SUBJECT TEACHING GUIDE

1107 - Experimental and Mathematical Methods for the Analysis of Combustion and Fire Dynamics
Master's Degree in Industrial Engineering
Master's Degree in Industrial Engineering Research

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering Research			Type and Year	Optional. Year 2 Optional. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	ADVANCES IN SECURITY AND RESOURCES ASSESSMENT IN INDUSTRY Module - Sustainable Design in Industrial Systems				
Course unit title and code	1107 - Experimental and Mathematical Methods for the Analysis of Combustion and Fire Dynamics				
Number of ECTS credits allocated	5	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS
Name of lecturer	MANUEL DANIEL ALVEAR PORTILLA
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Other lecturers	MARIANO LAZARO URRUTIA

3.1 LEARNING OUTCOMES
- To facilitate the initiation in combustion and fire dunamics simulation avanced tools
- To create a proactive attitude toward the scientific studies in this area of knowledge to be developed both in academia and companies
- To be able to understand the fundamental phenomena and analysis methods of combustion process to face innovative solutions for the technological challenges
- To facilitate the improvement of collaborative capabilities to solve practical technical issues on combustion and fire safety engineering and the dissemination of that knowlegde

4. OBJECTIVES

to present the main mechanisms about combustion and enclousure fire dynamics

To establish the knowledge core on physical and mathematical modelling to analise fire dynamics

To use both experimental combustion techniques and fire computer models for the characterization of the fire dynamics in enclosures

6. SUBJECT PROGRAM

CONTENTS	
1	Introduction to combustion and fire dynamics. Fuels, Chemical kinetics
2	Ignition. Pemixed and diffusion flames. Fire propagation. Enclosure fire dynamics
3	Introduction to CFD Fire computer modelling
4	Guiding CFD use in encluosure fire scenarios

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Simple exercises and questions to be solved in classroom.	Work	No	Yes	100,00
TOTAL				100,00

Observations

NOTE: GIVEN THE CURRENT UNCERTAIN HEALTH SITUATION, IN THE EVENT THAT THE COMPETENT HEALTH AND EDUCATION AUTHORITY DO NOT ALLOW ANY EVALUATION ACTIVITY TO BE CARRIED OUT IN PERSON IN THE CLASSROOM, A DISTANCE EVALUATION MODALITY WILL BE ADOPTED USING TELEMATIC MEANS.

Observations for part-time students

The evaluation methodology does not need from adaptations for part-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Fundamentals of Combustion Processes. Sara McAllister, et al. Springer
Introduction to fire dynamics. Dougal Drysdale. Wiley
Combustion fundamentals of Fire. Geoffrey Fox. Academic
Fundamentals of Fire Phenomena. James G. Quintiere. Wiley