

Course Title: Controlling robotic systems

Course description

Course components	36 CM; 24 TP
European credits	6 ECTS
Master specialization	Ingénierie pour la santé / Mechatronic Systems for Rehabilitation
Semestre où l'enseignement est proposé	

a) Objective

This course introduces the methods for mechanical modeling, analysis and control of robotics systems. It also will provide an understanding of real-time embedded systems with key modeling concepts and fundamental programming aspects of multithreaded applications running with real-time operating systems currently used in rehabilitation robotics.

It aims at giving to the students the possibility of beginning in complete autonomy the resolution of certain number of elementary problems of robotics as the configuration description, the generation of trajectories, the dynamic control as well as of being capable of analyzing the behavior of mechatronic systems from the point of view of their properties of kinemato-static transmission, their static and dynamic balance.

b) Content

Kinematic description and parametric representation of systems. Homogeneous transformations. Direct and inverse geometrical. Laws of transmission of movement. Resolution of the kinematic problems. Generation of articular and Cartesian trajectories. Position, force and impédance control. Introduction to real-time operating systems, tasks and kernel objects (semaphores, message queues, etc.), scheduling, synchronization and communication. Timer services, I/O subsystem, exceptions and interrupts.

c) Pre-requisites

Rational mechanics, C Language

d) Evaluation

Written examinations and practical work evaluation

Teaching method

In class work	Total time	Weekly hours	Enrollment
Lectures	36 h		
Tutorials			
Practical work	24 h		
Project			
Other			