

820330 - TDFE - Energy Fluid Transmission and Distribution

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
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ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: FRANCISCO ESTRANY CODA
Others: Primer quadrimestre:
FRANCISCO ESTRANY CODA - M11, M12
MARGARITA SÁNCHEZ JIMÉNEZ - M11, M12

Opening hours

Timetable: Generally, during the hour before the start time of the class and during the hour after class.

Prior skills

Sufficient capacity of written communication. Autonomous learning.

Requirements

MECÀNICA DE FLUIDS - Prerequisit
TERMODINÀMICA I TRANSFERÈNCIA DE CALOR - Precorequisit

Degree competences to which the subject contributes

Specific:

CEENE-220. Knowledge of the principles of operation of liquid, gas and vapour transport and distribution systems for the transport.

Transversal:

5. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

Teaching methodology

The course uses the methodology exhibition by 40%, individual work by 20%, work in groups by 40%. Ability in "Team Work", which is the rate that corresponds to this subject will be evaluated within the student's work to make the project that is commissioned during the semester.

Learning objectives of the subject

Acquire the knowledge necessary for the calculation, modeling and simulation of transport facilities and channeling fluid power, knowledge and calculation of the thermodynamic properties of water vapor, and ability to design industrial distribution of water vapor. Knowledge of the physical properties of natural gas, and the operation of extraction facilities and distribution of this fuel. Computing capacity of f LNG vaporization installations.



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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>CHAPTER 1: SYSTEMS OF UNITS USED IN ENGINEERING, DIMENSIONAL ANALYSIS AND MACROSCOPIC BALANCE OF ENERGY</p>	<p>Learning time: 3h Theory classes: 1h Self study : 2h</p>
<p>Description: Unit systems used in the engineering field. Usefulness of dimensional analysis for solving equations in analytical calculations. Application of dimensional analysis to the deduction of equations representative of the behavior of Physical Systems. The macroscopic balance of energy framed in the transport of fluids.</p>	
<p>CHAPTER 2: PIPELINES FOR ENERGY TRANSPORTOR LÍQUIDES</p>	<p>Learning time: 16h Theory classes: 6h Self study : 10h</p>
<p>Description: Energy balance applied to channeled fluids: Bernoulli's principle, I raise general and specific pose for gases and vapors in isentálpico regimes, isothermal and adiabatic. Fluid flow regimes. Calculation of friction head loss in a pipeline. Calculating the minimum diameter and the diameter of a driving optimum transport of a fluid. Concept and calculation of a bypass. Exercises and problems</p>	
<p>Chapter 3: STEAM AS A TRANSPORTATION AGENT FOR MECHANICAL AND HEAT ENERGY</p>	<p>Learning time: 20h 30m Theory classes: 6h 30m Laboratory classes: 4h Self study : 10h</p>
<p>Description: Saturated steam, wet steam and superheated steam: degrees of freedom and thermodynamic quantities. Specific calculation of the magnitudes of both the saturated steam as the wet steam and superheated steam. Determining a moisture vapor (condensation and strangulation methods). Enthalpy balances in steam plant. Mollier diagram. Comprehensive facility energy use, with steam as the main carrier of energy. Application to a waste incineration plant. Exercises and problems.</p>	
<p>CHAPTER 4 - MODELLING AND SIMULATION OF FLUID PIPES AND VAPOR TRANSPORT INSTALLATIONS</p>	<p>Learning time: 16h Theory classes: 2h Laboratory classes: 6h Self study : 8h</p>
<p>Description: Modelling and simulation of fluid liquid pipelines energy (oil). Pipeline sizing and calculation of the power required for pumping the liquid.</p>	

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<p>CHAPTER 5 - NATURAL GAS AS STRATEGIC FLUID FOR ENERGY TRANSPORT</p>	<p>Learning time: 16h Theory classes: 6h Self study : 10h</p>
<p>Description: Composition of natural gas. Thermodynamic properties of methane. Natural gas extraction plants. Types of natural gas. Transportation by pipeline to the distribution center. Solving exercises and problems.</p>	
<p>CHAPTER 6 - LIQUEFIED NATURAL GAS (LNG)</p>	<p>Learning time: 16h Theory classes: 6h Self study : 10h</p>
<p>Description: Composition of LNG compared to the GN. History of LNG. Security of LNG. Liquefaction of natural gas. Regasification of LNG-transport of LNG. Solving exercises and problems.</p>	
<p>CHAPTER 7 - PROCESSING AND DISTRIBUTION OF ENERGY</p>	<p>Learning time: 3h Theory classes: 1h Self study : 2h</p>
<p>Description: End of the route of transport of energy by fluid power piping. Operation of power stations. Starting the electricity supply system.</p>	
<p>CHAPTER 8 - MODELING AND SIMULATION OF GAS PIPELINES AND STEAM ACCUMULATORS</p>	<p>Learning time: 14h 30m Theory classes: 1h 30m Laboratory classes: 5h Self study : 8h</p>
<p>Description: Modeling and programmed simulation of large Natural Gas pipelines (approximating their properties to methane). Pipeline sizing and calculation of the power required for compression and gas drive. Modeling and programmed simulation of the start-up of a Steam Accumulator.</p>	

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PROJECT IN THE FIELD OF ENERGY	Learning time: 45h Guided activities: 15h Self study : 30h
<p>Description:</p> <p>The Project will focus on a topic contained within the field of three of the specific subjects of the degree "Degree in Energy Engineering" taught in the fifth four-month term: "Thermofluidodynamic Generation", "Transport and Distribution of Energy Fluids" and " Management of the Energy Sectors ". It is a common activity.</p>	

Qualification system

First Control Partial: 25% ç
 Second Partial Control: 25%
 Exercises in charge and Reports of Practice: 20%
 Project (including the assessment of competition): 30%
 No Examination of Reevaluation will take place

Regulations for carrying out activities

Students will be tested individually in a classroom in partial checks. Submit exercises correspond to proposals for calculating industrial installations and process units, derived from topics of Modelling and Simulation practices, and experimental practice of the steamer, and carried out by groups outside the classroom. The Transversal Project will conform to the standards common to all courses involved.

Bibliography

Basic:

- Ramos Carpio, Miguel Angel. Refino de petróleo, gas natural y petroquímica. Madrid: Fundación Fomento Innovación Industrial, 1997. ISBN 8460567559.
- Liengme, Bernard V.; Ellert, David J. A Guide to Microsoft Excel 2007 for scientists and engineers. London: Elsevier/AP, 2009. ISBN 9780123746238.
- Vian Ortuño, Ángel; Ocón García, Joaquín. Elementos de ingeniería química : operaciones básicas. 5ª ed. Madrid: Aguilar, 1967. ISBN 8403201532.

Complementary:

- Manual del ingeniero químico. 4ª ed. Madrid [etc.]: McGraw-Hill, cop. 2001. ISBN 8448130081.
- Ocón García, Joaquín; Tojo Barreiro, Gabriel. Problemas de ingeniería química : operaciones básicas. 3ª ed. Madrid: Aguilar, 1968. ISBN 9788403201057.