Giulio Antonini

Programme of "Compatibilità Elettromagnetica" "Electromagnetic Compatibility"		
• Code: **I2L010** • 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: **Giulio Antonini**		
1	**Course objectives**	The goal of this course is to provide specialist level expertise on electromagnetic compatibility, leading to full understanding of the aspects related to generating mechanisms of electromagnetic interferences and to their propagation. On successful completion of this module, the student should be able to evaluate EMC problems in electrical, electronic devices and equipments, according to their technical characteristics and functionalities, and to provide solutions.
2	**Course content and Learning outcomes (Dublin descriptors)**	Topics of the module include: **Signal Spectra-the Relationship between the Time Domain and the Frequency Domain:** The Fourier Series Representation of Periodic Signals, The Spectrum of Trapezoidal (Clock) Waveforms, Spectral Bounds for Trapezoidal Waveforms, Spectrum Analyzers, Representation of Nonperiodic Waveforms. **Multiconductor Transmission Lines and crosstalk:** The Transmission-Line Equations, The Per-Unit-Length Parameters, The Inductive–Capacitive Coupling Approximate Model, Shielded Wires, Twisted Wires. **Shielding:** Shielding Effectiveness: Far-Near Field Sources, Low-Frequency, Magnetic Field Shielding. **Radiated Emissions and Susceptibility:** Differential-Mode versus Common-Mode Currents, Differential- and Common Mode Current Emission Model. **Conducted Emissions and Susceptibility:** The Line Impedance Stabilization Network (LISN), Power Supply Filters, Power Supplies, Conducted Susceptibility. On successful completion of this module, the student should: - have deep **knowledge** of mechanisms of generation of electromagnetic interferences; - have **knowledge and understanding** of crosstalk and the principles to reduce it; - **understand and explain** the fundamental concepts of radiated and conducted emissions; - **understand** the principles of shielding of high and low frequency electromagnetic fields; - **demonstrate skills** in modeling EMC problems and simulation techniques; - demonstrate **capacity ,** given a complex electromagnetic environment, to be able to identify the possible interferences sources, the coupling paths and the potential victims and select the appropriate solution based on technical/economical reasoning and **ability** to correctly design electrical systems.
3	**Prerequisites and learning activities**	The student must have notions of electrical engineering, electromagnetic fields, electrical measurements taught in the exams of Electrical Engineering, Electrical Measurements offered in the 1st Cycle of Industrial Engineering.
4	**Teaching methods and language**	**Teaching method:** Lectures, classroom exercises with PCs, team work. **Language:** Italian / English **Ref. Text books :** C. R. Paul: "Introduction to Electromagnetic Compatibility", Ed. Wiley, 2006. Didactic material available by the teacher.
5	**Assessment methods and criteria**	Oral examination and homeworks/project.