# *VÉHICULES HYBRIDES : MODÉLISATION ET GESTION DE L'ÉNERGIE*

# HYBRID ELECTRIC VEHICLES : MODELLING AND ENERGY MANAGEMENT

**Lecturers:** Arnaud BREARD

| Lecturers : 16.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 12.0 | Project : 0.0 | Language : FR

## Objectives

The aim of this course is to present electric and hybrid vehicles. Modeling, sizing and energy management of hybrid vehicles and their components are studied. Twelve hours will be spent for practical works to develop and simulate vehicle models. These sessions mainly deal with the developement of a model of electric vehicle, the modelling and the energy management of Toyota Prius, and the energy management of serial hybrid vehicles.

Keywords : Hybrid vehicle, electric vehicle, cybernetic model, battery, engine, electrical machine, pollutant, energy management, emission standards, environnemental impact

## Programme

The teachers in charge of this session are researchers of IFSTTAR working on Electric and Hybrid Vehicles.
1) Hybrid electric vehicle : generalities, definitions, classification and cybernetic modelling.
2) The batteries for electric and hybrid vehicles : introduction, modelling, uses, sizing, security and ageing.
3) Engines and electrical machines : presentation, different types of electrical machines and their controls, different types of engines, anti-pollution norms, application for electric and conventional vehicles.

## Learning outcomes

- Understand the operation principles of the main components of hybrid vehicles (engine, battery, electronic converter,...)
- Modelling of a hybrid vehicle
- Sizing the components of a hybrid vehicle
- Simulate the energy management in a hybrid vehicle

## Independent study

Objectifs :

Méhodes :

## Core texts

Lino Guzzella, Antonio Sciarretta, *VEHICLE PROPULSION SYSTEMS - INTRODUCTION TO MODELING AND OPTIMIZATION.*, Springer, 2013
Chris Mi, M. Abul Masrur, David Wenzhong Gao *HYBRID ELECTRIC VEHICLES: PRINCIPLES AND APPLICATIONS WITH PRACTICAL PERSPECTIVES.*, Wiley, 2011

## Assessment

Final mark = 60% Knowledge + 40% Know-how
Knowledge N1 = 100% final exam
Know-how N2 = 100% continuous assessment