Course guide
240IEN34 - 240IEN34 - Thermal Equipment Design

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 724 - MMT - Department of Heat Engines.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2023 ECTS Credits: 4.5 Languages: Spanish

LECTURER

Coordinating lecturer: Martinez Ballester, Santiago
Others: Martinez Ballester, Santiago

PRIOR SKILLS

Thermotechnology
Thermodynamics
Fluid Mechanics
Basic Informatics

TEACHING METHODOLOGY

The classes combine theory and problems, inviting students to actively participate in them, in case analysis and technical decision making. Continuous work is encouraged throughout the course with the proposition of problems and analysis exercises and team design.

LEARNING OBJECTIVES OF THE SUBJECT

GENERAL OBJECTIVE
Apply the fundamentals of heat transfer, thermotechnics and thermodynamics to the calculation of equipment with generation, supply and / or recovery of thermal energy

SPECIFIC OBJECTIVES
1) Know the main types and particularities of industrial equipment in which there is generation, supply and / or recovery of thermal energy.
2) Know how to size the equipment mentioned above or determine its performance from:
   a) Obtaining more or less complex models for proposing mass and energy balances and applying the heat and / or mass transfer equations.
   b) The application of simplified calculation methods for specific thermal equipment. All this through the application of analytical and numerical calculation techniques.
3) Know the most appropriate sensors and equipment to use in thermal facilities and equipment for their correct experimental analysis.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>13.5</td>
<td>12.00</td>
</tr>
<tr>
<td>Self study</td>
<td>72.0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>27.0</td>
<td>24.00</td>
</tr>
</tbody>
</table>
Total learning time: 112.5 h

## CONTENTS

### INTRODUCTION

**Description:**
Presentation of the subject. Introduction to heat generation.

**Full-or-part-time:** 1h 30m  
Theory classes: 1h 30m

### HEAT GENERATION

**Description:**

**Full-or-part-time:** 12h  
Theory classes: 12h

### CONVECTION IN HEAT EXCHANGERS

**Description:**

**Full-or-part-time:** 6h  
Theory classes: 6h

### HEAT EXCHANGERS

**Description:**

**Full-or-part-time:** 12h  
Practical classes: 12h

### THERMOECONOMICS

**Description:**
Introduction to thermoeconomics. Application examples.

**Full-or-part-time:** 1h 30m  
Practical classes: 1h 30m
INSTRUMENTATION IN THERMAL INSTALLATIONS

Description:

Full-or-part-time: 6h
Theory classes: 6h

GRADING SYSTEM

The student's grade will be: \( N_{\text{final}} = 0.35 \times N_{\text{partial}_1} + 0.35 \times N_{\text{partial}_2} + 0.3 \times N_{\text{partial}_3} \)

\( N_{\text{final}} \): final mark
\( N_{\text{partial}_i} \): mark of the partial exams
\( N_{\text{exfinal}} \): mark of the final exam

The problems and design exercises proposed by the teachers to do at home are essential to reach the final exam in better conditions.

For the sole purpose of improving the course grade, the teaching staff reserves the possibility of incorporating, where appropriate, other elements or evaluation criteria.

EXAMINATION RULES.

Partial exams are written tests that are taken during class time, excepting the partial 3 which takes place on the date set by the Barcelona School of Industrial Engineering. They will consist of solving numerical problems or multiple choice questions that may contain small exercises. You must carry a calculator and for problems only a handwritten form on an A4 sheet is allowed on both sides, while for tests and theory questions only the calculator is allowed.

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Other resources:
Audiovisual and computer equipment
- Files in MS Powerpoint with transparencies about the theme of the course.
- Files in MS Excel with some exercises solved.
- Digital Campus ATENEA
- Collection of problems.