- Comprehend the malfunction of the electric power system.
- Estimate possible damage that fault currents, overheating of machines may cause.
- Focus on circuit operational disruption to avoid damages of the power devices as generators, transformers, transmission lines.
- Introduces basic monitoring schemes of the power devices and various relaying techniques supported by digital analysis to protect the power system.
- Elaborate on the selective protection of generators, motors, transmission lines, capacitors, reactors, and buses with respect to a predetermined priority.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Assess general protection measurements of devices and controls for the various components constituting the power system.
2. Differentiate among main types of generator protection as phase/ground fault stator protection, open/shorted field winding protection, over speeding and overheating protection.
3. Determine appropriate methods for transformer protection in the event of fault/short current, heat dissipation and magnetizing current.
4. Apply basic principles of transmission protection in the power system as for the ground

and over fault currents.
5. Classify main types of relay logics as hybrid/electromechanical/analogue/digital relay principles and the different criteria for their application.
6. Evaluate the characteristics of protective devices as fuse and relay characteristics.
7. Analyze the functional condition and the protection adequacy of the devices in a power system.

Course Content:

- Time Over current relay
- Instantaneous relay
- Distance relay
- Directional relay
- Differential Protection
- Circuit Beakers
- Substation
- Bus systems
- Current transformers
- Voltage Transformers
- Fundamental Units
- Phasors and Polarity
- Symmetric Components
- Relay Input Sources
- Protection Fundamentals and Basic Design Principles
- System-Grounding Principles
- Generator Protection/Intertie Protection for Distributed Generation
- Transformer, Reactor, and Shunt Capacitor Protection
- Bus Protection
- Motor Protection
- Line Protection
- Pilot Protection
- Stability, Reclosing, Load Shedding, and Trip Circuit Design
- Microprocessor Applications and Substation Automation

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises. Measuring overcurrent and nonsymmetry.

Assessment Methods:

Homework, semester project, midterm exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Protective Relaying: Principles and Applications	J.Lewis Blackburn, Thomas, J.Domin	CRC Press	2006	9781574447163
Power System Protection	Paul M. Anderson	John Wiley & Sons	2008	9780780334274

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Power System Protection Static Relays	T.S.M. Rao	McGraw Hill	2001	9780074603079