



# Faculté des sciences appliquées

**FSA**

MECA2160 **Combustibles et combustion**

[30h+15h exercices] 4 credits

This course is taught in the 1st semester

**Teacher(s):** Miltiadis Papalexandris, Jacques Vandooren  
**Language:** french  
**Level:** 2nd cycle course

## 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>ELME22/E</b>	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(4 credits)	Mandatory
<b>INCH23</b>	Troisième année du programme conduisant au grade d'ingénieur civil chimiste	(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)	