

## EN2930 Powertrain Design

**Professor:** Axel Coussement

**Language of instruction:** French – **Number of hours:** 36 – **ECTS:** 3

**Prerequisites:** None

**Period:** S8 Elective 13, One-week module 2 16-20 May IN28IS2, SEP8IS2

### Course Objectives

The objective is to give the students the basic working principle, economical and industrial constraints linked to the piston engines, along with the organisation of the automotive industry : Why so few manufacturers ? Why does gasoline engine are less efficient then diesels ? How do you deal why pollutants ? Which materials are used and why ? ...

Moreover the two design studies will allow the student to understand how, with simple laws, rule of thumbs and experience complex system can be pre-design allowing thus the further optimization until the final design is reached.

### On completion of the course, students should be able to

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### Course Contents

During the last decades, car engines have been subject to a deep evolution. Since the 90s electronic is more and more used for engine management and new architectures are appearing (hybrid, down-sizing, ...) increasing further their complexity. Those engine's design is thus very challenging and appeal to many different engineering specialities: mechanics, electronics, combustion, chemistry, electricity, material science, production management, etc.

After a general introduction to piston engines focusing on their working principle but also on the economical and industrial constraints of the automotive industry, it will be proposed to :

- ◇ Perform a study of the necessary modifications in an engine management software design for gasoline only to allow dual-fuel (bio-ethanol/gasoline) operation.
- ◇ Preliminary design/adaptation of an engine to a vehicle ( power-torque, cooling, hybridation ...) in order to achieve the prescribed performances.

Those studies are based on real scenarios encountered in the industry and will emphasize how complex system are designed.

### Course Organization

The course is divided into two parts : first a oral course and two mini-projects illustrating it. The time repartion is aproximatively 50%/50%.

### Teaching Material and Textbooks

PDF of the slides used in the course.

### Evaluation

The evaluation is based a written examan (with course notes) along with the evaluation of the mini-project performed during the course.