ETSIT UPM

ESCUELA TÉCNICA SUPERIOR DE INGENIEROS DE TELECOMUNICACIÓN

POLITÉCNICA
"Ingeniamos el futuro"

CAMPUS
DE EXCELENCIA
INTERNACIONAL

Program	09TT- Engineering in Telecommunication Technologies and Services

Course number and name

Number	95000037
Name	Communications Electronics Electrónica de Comunicaciones
Semester	Y3 - S6

Credits and contact hours

ECTS Credits	4.5
Contact hours	67

Coordinator's name	Manuel Sierra Pérez

Specific course information

Description of course content

Introduce the student into the design of radio frequency subsystems for communications showing the influence of non-linearities and the effects of electronic noise in RF subsystems. Subsystems shown include frequency synthesizers, radio transmitters and receivers analyzing the most important components (oscillators, amplifiers, mixers, filters, modulators and demodulators) design, specification and limitations. Student have to complete four experimental tasks at laboratory.

List of topics to be covered

1. Introduction. Homodyne Transmitters and receivers schematics.
2. Distortion and noise in communication systems: Linear and non linear distortion, introduction to frequency mixing, electronic noise
3. Mixers and linear modulation/demodulation (AM, DBL,QAM,BLU, ASK and QAM)
4. Oscillators, PLL, synthesizers, angular modulation/demodulation and carrier re-covering.
5. RF Amplifiers and Filters
6. Receivers. Typical receiver parameters. Receiver types. Selectivity in receivers. Sensitivity. Receiver noise. Dynamic range and automatic gain control. AGC
7. Transmitters. Basic transmitter parameters. Transmitter types.
8. Laboratory work: Spectrum analyzer, Analog and digital modulations, PLL and frequency synthesis, Heterodyne transceiver

Prerequisites or co-requisites

Being no prerequisites it is recommended to have previously coursed: Communications Theory, Basic Electronic and Instrumentation, Analog Electronics, Digital Signal Processing, Transmission Systems, Circuit Analysis and Design

Course category in the program

_X_ R (required)	__ E (elective)	__ SE (selective elective)

Specific goals for the course

Specific outcomes of instruction

RA1: On the blocks diagram of a transmitter/receiver system the student will be able to define the individual block specifications to fulfill the system requirements.

RA2: On a given subsystem (Modulator, demodulator, amplifier, filter, mixer) the student will able to analyze its operation and to deduce its specifications.

RA3: On the blocks diagram of a transmitter/receiver system the student will be able to select from catalogs the more appropriated circuits and subsystems.

RA4: The student will operate easily the basic equipment found in an communication laboratory.

RA5: The student will be able to take measurement on electronic subsystems to obtain it specifications and to wrote clear and concise laboratory notes

Student outcomes addressed by the course

CE-ST3, CE-ST4, CG5, CG7

Bibliography and supplemental materials

Text Books:

M. Sierra-Pérez, B. Galocha, J.L. Fernandez y M. Sierra Castañer. "Electrónica de Comunicaciones" Editorial Prentice Hall. 2003.

Online manuals for laboratory sessions.

Complementary books:

H.C. Krauss, C.W. Bostian, F.H. Raab. "Estado Sólido en Ingeniería de Radiocomunicaciones". Ed. Limusa. 1984

R. Best. "Phase Locked Loops" Ed. Wiley. 1976

Miller. "Basic Electronic Communication" Prentice Hall

Wolaver. "Phase Loop Circuit Design" Ed. Prentice Hall.

Erst. "Receiving System Design" Ed. Prentice Hall. 1992.

S.A. Maas. "Microwave Mixers" Artech House 1993.

F.M. Gardner " Phaselock Techniques" Ed. Wiley 1979

PLL Performance. Simulation and Design. Dean Banerjee. ISBN:1-59858-134-1

Teaching methodology

_X_ lectures	_X_ problem solving sessions	__ collaborative actions	_X_ laboratory sessions

Other:	On-line exercises