EEE.9-1.2 Electrical Power Systems II

COURSE OUTLINE

1 GENERAL

SCHOOL	Engineering		
DEPARTMENT	Electrical and Electronics Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	EEE.9-1.2	**SEMESTER**	9
COURSE TITLE	Electrical Power Systems II		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	5
Laboratory	2	
Total	5	

COURSE TYPE:	Specialization Course
PREREQUISITE COURSES:	Introduction to Electrical Power Systems Electrical Power Systems I
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (official)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	www.eee.uniwa.gr

2 LEARNING OUTCOMES

Learning outcomes

The objective of the course is to familiarize the student with electrical power systems and especially with:

- frequency regulation,
- voltage regulation,
- multimachine systems stability,
- non-linear systems stability,
- transient stability.

General Competences

The course aims at developing the following abilities:

1. Search for, analysis and synthesis of data and information, with the use of the necessary technology
2. Adapting to new situations
3. Decision-making
4. Working independently
5. Team work
6. Criticism and self-criticism

3 COURSE CONTENT

A. THEORY

Frequency regulation: area control error, continuous and discrete control, frequency and interconnection flow control. Excitation types. Automatic voltage regulators. Introduction to stability of non-linear systems: Steady state stability (small disturbances) and transient

stability. Stability of small modern machine disturbances. Electromechanical oscillations. Effect of voltage regulation. Stabilization systems. Stability in multimachine systems. Transient stability. Direct and indirect methods. Energy functions. Determination of critical angles and error clearing time. Applications for symmetrical and non-symmetrical errors.
Energy Control Centers: Description and functions of energy control centers. Distributed and parallel operation of energy control centers. State estimation in transmission and distribution networks. Detection of parameter and topology errors of electrical power systems. Equivalent networks. Safety and sensitivity analysis. Sparse matrix techniques.

B. LABORATORY

- Power feeder
- Phase sequence
- Real and reactive power
- Voltage regulation and power flow in a transmission line, Ferranti effect
- Voltage drop and phase difference between the sending and the receiving bus of a transmission line
- Transmission line simulation in terms of the steady stability limit
- Power network and three-phase autotransformer
- Parallelism of generators and transformers in electrical power systems
- Control center simulation
- Confirmation of power flow in electrical power systems

4 TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	In the classroom with the physical presence of students
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of I.C.T. for communication with students
TEACHING METHODS	

Activity Semester workload	***Activity Semester workload***
Lectures	39
Study	59
Laboratory	26
Technical Reports	26
Course total	150

STUDENT PERFORMANCE EVALUATION	Written examination: 70% Laboratory exercise: 30%

5 ATTACHED BIBLIOGRAPHY

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