



## 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**

<b>ELME21/E</b>	Première année du programme conduisant au grade d'ingénieur (4 credits) civil électro-mécanicien (énergie)		
<b>ELME22/E</b>	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(4 credits)	Mandatory
<b>ELME23/E</b>	Troisième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(4 credits)	
<b>MECA22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(4 credits)	
<b>MECA23</b>	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(4 credits)	