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>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>30h</td>
<td></td>
<td>26.67%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>15h</td>
<td></td>
<td>13.33%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td></td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>67h 30m</td>
<td></td>
<td>60.00%</td>
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</tbody>
</table>
# 240611 - Fire Engineering

## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time</th>
<th>Theory classes:</th>
<th>Practical classes:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO FIRE ENGINEERING</strong></td>
<td>7h 30m</td>
<td>1h 30m</td>
<td>1h 30m</td>
<td>4h 30m</td>
</tr>
<tr>
<td><strong>FUNDAMENTALS OF COMBUSTION AND FIRE DYNAMICS</strong></td>
<td>25h</td>
<td>5h</td>
<td>5h</td>
<td>15h</td>
</tr>
<tr>
<td><strong>TOOLS FOR FIRE SIMULATION</strong></td>
<td>8h 45m</td>
<td>1h 45m</td>
<td>1h 45m</td>
<td>5h 15m</td>
</tr>
<tr>
<td><strong>FIRE PROTECTION</strong></td>
<td>42h 30m</td>
<td>8h 30m</td>
<td>8h 30m</td>
<td>25h 30m</td>
</tr>
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</table>

### Description:

**INTRODUCTION TO FIRE ENGINEERING**
Fire engineering and the diverse topics of study. Types of fire: industrial fires, compartment fires, wildland fires.

**FUNDAMENTALS OF COMBUSTION AND FIRE DYNAMICS**

**TOOLS FOR FIRE SIMULATION**
Fire models: empirical models, quasi-physical models, zone models, CDF models. Available simulation tools.

**FIRE PROTECTION**
### FIRE INVESTIGATION

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 28h 45m</th>
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</thead>
</table>
| Methodology to fire investigation. Ignition sources. Fire trances. Professional areas involved in fire investigation. | Theory classes: 5h 45m  
Practical classes: 5h 45m  
Self study : 17h 15m |
# Planning of activities

## PROBLEMS

<table>
<thead>
<tr>
<th>Hours: 36h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study: 36h</td>
</tr>
</tbody>
</table>

**Description:**
Individually solved at home. Periodically deliveries

**Support materials:**
Formulation, class notes, slides and other bibliographic material

**Descriptions of the assignments due and their relation to the assessment:**
Problem solved

**Specific objectives:**
OE1, OE2, OE3, OE4

## LABORATORY

<table>
<thead>
<tr>
<th>Hours: 6h</th>
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<tbody>
<tr>
<td>Laboratory classes: 6h</td>
</tr>
</tbody>
</table>

**Description:**
Exercises at the flames laboratory

**Support materials:**
Fromulation, class notes, slides

**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

<table>
<thead>
<tr>
<th>Hours: 10h</th>
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<tbody>
<tr>
<td>Self study: 10h</td>
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</tbody>
</table>

**Description:**
Team solving of the investigation of a real fire

**Support materials:**
Formulation, class notes, slides

**Descriptions of the assignments due and their relation to the assessment:**
Report with the results obtained

**Specific objectives:**
OE5

## MIDTERM EXAM

<table>
<thead>
<tr>
<th>Hours: 26h 15m</th>
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<tbody>
<tr>
<td>Theory classes: 1h 15m</td>
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<tr>
<td>Self study: 25h</td>
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Last update: 01-06-2017

Universitat Politècnica de Catalunya
240611 - Fire Engineering

**Description:**
Test examination

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

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

**Specific objectives:**
OE1, OE2, OE3

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**FINAL EXAM**

**Hours:** 63h
Theory classes: 3h
Self study: 60h

**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

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**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: