

EE6303**ELECTROMAGNETIC COMPATIBILITY & INTERFERENCE**

Academic Unit :	3.0
Prerequisite / Co-requisite :	Nil
Effective :	Academic Year 2002-2003
Last update :	May 2006

OBJECTIVE

Minimizing electromagnetic interference (EMI) and coupling within circuits and systems is a key design aspect in electronic and electrical engineering. Most design engineers are competent in designing a circuit or system to perform a specific function but lack the necessary knowledge for designing that circuit or system to meet the required EMI specifications. The objective of this course is to fill the this knowledge gap with the following important topics:

- (1) Overview of electromagnetic compatibility (EMC) and EMI that covers the history of EMI occurrence and the development of worldwide EMC regulatory requirements.
- (2) Discussion of behaviors of passive components at high frequencies and their impacts on EMC.
- (3) Concepts of grounding and shielding. Design and implementation of grounding and shielding.
- (4) Fundamental mechanisms of crosstalk, radiation and conduction that lead to EMI problems. Design techniques to suppress these EMI problems.
- (5) Discussion on non-linear phenomena of active devices and electrostatic discharge (ESD). Design techniques to avoid EMI problems resulted from non-linear phenomena and ESD.
- (6) Discussion on test methods and procedures for both emission and immunity EMC tests.

DESIRED OUTCOME

- (1) Understand EMC regulatory requirements in North America, European Community and Asia Pacific region.
- (2) Be able to select proper passive components at high frequencies to minimize unwanted EMI behaviors.
- (3) Be able to apply the correct grounding and shielding methodologies for specific product groups and operating frequencies.
- (4) Be able to apply the correct circuit layout and design techniques to resolve EMI problems arising from crosstalk, radiation and conduction.
- (5) Be able to avoid non-linear phenomena and (ESD) with good design practices.
- (6) Understand the basic setup for a product-under-test to meet a specific EMC standard.

OTHER RELEVANT INFORMATION

This course is intended for Master students with electronic design background but without much EMC/EMI design knowledge.

CONTENT

EMC/EMI Overview. EMI Properties of Passive Components. Crosstalk and Cabling. Grounding. Shielding. Conducted EMI and Filtering. Non-linear Phenomena. Digital Circuit Noise and Radiation. Electrostatic Discharge. EMI Emission Measurements and Test Methods. Susceptibility Testing.

ASSESSMENT SCHEME

Continuous Assessment	20%
Final Examination	80%

TEXTBOOK

1. C. R. Paul, Introduction to electromagnetic compatibility, 2nd Edition, John Wiley & Sons, 2006.

REFERENCES

1. H. W. Ott, Noise reduction techniques in electronic systems, 2nd Edition, John Wiley & Sons, 1988.
2. E. L. Bronaugh, and W. L. Lambdin, Electromagnetic interference test methodology and procedures, Interference Control Technologies Inc., 1988.
3. W. E. Greason, Electrostatic damage in electronics: devices and system, Research Studies Press Ltd, 1987.