

5.0 credits	30.0 h + 30.0 h	1q
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Teacher(s) :	Papalexandris Miltiadis ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	http://icampus.uclouvain.be/claroline/course/index.php?cid=LMECA2160
Main themes :	Origins, nature, and conditioning of fuels. Mass and energy balance laws of combustion. Physical chemistry and chemical kinetics of combustion: reacting schemes and phenomenology of the modes of combustion. Fuel combustion technologies: conception and design of combustion heat transfer equipment.
Aims :	To provide the theoretical and practical background in the use of fuels via a physico-chemical approach to combustion and to present the technological aspects relative to fuel combustion. <i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i>
Evaluation methods :	Written, with open books and notes. The grade on the lab report counts for 25% of the overall grade.
Teaching methods :	Laboratory: Operation of a domestic natural-gas boiler and analysis of its combustion efficiency.
Content :	<p>1. Energetic study of fuels and their use. Origins and formation of fuels. Conditioning and specification of fuels. Global mass and energy balance laws in combustion. Control and diagnostic techniques.</p> <p>2. Thermochemistry. Chemical kinetics of combustion. Chain-branching mechanisms. Explosivity and flammability limits, flame temperature. Chemical reaction rates, deflagrations and detonations. Pollutant formation. Measurement techniques.</p> <p>3. Combustion and heat transfer technologies. Combustion of gases: burners for premixed and non-premixed combustion. Combustion of liquids: pulverization and diffusion. Combustion of solids: fixed beds, pulverization, fluidized beds.</p> <p>4. Use of heat: Heat transfer basics. Conduction, free and forced convection, radiation. Applications to combustion related problems.</p> <p>The balance laws of mass and of energy and the physico-chemical calculations are the objects of exercises and laboratory experiments. In these experiments emphasis is placed upon the phenomenology of combustion, control methods and diagnostics and upon operating methods.</p>
Bibliography :	-- S.R. Turns, Introduction to Combustion, Mc Graw Hill, 2000. -- K.K. Kuo, Principles of Combustion, Wiley, 2005 -- T. Poinso & mp; D. Veynante, Theoretical and Numerical Combustion, Edwards, 2003.
Cycle and year of study :	> Master [120] in Mechanical Engineering > Master [120] in Electro-mechanical Engineering
Faculty or entity in charge:	MECA