Course guide
295906 - EFOC - Fire Engineering

Last modified: 02/10/2025

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer:

Others:

TEACHING METHODOLOGY

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, desgin 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

Type	Hours	Percentage
Hours large group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

3. Introduction to Fire Engineering

Description:
Fire Engineering and related areas. Types of fire: industrial, buildings and wildland fires.

Full-or-part-time: 7h 30m
Theory classes: 7h 30m

3. Fundamentals on combustion and fire dynamics

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.

Full-or-part-time: 25h
Theory classes: 25h

3. Tools for compartment fires simulation

Description:
Compartment fire dynamics. Types of models: empirical, quasi-physical, zone models, CFD models. Simulation exercises.

Full-or-part-time: 8h 45m
Theory classes: 8h 45m

4. Fire protection

Description:
Introduction to fire protection. Suppression: mechanisms and agents. Fire safety: active and passive fire protection. Fire emergency management.

Full-or-part-time: 42h 30m
Theory classes: 42h 30m

5. Bases for fire protection design measures and strategies

Description:
Prescriptive and performance-based design. Legislation. Design projects of supression, ventilation and evacuation systems.

Full-or-part-time: 37h 30m
Theory classes: 37h 30m

6. Fire investigation

Description:
Methodos for forensic analysis. Ignition sources. Fire patterns and vestiges. Professional activities involving fire investigation. Study cases.

Full-or-part-time: 28h 45m
Theory classes: 28h 45m

GRADING SYSTEM

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 [on line]. 5th ed. New York: Springer, 2015 [Consultation: 30/04/2020]. Available on: https://dx.doi.org/10.1007/978-1-4939-2565-0. ISBN 9781493925650.
- McAllister, Sara; Chen, Jyh-Yuan ; Fernandez-Pello, A. Carlos. Fundamentals of combustion processes [on line]. New York, [etc.]: Springer, 2011 [Consultation: 30/04/2020]. Available on: http://dx.doi.org/10.1007/978-1-4419-7943-8. ISBN 9781441979438.