

Title Compatibilità, normativa e sicurezza degli apparati elettronici Electromagnetic compatibility regulation and safety of electronic systems	Degree Corso di Laurea Magistrale in Ingegneria Elettronica (DM 270/04)	Year 2	Teaching Period 1	Credits 6
Teacher: Ruben Specogna		Academic year: 2014/2015		

Objectives:

The course covers the main theoretical and practical aspects of Electromagnetic Compatibility, dealing also with EMC standard requirements.

Acquired skills:

- Standard requirements for EMC and electrical safety
- Simple Theoretical models for time domain and frequency domain EMC analyses
- Basic principles of the design of electronic systems which satisfy EMC standard requirements and perform reliably in the presence of interference sources

Lectures and exercises		hours
Topics	Specific contents	
Introduction to Electromagnetic Compatibility	Introduction to Electromagnetic Compatibility.	2
EMC Standard Requirements and electrical safety	European Commission Directives, standard requirements for commercial products. Electrical safety.	8
Non ideal behavior of Passive components	Conductors, Resistors, Inductors, Capacitors, ferrite beads.	2
Radiated emissions	Simple emission models for conductors and PCB lands. Common Mode (CM) and Differential mode (DM) currents. EMC standard requirements.	4
Radiated Susceptibility	The response of a transmission line excited by a non uniform e.m. field, Susceptibility measurements, EMC standard requirements.	8
Conducted Emissions	Measurements of conducted emissions: LISN, CM and DM currents. Conducted emissions sources. Power Supply Filters: basic properties of filters (low pass, high pass, band pass, band reject), effect of the filter elements on CM and DM currents. EMC standard requirements.	6
Conducted Susceptibility	Susceptibility measurements, EMC standard requirements.	2
Crosstalk	Lumped parameters models: inductive and capacitive couplings, common-impedance coupling. Transmission lines (basic principles).	14
Shielding effectiveness of metallic sheets	Shielding effectiveness: far-field sources, near-field sources, low frequency, magnetic field shielding.	2
Electrostatic Discharges (ESD)	Origin and effects of the ESD event.	2
Electromagnetic field sources (high/low frequency) and safety of electronic systems	Basic principles. Safety of electronic systems	4
Total hours for lectures and exercises		54
for exercises only		6
Further educational activities		hours
Labs		15
Tutorials / Seminars		0
Workshops		0
Guided tours		0
		0
Total hours for further educational activities		15
Total hours		69

Type of exam: Written and oral

References:

- Clayton R. Paul, Introduction to Electromagnetic Compatibility, J. Wiley & Sons
- Henry W. Ott, Noise reduction techniques in electronic systems, J. Wiley & Sons

Additional material or information on line <http://materialedidattico.uniud.it>