Last update: 14-10-2019

820326 - TECE - Power Station Technology

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: YOURI ALEXANDROVICH KOUBYCHINE MERKULOV

Others: Primer quadrimestre:
GUILLEM PERE CORTES ROSSELL - T11
YOURI ALEXANDROVICH KOUBYCHINE MERKULOV - T11

Opening hours

Timetable: Just after the lectures. Other time frames to be appointed by e-mail.

Prior skills

Those given by the following courses:
- Mechanics of Fluids
- Thermodynamics and Heat Transfer
- Energy Resources
- Thermal and Fluid Dynamic Power Generation I

Requirements

GENERACIÓ TERMOFLUIDODINÀMICA - Prerequisit

Degree competences to which the subject contributes

Specific:

CEENE-15. Analyse energy transformation mechanisms inside machines.

CEENE-200. Measure and design energy production systems based on nuclear power.

Transversal:

05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

820326 - TECE - Power Station Technology

Teaching methodology

The subject is based on classroom sessions (lectures and exercicies) and non-contact student work, with individual activities and activities to do in cooperative team

As part of the exhibition Professor classroom sessions illustrate the contents with numerical exercises on the blackboard.

In classroom sessions the teacher illustrates the contents with numerical exercises on the blackboard.

In the practical sessions the students solve a numerical exercise under the teacher supervision

Individual activities solved out of class include solve various exercises to prepare in advance the practical sessions or to settle the concepts of the lectures. The resolution of these activities will weigh on the assessment of the subject. Delivery of reports of practices (both what students have done in class and what they do outside the classroom later) also have a weight in the evaluation.

Validation tests will be established to ensure that students have done the activities and have assimilated the concepts.

The digital platform ATENEA will be used to announce the activities to be done and collect the deliveries of each student

Learning objectives of the subject

The subject shows to the student the methods that allows to take advantage of many energy sources and understand the physical and technological principles to convert and make use of thermal and fluidodynamic energy.

Also, the subject tries to make the student to know the socioeconomic and environmental implications of the energy transformation and energy use.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

820326 - TECE - Power Station Technology

Content

Introduction	Learning time: 1h 30m Theory classes: 1h 30m

Description:
Overview of the subject and organization of the course.

Classical thermal power plants (the coal fired power plant)	Learning time: 28h Theory classes: 6h Laboratory classes: 2h Self study : 20h

Description:
Overview. Description of the boiler, burners, heat exchangers, turbine, condenser, and other equipment of a steam-cycle thermal power plant.

Related activities:
There will be a practical session where the main parameters involved in the energy balance in this type of plants will be calculated. In addition, a series of non-contact activities will be programmed to be solved individually or in team.

Combined cycle power plants	Learning time: 23h 30m Theory classes: 4h 30m Laboratory classes: 4h Self study : 15h

Description:
Description of the technology, with the focus on the gas turbine and the recovery boiler.

Related activities:
There will be practical sessions where the main parameters involved in the energy balance in this type of plants will be calculated. In addition, a series of non-contact activities will be programmed to be solved individually or in team.

Nuclear power plants	Learning time: 30h Theory classes: 6h Laboratory classes: 4h Self study : 20h

Description:
Exposition of the fundamentals underlaying the use of this type of energy. Description of the main technologies.

Related activities:
There will be practical sessions where the main parameters involved in the energy balance in this type of plants will be calculated and about the nuclear fuel cycle. In addition, a series of non-contact activities will be programmed to be solved individually or in team.

Hydropower	Learning time: 21h 30m Theory classes: 4h 30m Laboratory classes: 2h Self study : 15h

Description:
Description of the resource, siting and technologies. Overview of a plant and its components. Introduction to pumped-storage plants.

Related activities:
There will be practical sessions where the main parameters involved in the energy balance of hydroelectric power plants will be calculated, with a focus on the energy accumulation capabilities of some plants. In addition, a series of non-contact activities will be programmed to be solved individually or in team.

Cogeneration and trigeneration	Learning time: 21h 30m Theory classes: 4h 30m Laboratory classes: 2h Self study : 15h

Description:
Analysis of advantages and disadvantages of cogeneration and trigeneration. Description of the technologies. Balance calculations and determination of the efficiency parameters.

Related activities:
There will be practical sessions where the main parameters involved in the energy balance in this type of plants will be calculated. In addition, a series of non-contact activities will be programmed to be solved individually or in team.

Closing sessions	Learning time: 6h 30m Theory classes: 1h 30m Self study : 5h

Description:
Resume sessions where all the studied technologies are placed in context.

Related activities:
A series of non-contact activities will be programmed to be solved individually or in team.

Qualification system

60% exams. Will be 3 long exams(between 90 minutes and 120 minutes) during the semester, the two first will be related with specific topics and the last one will include the overall topics studied. The weight of each exam will be defined at the begining of the semester. Each exam will include theory and exercises.

40% class activities. This mark will include the following items:
- The assistence to class sessions
- The evaluation of the activities done at class
- Evaluation of the reports of class activities
- Short exams done at class

At the end of the semester will be a re-evaluation exam. The students will be able to access the re-assessment test that meets the requirements set by the EEBE in its Assessment and Permanence Regulations (https://eebe.upc.edu/ca/estudis/normatives-academiques/documents/eebe-normativa-avaluacio-i-permanencia-18-19-aprovat-je-2018-06-13.pdf)

Regulations for carrying out activities

- Is not allowed to do theory exams with any book or class notes but is allowed a scientific calculator not programable
- Is allowed to do problem exams with class notes and additional bibliography and also a scientific calculator not programable
- The detection of and irregular action during the evaluation that could change the mark significantly could imply fail the overall subject.

820326 - TECE - Power Station Technology

Bibliography

Complementary:

Palacín, Pere; Oriol, Josep. Tecnología energética. PPU, 2013. ISBN 9788494161827.

Fernández Díez, Pedro. Col·lecció de llibres sobre enginyeria energètica [on line]. [Consultation: 25/06/2014]. Available on: <http://es.pfernandezdiez.es/>.

Moran, Michael J.; Shapiro, Howard N. Fundamentos de termodinámica técnica. 2ª ed. Barcelona: Reverté, cop. 2004. ISBN 8429143130.

Lamarsh, John R; Baratta, Anthony J. Introduction to nuclear engineering. 3rd ed. Upper Saddle River: Prentice Hall, cop. 2001. ISBN 978-0201824988.

Others resources:

AR