Marco Tursini

Programme of "Automazione Elettrica" "Electrical Automation"		
• Code: **I2L045** • type of course unit: **compulsory** • level of course unit: **second cycle in Electrical Engineering** • year of study: **2nd**; semester: **1st**		
Number of ECTS credits: **9** (workload is **225** hours; 1 credit = 25 hours)		
Teacher: **Marco Tursini**		
1	**Course objectives**	The goal of this course is to provide specialist level expertise on electrical motion components, systems, and design tools. On successful completion of this module, the student should be aware of the advanced motion and motor control techniques and should be able to analyze, simulate and design micro-controller based automation systems.
2	**Course content and Learning outcomes (Dublin descriptors)**	Topics of the module include: Part I – Theory **Electrical motors & drives:** permanent magnets, variable and switched reluctance motors; AC & DC brushless, multiphase and fault tolerant drives; current regulated voltage source inverters; optimum & flux-weakening control strategies; sensorless control. **Motion control:** current, speed, and position control; standard & multivariable regulators; real time control and simulation. **Sensors & transducers:** encoders, resolvers, Hall sensors. Part II – Laboratory **Simulation of drives:** using Matlab/Simulink**.** **Micro-controllers for automation:** PWM, A/D, capture and compare units, serial interface, examples of applications**.** On successful completion of this module, the student should: - have deep **knowledge** of advanced motor control strategies; - have **knowledge and understanding** of motion control principles; - **understand and explain** the fundamental concepts of real-time control in automation. - **understand** the operating principles of some basic sensors and transducers employed in automation; - **demonstrate skills** in advanced control of AC drives and their simulation techniques; - demonstrate **capacity** to evaluate and select the appropriate drive system for a given application based on technical/economical reasoning and **ability** to design the motion control.
3	**Prerequisites and learning activities**	Basic notions of electrical machines, power converters and control contained in the exams of Electrical Machines, Power Electronics and Automatic Control are recalled during the course.
4	**Teaching methods and language**	Teaching method: Lectures, classroom exercises with PCs, laboratory team work Language: Italian / English Ref. Text books : H. Bühler: "Electronique de reglage et de commande", Ed. Dunod , Traité d'électricité, d'électronique et d'électrotechnique, 1982; W. Leonhard: "Control of electrical drives", Springer, 2001;
5	**Assessment methods and criteria**	Oral examination or laboratory project (student choice)