Electric power stations I

Academic Year: (2020 / 2021) **Review date: 10-07-2020**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: VEGA BLAZQUEZ, MERCEDES DE

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Thermal engineering

OBJECTIVES

The objectives of this course are to provide a sound basis in thermodynamics of vapor and gas power systems, employed in electric power plants, and study their operating principles and technology as well as to provide the operating and characteristics of hydraulic turbines and power plants.

At the end of the course, the student will be able to:
-Identify the main systems of a thermal power plant and understand its operation;
-Identify the main systems of an hydraulic power plant and understand its operation;
-Evaluate the performance of the energy conversion processes taking place in the power plants
-Analyze energy savings and environmental impact of power plants.

At the end of the course, the student will be able to:
· identify the characteristics, requirement and economic considerations of energy systems in their relationship with professionals in this sector.
· understand the mechanical-thermal systems that interact with the most common configurations of electric generators and the important phenomena influencing the quality of the energy produced.
· have skills to work in power stations or companies operating such stations where they will be compulsory to interact with professionals specialising in energy matters.
· better understand the technical and operative documentation of electricity generating groups and modules.
· behave as professional who must be responsible for saving energy.

During the course the following skills will be trained:
-solve problems
-find, communicate and discriminate relevant information concerning power plants
-work in groups in order to solve complex problems

After the course, the student is expected to have
. A critical attitude versus the analysis of the performance and operation of the systems
. A colaborative spirit in order to obtain from different agents the information and knowledge necessary to complete complex problems

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DESCRIPTION OF CONTENTS: PROGRAMME

Energy. Sources of energy. Electric sector
Energy conversion plants.
Classification of types of power stations.
Thermal power generation. Steam power plants. Solar thermal power plants. Nuclear power plants. Alternating engines. Gas turbines.
Hydraulic plants.
Cogeneration.

LEARNING ACTIVITIES AND METHODOLOGY

(1) Magister courses
(2) Problems solved by the teacher
(3) Problems solved by the pupils
(4) Practice in laboratory.
(5) Project in groups
Answers and the correction of the problems is done in common and this may serve to develop the hability to analyze and communicate relevant information.

ASSESSMENT SYSTEM

The evaluation is based on:
-exercices etc.
-Individual evaluation in short tests (35%): 2 exams
-Final exam (50%).
-Project in groups (15%) : Design and Performance of a powerplant system to respond for a given demand over a period of time.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- Breeze, Paul A. Power generation technologies , Elsevier, 2005
- El-Wakil, Mohamed Mohamed Powerplant technology , McGraw-Hill, 1984
- Elliott, Thomas C. Standard handbook of powerplant engineering, McGraw-Hill, 1998
- Moran, Michael J. Fundamentos de termodinámica técnica , Reverté, 2004

ADDITIONAL BIBLIOGRAPHY

- Drbal, Lawrence F. Power plant engineering, Kluwer Academic Publishers, 2003
- J.A. Soriano Termodinámica Lógica y Motores Térmicos, Ciencia 3, 1999
- S.L. Dixon Fluid Mechanics and Thermodynamics of Turbomachinery, Butterworth, 1999
- Sabugal García, Santiago Centrales térmicas de ciclo combinado / teoría y proyecto, Díaz de Santos, 2006