Combustion

Academic Year: (2019 / 2020) **Review date: 02-05-2019**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: NAVARRO CAVALLE, JAUME

Type: Electives ECTS Credits : 3.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fluid Mechanics
Thermal Engineering

OBJECTIVES

Basic knowledge of combustion processes, their physical laws, and their applications to propulsion

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to combustion phenomena and fuels.
   1.1. Combustion in aerospace and industrial applications.
   1.2. Hydrocarbon basic nomenclature.
2. Thermochemistry.
   2.1. Fundamental laws of Thermodynamics.
   2.2. Adiabatic Flame Temperature and combustion heat.
   2.3. Chemical equilibrium and dissociation processes.
3. Chemical kinetics.
   3.1. Arrhenius' equation.
   3.2. Complex and single-step combustion mechanism.
   3.3. Pollutants formation. Zeldovich mechanism.
4. Analysis of simple reacting systems.
   4.1. Closed systems: constant pressure/volume reactors.
   4.2. Open systems.
5. Mass and heat diffusion of gas mixtures. Evaporation of liquids
   5.1. Mass diffusion. Fick's Law and Stefan's Problem.

LEARNING ACTIVITIES AND METHODOLOGY

The methodology combines
1) lecture classes presenting the different subjects
2) problem solving sessions
3) computer lab sessions, development or use of simple numerical tools to describe different combustion phenomena
4) homework sets of exercises
5) quizzes

Both homework and quizzes contribute to continuous evaluation mark.

Tutorials can be both personally or through Aula Global

ASSESSMENT SYSTEM

In order to pass the subject in the ordinary call, two requirements need to be met:

1) to have a MINIMUM mark of 4.0 over 10 in the end-of-term exam;
2) to have a minimum overall mark of 5.0 over 10 (weighing 60% the end-of-term exam mark and 40% the mark of the continuous evaluation).

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- I. GLASSMAN, R. YETTER, N. GLUMAC COMBUSTION, 5TH EDITION, ACADEMIC PRESS, 2015
- STEPHEN R. TURNS AN INTRODUCTION TO COMBUSTION, 3RD EDITION, MAC GRAW-HILL INTERNATIONAL, 2012

ADDITIONAL BIBLIOGRAPHY

- C.K. LAW Combustion Physics, Cambridge University Press, 2006
- K.K. KUO Principles of combustion, 2nd. edition, Wiley, 2005