

Faculty of Applied Sciences



MECA2160 Fuels and combustion.

[30h+15h exercises] 4 credits

This course is taught in the 1st semester

Teacher(s): Miltiadis Papalexandris, Jacques Vandooren
Language: French
Level: Second cycle

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.

Main themes

Origine, 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.

Content and teaching methods

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.

Physical chemistry and chemical kinetics of combustion :

Chemical mechanisms and conditions for propagation.

Explosivity and flammability limits, flame temperature.

Chemical reaction rates, deflagrations and detonations.

Pollutant formation. Measurement techniques.

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.

Use of heat: heat transfer basics.

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.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites :

None

Other credits in programs

ELME22/E	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(4 credits)	Mandatory
MECA22	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(4 credits)	
MECA23	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(4 credits)	