Energy and Water

Academic Year: (2023 / 2024) **Review date: 22/01/2024 11:12:25**

Department assigned to the subject: Thermal and Fluids Engineering Department

Coordinating teacher: HERNANDEZ JIMENEZ, FERNANDO

Type: Electives ECTS Credits : 3.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Calculus I, II
Writing and Communication Skills
Thermal Engineering
Environmental Technology
Heat power plants
Engineering Fluid Mechanics

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG4. Being able to do design, analysis, calculation, manufacture, test, verification, diagnosis and maintenance of energetic systems and devices.
CG7. Assess, control, and reduce the social and environmental impact of projects and facilities within the field of energy engineering.
CG10. Being able to work in a multi-lingual and multidisciplinary environment
CE20 Módulo CRI. Basic knowledge on environmental and sustainability technologies and their application.
CE1 Módulo TE. Applied knowledge on thermal engineering.
CE8 Módulo TE. Applied knowledge on renewable energies.
CT1. Ability to communicate knowledge orally as well as in writing to a specialized and non-specialized public.
CT2. Ability to establish good interpersonal communication and to work in multidisciplinary and international teams.
CT3. Ability to organize and plan work, making appropriate decisions based on available information, gathering and interpreting relevant data to make sound judgement within the study area.
CT4. Motivation and ability to commit to lifelong autonomous learning to enable graduates to adapt to any new situation.

By the end of this content area, students will be able to have:
RA1.2 a systematic understanding of the key aspects and concepts of the branch of energy engineering.
RA1.3 coherent knowledge of the branch of energy engineering including some at the forefront of energetic technologies;
RA2.1 the ability to apply their knowledge and understanding to identify, formulate and solve energy

engineering problems using established methods;
RA2.3 the ability to select and apply relevant analytic and modelling methods.
RA4.1 the ability to conduct searches of literature, and to use data bases and other sources of information;
RA5.1 the ability to select and use appropriate equipment, tools and methods;
RA5.2 the ability to combine theory and practice to solve energy engineering problems;
RA6.1 function effectively as an individual and as a member of a team;
RA6.3 demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.

OBJECTIVES

By the end of this content area, students will be able to have:
1. a systematic understanding of the key aspects and concepts of thermal engineering and fluid mechanics.
2. coherent knowledge of thermal engineering and fluid mechanics including some at the forefront of the branch in mechanical engineering.
3. the ability to apply their knowledge and understanding to identify, formulate and solve problems of thermal engineering and fluid mechanics using established methods.
4. the ability to select and apply relevant analytic and modelling methods in thermal engineering and fluid mechanics.
5. the ability to conduct searches of literature, and to use data bases and other sources of information.
6. the ability to select and use appropriate equipment, tools and methods to solve problems of thermal engineering and fluid mechanics.
7. the ability to combine theory and practice to solve problems of thermal engineering and fluid mechanics.
8. function effectively as an individual and as a member of a team.
9. demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction

Water use in society (industrial, commercial, residential)
Climate change, population increase and energy demand
Water for energy & Energy for water

2. Water for Energy

Water use in fossil-fuel plants
Water use in renewable-based plants
Relationships among water use, fuel type, efficiency, technology & environmental impacts
Effects and consequences

3. Energy for water

Water scarcity, stress on water systems and energy generation
Strategies to reduce water use
Processes for desalination and water reuse

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology will include:

1. Lecture slides and recommended bibliography.
2. Problem solving sessions related with the course topics.
3. Homework problems.
4. Preparation and presentation of scientific reports, including three practical sessions.
In addition, the class may include tutorials in groups.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

ORDINARY CALL:

- Continuous evaluation (100% of the total grade)

Contents:

- Practical problems on the topics of the course
- Short theoretical questions
- Presentations of scientific papers
- Test quizzes
- Project

The realization of the project is obligatory. A minimum grade of 4.5 out of 10 will be required in the final project to consider the continuous evaluation.

EXTRAORDINARY CALL:

The realization of the project is obligatory. If not delivered in the ordinary call, it must be delivered in the extraordinary call. A minimum grade of 4.5 out of 10 will be required.

BASIC BIBLIOGRAPHY

- null Sustainable Water for the Future: Water Recycling versus Desalination, Elsevier, 2009

- Gustaf Olsson Water and Energy- Threats and Opportunities, IWA Publishing, 2012