COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
DEPARTMENT	Electrical and Computer Engineering		
LEVEL	Undergraduate (First course of study)		
COURSE CODE	9.004	**SEMESTER**	9th
COURSE NAME	Distribution Networks and Distributed Generation		

COURSEWORK BREAKDOWN	**WEEKLY TEACHING HOURS**	**ECTS Credits**
Lectures and exercises	4	4

COURSE TYPE	Knowledge deepening / Special Background
PREREQUISITE COURSES	-
TEACHING EXAMINATION LANGUAGE	GREEK
COURSE OFFERED TO ERASMUS STUDENTS	NO
WEB PAGE (URL)	https://eclass.hmu.gr/courses/ECE161/

(2) LEARNING OUTCOMES

Learning outcomes

Distribution networks are no longer the last link in the supply chain for electricity consumers, but they can act even as producers. Significant funding is expected for the modernization of these networks to enable them to cope with the challenges of the new era under deregulation.
Upon successful completion of the course the student will have granted with the necessary advanced knowledge to be able to solve problems in issues of modern distribution networks, and their expected significant development in the coming years such as:

A) Apply the necessary calculations for the operation of distribution networks for issues such as (voltage management within specific limits, reliability, etc.) deepening in knowledge acquired during previous semesters courses not only of Power Systems stream of courses.
B) Development of Electricity Distribution Networks composing them with the appropriate components, evaluating the possible solutions that exist with techno-economic criteria.
C) Understand the value and the difficulties of managing dispersed production (definitions, basic technical characteristics, and methods of their management) and evaluate ways of organizing it by proposing the most appropriate solutions.

By choosing this course, the graduates will be able to present innovative applications in the distribution networks in order to respond to the modern environment of Power Systems.

General Skills

The course aims at the acquisition by the graduate of the following general competencies:

- Search, analysis, and synthesis of data and information, using the necessary technologies
- Adaptation to new situations
- Working independently
- Team work
- Exercise of criticism and self-criticism
- Project planning and management

(3) SYLLABUS

The aim is to acquire advanced knowledge about the peculiarities of distribution networks and the challenges of integrating energy sources into them. In order for the modern Electrical and Computer Engineer graduate to cope with the significant changes expected at this level of operation of Power systems, they must have been equipped with the basic knowledge of Distributed Generation organization (micro-networks, etc.) as well as the requirements of intelligent networks. For this purpose, the structure of the course content is as follows:

Theory

1. Technical characteristics of Demand. Factors affecting their penetration, fluctuation and growth.
2. Calculation of power flows, voltages, power losses and energy losses in distribution networks with concentrated and distributed loads.
3. Voltage regulation and distribution network compensation.
4. Basic principles of reliability of operation of distribution networks.
5. Optimal operation and development of distribution networks.
6. Dispersed/Distributed Generation - Basic Concepts - network organization structures with dispersed production.
7. Distribution network automation and switching to Intelligent Network (Smart Grid)
8. Protection devices, component failure and modeling of their failure to activate. Load switching actions.

(4) TEACHING AND LEARNING METHODS - ASSESSMENT

MODE OF DELIVERY	Face to face in the classroom
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	Use of ICT in teaching Use of ICT in laboratory training Use of ICT in communicating with students through the electronic platform e-class
TEACHING ORGANIZATION	

Method description/Activity	**Semester Workload**
Lectures	50
Workshops	17
Study (project)	19
Independent study	34
Total Contact Hours	**120**

ASSESSMENT METHODS

Examination language: Greek

Evaluation methods:

1. Written final exam(80%)
   - with problem solving
2. Written Assignments (10%)
3. Final Project in teamwork (10%)

The evaluation criteria are announced to the students at the beginning of the semester and are posted on the Eclass course website.

(5) RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

1. *Distribution Of Electricity (2014), Malatestas Pantelis B. Version: 1η/2014, Publications A. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε*
2. *SYNCHRONOUS TRANSMISSION AND DISTRIBUTION SYSTEMS FOR ELECTRICITY Paul GEORGILAKIS, Version: 1/2016. Testator (Publisher):Greek academic electronic textbooks and Aids - Repository "Kallipos*
3. *Transmission and distribution of electricity. Issue: 4th ed./ 2001, Authors: Weedy B. M.,Cory B. J.Testator (Publisher): STELLA PARIKOU & Co. OE*
4. *Production, transmission, distribution of electricity: Xanthos Vasilis N.Version: 2η eccl./ 2003 Ziti Publications*
5. *Hatziargyriou, N. (Ed.). (2014). Microgrids: architectures and control. John Wiley & Sons.*
6. *Burke, J. J. (1994). Power distribution engineering: fundamentals and applications. CRC Press.*
7. *Brown, R. E. (2017). Electric power distribution reliability. CRC press.*
8. *Government Gazette B ' / 78-20. 01. 2017 - Code of management of the Hellenic Electricity Distribution Network (Hedno)*

Scientific Journals

1. *IEEE PES Journals*
2. *IEEE Power and Energy Magazine*
3. *Journals of IET*

https://digital-library.theiet.org/content/journals;jsessionid=4dn8rsi19srpv.x-iet-live-01

4. International Council on Large Electric Systems(CIGRE) Reference Papers of https://www.cigre.org/GB/publications/reference-papers

Links

1. *Smart Grids Platform: https://www.etip-snet.eu/*
2. *Hellenic Electricity Distribution Network Operator www.deddie.gr*
3. *Smart Grids European Technology Platform https://www.earpa.eu/earpa/39/etp_smartgrids.html*