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## 2SC5692 – Hybrid power train

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**Department:** DOMINANTE - ENERGIE

**Language of instruction:** FRANCAIS

**Campus:** CAMPUS DE PARIS - SACLAY

**Workload (HEE):** 40

**On-site hours (HPE):** 27,00

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### Description

The objective is to be able to propose a hybrid powertrain model and combine the practical part on a characterization bench and the modeling part.

### Quarter number

ST5

### Prerequisites (in terms of CS courses)

Electric energy

### Syllabus

1. Presentation of the different elements of the hybrid power train :  
Introduction to the environmental, economic constraints  
Presentation of ways to increase the overall efficiency of the powertrain and the structure of a hybrid drive train  
Presentation of the combustion engine, structure of the automotive industry  
Control of electrical machines (choice between MCC and synchronous machine), for integration in a system model
2. Application and development of a numerical model :  
Presentation of the hybrid system model in Simulink :  
Implementation of the different parts of the block diagram: car model, combustion engine, gearbox, electric motor coupling, batteries.  
Presentation of a flow management strategy on WLTP consumption cycle.

### Class components (lecture, labs, etc.)

Project

### Grading

final defense



## **Resources**

Modeling on Matlab

Papers

### **Learning outcomes covered on the course**

- Implementing a systemic model of the electric powertrain and then a hybrid powertrain
- Implementing digital processing tools under matlab/Simulink
- Implementing a control approach for the entire hybrid chain from driver to wheels
- Introduction to cycle dimensioning: complexity of the system and contradiction of several objectives to be achieved