

295906 - EFOC - Fire Engineering

Coordinating unit:	295 - EEBE - Barcelona East School of Engineering		
Teaching unit:	713 - EQ - Department of Chemical Engineering		
Academic year:	2018		
Degree:	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) BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)		
ECTS credits:	6	Teaching languages:	Catalan

Teaching staff

Coordinator:	Pastor Ferrer, Elsa
Others:	Planas Cuchi, Eulalia

Learning objectives of the subject

The main objective of this subject is to provide the students with the basic knowledge on Fire Engineering (or fire protection engineering) to analyse, design and implement adequate fire safety measures in structures, industries and at the wildland-urban interface.

We work on fundamental aspects of combustion and fire dynamics (fuels characterization, materials, fire chemistry, ignition, flames propagation, etc.), we present (theoretically and practically) the available tools and software for fire simulation, we describe the main measures for active and passive fire protection and we establish the basis to perform fire safety projects under either a prescriptive and a performance based approach. At the end of the course we give a brief introduction on fire investigations and forensics.

Study load

Total learning time: 150h	Hours large group:	60h	40.00%
	Self study:	90h	60.00%

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Content

3. Introduction to Fire Engineering	Learning time: 7h 30m Theory classes: 7h 30m
Description: Fire Engineering and related areas. Types of fire: industrial, buildings and wildland fires.	
3. Fundamentals on combustion and fire dynamics	Learning time: 25h Theory classes: 25h
Description: Fuel types and classification. Physicochemistry of combustion. Heat of combustion. Flame temperature. Combustion products. Heat transfer. Pre-mixed flames. Diffusion flames. Ignition. Propagation. Burning rate.	
3. Tools for compartment fires simulation	Learning time: 8h 45m Theory classes: 8h 45m
Description: Compartment fire dynamics. Types of models: empirical, quasi-physical, zone models, CFD models. Simulation exercises.	
4. Fire protection	Learning time: 42h 30m Theory classes: 42h 30m
Description: Introduction to fire protection. Suppression: mechanisms and agents. Fire safety: active and passive fire protection. Fire emergency management.	
5. Bases for fire protection design measures and strategies	Learning time: 37h 30m Theory classes: 37h 30m
Description: Prescriptive and performance-based design. Legislation. Design projects of suppression, ventilation and evacuation systems.	

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6. Fire investigation	Learning time: 28h 45m Theory classes: 28h 45m
Description: Methodos for forensic analysis. Ignition sources. Fire patterns and vestiges. Professional activities involving fire investigation. Study cases.	

Bibliography

Basic:

Drysdale, Dougal. An introduction to fire dynamics. 3rd. Chichester: Wiley, 2011. ISBN 9780470319031.

Quintiere, James G. Fundamentals of fire phenomena. Chichester: John Wiley & Sons Ltd, 2006. ISBN 9780470091135.

Complementary:

Society for fire Protection Engineers. SFPE Handbook of fire protection engineering. 5th. New York: Springer, 2015.

McAllister, Sara; Chen, Jyh-Yuan ; Fernandez-Pello, A. Carlos. Fundamentals of combustion processes. New York, [etc.]: Springer, 2011. ISBN 9781441979421.