

340056 - ETER-M6O29 - Thermal Engineering

Coordinating unit:	340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit:	729 - MF - Department of Fluid Mechanics
Academic year:	2017
Degree:	BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits:	6
Teaching languages:	Catalan

Teaching staff

Coordinator:	JAUME MIQUEL MASALLES
Others:	JAUME MIQUEL MASALLES CARLOS PRUDENCIO DE GRACIA DAVID PUJOL BRESCÓ

Prior skills

Differential and integral calculus.
Differential equations.
Knowledge of: Fundamentals of thermal engineering
Knowledge of: Fluid mechanics.

Requirements

340025 - Differential Equations
340026 - Advanced Calculus
340038 - Fundamentals of Thermal Engineering (in case you have not studied: 340032 - Thermal Engineering and Fluid Mechanics)
340039 - Fluid Mechanics (in case you have not studied: 340032 - Thermal Engineering and Fluid Mechanics)

Degree competences to which the subject contributes

Specific:

1. CE21. Applied thermal engineering knowledge.

Transversal:

2. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
4. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
5. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
6. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

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Teaching methodology

- Lectures and participatory classes, consisting of explanation and development of the theory and, if necessary in the resolution of problems. The material user will be available to the student in the Digital Campus section of the subject.

Learning objectives of the subject

At the end of the course students should be able to :

Study load

Total learning time: 150h	Hours large group:	52h 30m	35.00%
	Hours medium group:	0h	0.00%
	Hours small group:	7h 30m	5.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

<p>(ENG) TEMA 1. AIRE HÚMEDO. PROCESOS DE ACONDICIONAMIENTO DE L AIRE.</p>	<p>Learning time: 30h Theory classes: 13h Self study : 17h</p>
<p>Description: 1.1.- P-V-T relations and thermodynamic properties of ideal gas mixtures.</p> <p>Related activities: A1. Problems of moist air and air conditioning processes.</p> <p>Specific objectives: At the end of this teaching unit, the student must be able to:</p>	
<p>(ENG) TEMA 2. TRANSMISIÓN DE CALOR POR CONDUCCIÓN EN ESTADO ESTACIONARIO Y TRANSITORIO</p>	<p>Learning time: 44h 30m Theory classes: 17h Laboratory classes: 1h 30m Self study : 26h</p>
<p>Description: 2.1 General equation of heat conduction: Equation in Cartesian coordinates and equation in cylindrical coordinates.</p> <p>Related activities: A2. Problems of steady-state and transient heat conduction.</p> <p>Specific objectives: At the end of this teaching unit, the student must be able to:</p>	
<p>(ENG) TEMA 3. TRANSMISIÓN DE CALOR POR CONVECCIÓN: CORRELACIONES EMPÍRICAS</p>	<p>Learning time: 24h 15m Theory classes: 8h Laboratory classes: 2h 15m Self study : 14h</p>
<p>Description: 3.1.- Relevant dimensionless parameters for characterizing forced convection.</p> <p>Related activities: A6. Problems of convective heat transfer: Empirical correlations.</p> <p>Specific objectives: At the end of this teaching unit, the student must be able to:</p>	

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<p>(ENG) UNIT 4. EQUIPMENT AND HEAT GENERATORS</p>	<p>Learning time: 33h 15m Theory classes: 12h Laboratory classes: 2h 15m Self study : 19h</p>
<p>Description: 4.1. Heat exchangers: Classification. Overall heat transfer coefficient (U). Energy balance equations. Logarithmic mean temperature difference (LMTD). F graphics for various types of heat exchangers. Calculation Method F-DTML. Effectiveness (E) and number of transfer units (NUT) exchanger. E-NUT graphics and formulas $E = f(Rc, NUT)$ and $NUT = f(Rc, E)$ for exchangers of various configurations. Solving the problem of thermal behavior analysis and the problem of a heat exchanger design.</p> <p>Related activities: A3. Laboratory: Experimental study of the thermal behavior of heat exchangers: double pipe, shell and tube, and plate. A7. Problems of equipment and thermal generators. A11. Second individual written test.</p> <p>Specific objectives: At the end of this teaching unit, the student must be able to:</p>	
<p>(ENG) TEMA 5. CALOR Y FRÍO INDUSTRIAL</p>	<p>Learning time: 18h Theory classes: 4h Self study : 14h</p>
<p>Description: 5.1. Fuels and combustion: Classification of fuels. Calorific value of fuels. Mass balance and chemical equations of combustion (stoichiometric combustion, combustion with air excess and defect). Energy balance in combustion. Adiabatic flame temperature.</p> <p>Related activities: A8. Preparation, delivery in writing and oral presentation of Topic 5: Industrial heat and cold.</p> <p>Specific objectives: At the end of this teaching unit, the student must be able to:</p>	

Qualification system

The evaluation weight of the various concepts involved in the qualification of the subject are:

- INDIVIDUAL WRITTEN TESTS (68 %)
- DELIVERY OF EXERCISES RESOLVED (10 %)
- REPORTS OF LABORATORY PRACTICE (10 %)
- PREPARATION, DELIVERY IN WRITING AND ORAL PRESENTATION OF AN ITEM (12 %)



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Regulations for carrying out activities

- Each of the two individual written exams (Partial Controls) consist of two parts: a test of theory (which may constitute up to 30% of the grade of the exam) and a number of problems (up 100% of note the exam). Both exams have the same evaluative weight (34 %) being the sum of both the 68 % of the final grade.

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Bibliography

Basic:

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Complementary:

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