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

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