



ENGLISH TAUGHT COURSES AVAILABLE FOR EXCHANGE STUDENTS 2022

ELECTRIC VEHICLES

The increasing amount of greenhouse gases (GHG) are considered as a major challenge for climate change and global warming. Transportation sector contributes to a 24% of global CO₂ emissions which are considered as the main composition of GHGs. The growing concerns about climate change and energy security have accelerated a global transition to a more sustainable transport system. Electric Vehicles (EVs), representing an innovative technology with the potential to reduce greenhouse gas emissions and support the mitigation of climate change, have gained substantial interests in recent years.

However, the novel structure of EV applications requires industry to establish rules for the sizing and use of control systems in order to exploit them in the best conditions. Today, recent innovations in the fields of electric machines, power storage systems, power electronics and control systems have led researchers to investigate ways to improve the reliability of electromechanical energy conversion chains and the quality of EV systems.

It is in this context the EVs program will focus on automotive transportation technologies that are being used in EV applications. Students in the EVs program graduate with technical expertise in the electric machines, power electronic systems and control system, as well as a good knowledge about the EV infrastructures and power conversion chain.

PRE-REQUISITES

- A bachelor's degree or equivalent in related fields
- Proven knowledge in the following fields:
 - ✓ Fundamentals of electric circuits
 - ✓ Fundamentals of electronic
 - ✓ Basic knowledge of MATLAB/Simulink
 - ✓ Fundamentals of control systems

COURSES OUTLINE – KEY FEATURES

2 years, including 3 semesters of coursework and 1 semester of internship

YEAR 1

Course title
Automotive semiconductor devices and components
Power converters
Electrical machines
Simpower system (Matlab/Simulink) for EV
LTspice for simulation
State space control
Discrete control
CAN communication bus
Programing the microcontrollers
Automotive sensors technology
Principles of conventional and modern (electric) vehicles
Standards (norms) for EV technology
Project

YEAR 2

Course title
Hybridization of the vehicles
Impact of renewable energies in EV technology
Charging technologies for EV systems
Mechanical drivetrain (power transmission) of EVs
Energy storage systems for EVs
Battery management system (BMS)
Market and economy issues for EV industry
Vector control for EV drivetrain
Project