240611 - Fire Engineering

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2017
Degree: BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 4.5  
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: ELSA PASTOR FERRER
Others: EULALIA PLANAS CUCHI

Teaching methodology

Lectures, problems seminars and practical exercises at the flames laboratory

Learning objectives of the subject

The objective of this subject is to get the student introduced into the fire protection engineering science and technology, so that he/she can acquire the basic knowledge to analyse, design and implement the suitable fire safety measures in buildings and industry. The student will be capable of:

OE1. Apply the basic laws of combustion and fire dynamics.
OE2. Use at basic level several fire simulation tools.
OE3. List the diverse fire protection systems.
OE4. Describe the bases of fire investigation.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>0h</th>
<th>0.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>30h</td>
<td>26.67%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
<td>13.33%</td>
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<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>67h 30m</td>
<td>60.00%</td>
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## Content

### INTRODUCTION TO FIRE ENGINEERING

**Description:**
Fire engineering and the diverse topics of study. Types of fire: industrial fires, compartment fires, wildland fires.

**Learning time:** 7h 30m  
Theory classes: 1h 30m  
Practical classes: 1h 30m  
Self study: 4h 30m

### FUNDAMENTALS OF COMBUSTION AND FIRE DYNAMICS

**Description:**

**Learning time:** 25h  
Theory classes: 5h  
Practical classes: 5h  
Self study: 15h

### TOOLS FOR FIRE SIMULATION

**Description:**
Fire models: empirical models, quasi-physical models, zone models, CDF models. Available simulation tools.

**Learning time:** 8h 45m  
Theory classes: 1h 45m  
Practical classes: 1h 45m  
Self study: 5h 15m

### FIRE PROTECTION

**Description:**

**Learning time:** 42h 30m  
Theory classes: 8h 30m  
Practical classes: 8h 30m  
Self study: 25h 30m
### FIRE INVESTIGATION

**Learning time:** 28h 45m
- Theory classes: 5h 45m
- Practical classes: 5h 45m
- Self study: 17h 15m

**Description:**
Methodology to fire investigation. Ignition sources. Fire trances. Professional areas involved in fire investigation.
## Planning of activities

### PROBLEMS

| Description: | Hours: 36h  
Self study: 36h |
<table>
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<tbody>
<tr>
<td>Individually solved at home. Periodically deliveries</td>
<td></td>
</tr>
<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides and other bibliographic material</td>
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<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides</td>
</tr>
<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
<td>Problem solved</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>OE1, OE2, OE3, OE4</td>
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### LABORATORY

| Description: | Hours: 6h  
Laboratory classes: 6h |
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<tbody>
<tr>
<td>Exercises at the flames laboratory</td>
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<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides</td>
</tr>
<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides</td>
</tr>
</tbody>
</table>
| Descriptions of the assignments due and their relation to the assessment: | Preliminary report before the exercise  
Final report after the exercise |
| Specific objectives: | OE1, OE2, OE3, OE4 |

### REAL CASE FIRE INVESTIGATION

| Description: | Hours: 10h  
Self study: 10h |
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<tbody>
<tr>
<td>Team solving of the investigation of a real fire</td>
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<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides</td>
</tr>
<tr>
<td>Support materials:</td>
<td>Formulation, class notes, slides</td>
</tr>
<tr>
<td>Descriptions of the assignments due and their relation to the assessment:</td>
<td>Report with the results obtained</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>OE5</td>
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### MIDTERM EXAM

| Description: | Hours: 26h 15m  
Theory classes: 1h 15m  
Self study: 25h |
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Description:
Test examination

Support materials:
Class notes, slides, solved problems and other bibliographic material

Descriptions of the assignments due and their relation to the assessment:
Answers to the questions

Specific objectives:
OE1, OE2, OE3

## FINAL EXAM

Description:
Final exam based on theoretical questions and problems

Support materials:
Class notes, slides, solved problems and other bibliographic material

Descriptions of the assignments due and their relation to the assessment:
Answers to the questions

Specific objectives:
OE1, OE2, OE3, OE4

### Qualification system

FINAL MARK: \[ NF = 0.2 \times NP + 0.3 \times NEP + 0.5 \times NEF; \]

NP: Mean mark of practical exercises
NEP: Mid term exam mark
NEF: Final exam mark

### Regulations for carrying out activities

All tests (i.e. practical exercises, mid term exam and final exam) can be done using all sorts of available bibliographic material: lecture notes, books, solved problems, etc. All tests are compulsory.
Bibliography

Basic:


Complementary: