UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

DIGITAL COMMUNICATIONS

Anno immatricolazione	2018/2019
Anno offerta	2018/2019
Normativa	DM270
SSD	ING-INF/03 (TELECOMUNICAZIONI)
Dipartimento	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
Corso di studio	ELECTRONIC ENGINEERING
Curriculum	Space Communication and Sensing
Anno di corso	1°
Periodo didattico	Secondo Semestre (06/03/2019 - 14/06/2019)
Crediti	6
Ore	45 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	GAMBA PAOLO ETTORE (titolare) - 6 CFU
Prerequisiti	The course is aimed at students with a basic knowledge of electrical communication and signal theory
Obiettivi formativi	The student will learn some of the advanced techniques for digital transmission and coding of the information. Accordingly, he/she will be able to design the basic elements of a modern digital communication system, explaining the rational behind his/her choices.
Programma e contenuti	The course is for students with a basic knowledge of transmission techniques and is devoted to digital communications. Course introductory notes Deterministic signals and their frequency characterization Stochastic variables and processes

Sampling Theorem
Information Theory: entropy
Information Theory: source coding
Channel capacity

Coding techniques for information protection
Codes for error detection and correction
Algebraic codes
Convolutional codes, maximum likelihood decoding, Viterbi algorithm
Concatenated codes
Turbo codes
LDPC codes

Transmission on AWGN channels
Digital signals: PSD and power
Nyquist criterion to avoid intersymbol interference (ISI)
Optimum decoder
Probability of error for BPSK and 4-QAM constellations. Upper and Lower bounds for BER values

Channels with fading
Fading definition and effects
Diversity techniques
Linear equalizers: Zero Forcing Equalizers
Linear equalizers: LMS, fractional and Decision Feedback equalizers

Synchronization and syntonization
Frequency error estimates (open-loop and closed-loop)
Phase error estimates (open-loop and closed-loop)
Timing error estimates (open-loop and closed-loop)

OFDM modulation (introduction)

Metodi didattici

Lectures (hours/year in lecture theatre): 45
Practical classes (hours/year in lecture theatre): 0
Workshops (hours/year in the lab): 0

The concepts are introduced by means of lectures with slides integrated with explanation at the blackboard. Complementary topics are presented by means of one or two seminars by company representatives introducing examples of real digital communication systems

Testi di riferimento

J.R. Barry, E.A. Lee, D.G. Messerschmitt. Digital Communication (third edition). Springer 2004

Modalità verifica apprendimento

Oral test, with questions aiming at understanding which are the concepts acquired by the student and his/her ability to explain how the functional blocks of digital systems work. The minimum score to pass the exam is 18, the top one is 30 cum laude.

Altre informazioni

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Obiettivi Agenda 2030 per lo sviluppo sostenibile	$lbl_legenda_sviluppo_sostenibile