ELECTRONIQUE DE PUISSANCE

POWER ELECTRONICS

Lecturers: **Loris PACE, Arnaud BREARD**
| Lecturers : 16 | TC : 10 | PW : 6.0 | Autonomy : 12 | Study : 4 | Project : 0.0 | Language : FR

Objectives

- Understand the interest and role of power electronics;
- Know : the fundamental concepts which govern this discipline, the main structures of electronic power converters;
- Be able to trace the shapes of currents and voltages in an electronic power converter from a block diagram;
- Be able to choose the electronic power switches for a given converter and specifications;
- Be able to assess the losses in an electronic power switch;
- Know the technologies used for the production of passive components in power electronics;

Keywords : Power electronics, static conversion of electrical energy, energy efficiency of systems, passive and active electronic components, EMC

Programme

Main introduction, concept of sources and switches, topologies of power converters.
Passive components in power electronics : Roles and importance
   - Inductive components: Technology, Sizing
   - Capacity components: Technologies, Choice criteria
Thermal problems in power electronics: Losses
Determination and implementation of control in power electronics:
   - Close control of switches, Pulse width modulations
Electromagnetic compatibility (EMC): Introduction and generalities, EMC in power electronics, Conducted / radiated disturbances

Learning outcomes

- Understand the interest and role of power electronics
- Know the fundamental concepts which govern this discipline

Independent study

Objectifs : Autonomous work consists in sizing a system based on specifications and establishing a model that will validate this sizing. The system will be studied in pairs with a student following the electromechanical conversion module. It will be a converter - electromechanical actuator combination. Each student will therefore be able to take advantage of the teaching of his module and must be

Méhodes : Sizing a device using an analytical approach
Construction of a model and verification of the relevance of the design elements

Core texts

J.-P. Ferrieux, F. Forest, *ALIMENTATIONS À DÉCOUPAGE, CONVERTISSEURS À RÉSONANCE*, Masson
J.-L. Cocquerelle *CEM ET ÉLECTRONIQUE DE PUISSANCE*, Technip
R. W. Erickson, D. Moksimovic*FONDAMENTALS OF POWER ELECTRONICS*, Kluwer Academic Publishers

Assessment

Final mark = 75% Knowledge + 25% Know-how
Knowledge mark = 100% final exam + 0% continuous assessment
Know-how mark = 50% practical work + 50% autonomy work