220560 - Environmental and Energy Management

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 758 - EPC - Department of Project and Construction Engineering
Academic year: 2017
Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: MARTA GANGOLELLS
Others: DANIEL GARCIA ALMIÑANA - Simó Josa, Jordi
Cusido Roura, Meritxell
Fernandez Valles, Juan Carlos

Degree competences to which the subject contributes

Specific:
1. To analyze the risks and consequences of proposed solutions in the various organizational sub-systems and their social and environmental contexts.
2. Apply theories and inherent principles in the production and logistics area in order to analyze uncertainty complex situations and make decisions using engineering tools.
3. Plan, organize, implement, lead and manage engineering projects, especially projects of innovation (R + D + I) and process improvement.

Generical:
4. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.
5. Self-learning capacity to independent continuous training.
6. Ability to effectively communicate their findings, knowledge and concluding reasons to skilled and unskilled audiences, clearly and unambiguously.
7. Ability to integrate knowledge and formulate judgments with the aim of making decisions based on information that, with incomplete or limited include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
8. Ability to understand the impact of engineering solutions in a global and social context.
9. Ability to operate and lead multidisciplinary and multicultural groups, with negotiation skills, group work, relationships in an international setting, and conflict resolution.
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Teaching methodology

The course is divided into three parts:

- Theory classes.
- Practical classes.
- Self-study for doing exercises and activities.

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding.

In the practical classes (in the classroom), teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning. We propose that students solve exercises in and outside the classroom, to promote contact and use the basic tools needed to solve problems.

Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts. The teachers provide the curriculum and monitoring of activities (by ATENEA).

Learning objectives of the subject

The aim of this subject is to provide basic knowledge on the interrelation between industrial activities and the environment. The importance of the various existing instruments for the integrated prevention and control of the pollution will be stressed, going deep into both legal and regulation issues which may affect industrial facilities. Taking into account the special relation between environment and energy, the subject will focus mainly on energy management aspects within the company.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 8h</th>
<th>6.40%</th>
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<tbody>
<tr>
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<td>Hours medium group:</td>
<td>15h</td>
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<td>Guided activities:</td>
<td>22h</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>80h</td>
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## Content

| Module 1: Introduction to environmental problematics | Learning time: 4h 12m  
Theory classes: 2h 12m  
Self study : 2h |
|---|---|
| **Description:**  
Introduction and historical referents.  
Concept and sustainability indicators.  
Main environmental issues. | |

| Module 2: Life Cycle Assessment | Learning time: 4h 12m  
Theory classes: 2h 12m  
Self study : 2h |
|---|---|
| **Description:**  
Concept  
Legal framework  
Methodology | |

| Module 3: Prevention and control of activities | Learning time: 49h 54m  
Theory classes: 8h 54m  
Practical classes: 7h  
Self study : 34h |
|---|---|
| **Description:**  
Directive concerning industrial emissions, Best Available Techniques (BATs), Emission Limit Values and BAT Reference Documents (BREFs).  
Law on pollution prevention and control of activities, classification of activities and administrative intervention regime. | |

| Module 4: Environmental Management Systems in companies | Learning time: 4h 12m  
Theory classes: 2h 12m  
Self study : 2h |
|---|---|
| **Description:**  
Introduction to Environmental Management Systems.  
Legal framework for Environmental Management Systems.  
Environmental Management System implementation process.  
Environmental Management System audits and system verification/certification.  
Environmental communication and information.  
Integrated Management Systems. | |
### Module 5: Environmental problematics related to energy usage

**Description:**
- Pollutant emissions.
- Greenhouse gas emissions.
- Emissions trading.
- Renewable energies' role.

**Learning time:** 4h 12m  
Theory classes: 2h 12m  
Self study: 2h

### Module 6: Energy Market & Network energies

**Description:**
- Current framework.
- Gas tariff.
- Electricity tariff.
- Special regime tariff.
- Energy market price.
- Supply reliability.

**Learning time:** 4h 12m  
Theory classes: 2h 12m  
Self study: 2h

### Module 7: The energy quality

**Description:**
- Electricity's main quality parameters.
- Problems derived from a poor quality supply.
- Legal framework.
- Natural gas' main characteristics.
- Typical composition of the supplied gas.
- Gas composition effects to devices.

**Learning time:** 4h 12m  
Theory classes: 2h 12m  
Self study: 2h
Module 8: Energy services

**Description:**
- Introduction to energy services market.
- Energy Service Companies (ESCOs).
- Energy management models.
- Performance verification methodology (CMVP).
- Systems' telemanagement and monitoring.
- Continuous energy management improvement guarantee.

<table>
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<tr>
<th>Learning time: 4h 12m</th>
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<tr>
<td>Theory classes: 2h 12m</td>
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<tr>
<td>Self study : 2h</td>
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Module 9: Methodology of the energy audits

**Description:**
- First stage. Data gathering and audit planning.
- Second stage. Experimental measurements for the energy balance of the system.
- Third stage. Energy balance.
- Fourth stage. Analysis of system's energy performance improvements.
- Fifth stage. Final results.

<table>
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<tr>
<th>Learning time: 45h 42m</th>
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<tr>
<td>Theory classes: 6h 42m</td>
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<tr>
<td>Practical classes: 7h</td>
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<td>Self study : 32h</td>
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Qualification system

The final course grade depends on the following evaluation evidences:

- Cases, weigh: 25%
- Mid-term exam, weigh: 25%
- Project, weigh: 50%

Non-satisfactory results in the exam of the first part will be able to be redirected by means of a written test that will take place the day of the final exam. This reset exam will cover, in any case, concepts related to theory of the first part of the subject. All the students can take this exam. Marks in the reset exam can range from 0 to 10. Only the best mark will be taken into account.
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Bibliography

Basic:

Complementary:

Others resources:
Hyperlink
http://territori.gencat.cat/ca/inici/