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Politecnico di Torino

Academic Year 2009/10 (first time established in A.Y.2007/08)

01MPVJA

RF Microelectronics

1st degree and Bachelor-level of the Bologna process in Electronic And Computer Engineering - Vercelli (III FACOLTA' DI INGEGNERIA)

Teacher	Status	SSD	Les	Ex	Lab	Years Stability

SSD	CFU	Activities	Area context
ING-INF/01	5	B - Caratterizzanti	Ingegneria elettronica

Objectives of the course

Thre course provides an overview of the building blocks of the RF analog interface of a communication system, including both linear and nonlinear buidling blocks. The CAD design of RF subsystem (linear and above all nonlinear) is addressed.

Expected skills

General information on the RF analog interface (LNAs, PAs, mixers, oscillators). CAD strategies for their simulation and design.

Prerequisites

Linear RF electronics. Linear CAD tools. Basic electronics.

Syllabus

Basic concepts in RF design, modulation and detection, transceiver architectures, case studies. Computer aided design examples.

Power amplifiers: basic issues and topologies. Conventional power amplifiers (calss A to C). Innovative classes (harmonic loading, class F; switching, class D and E). Distortion in power amplifiers. High-efficiency power amplifier design. High-linearity design techniques. Computer aided design examples.

Basics of noise in linear and nonlinear systems. RF low-noise amplifiers (FET and bipolar). Inductively degenerated LNA. Common base (source) LNAs. Cascode LNAs.

Low-noise mixers: bipolar mixers, FET mixers, noise performances. Design case studies. Computer aided design examples.

Oscillators: basic topologies, phase noise, bipolar and FET oscillators. Computer aided design examples.

Laboratories and/or exercises

CAD labs with the MWOffice RF design suite, leading to a final project.

Bibliography

B. Razavi, RF Microelectronics, Prentice Hall, 1998
Slides and handouts (see course web site)
G.Ghione, M.Pirola, Elettronica delle microonde, OTTO 2002, Vol I and II

Revisions / Exam

50% final test (problems and questions)
50% project

Programma definitivo per l'A.A.2009/10

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