COURSE DESCRIPTION CARD - SYLLABUS

Course name
Spread spectrum systems

Course

Field of study
Electronics and Telecommunications
Area of study (specialization)

Level of study
First-cycle studies
Form of study
full-time

Year/Semester
2/3
Profile of study
general academic
Course offered in
English
Requirements
elective

Number of hours

Lecture
30
Tutorials

Laboratory classes
30
Projects/seminars

Other (e.g. online)

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge of wireless communication systems technology. Knowledge of EM wave propagation and antenna systems. Understanding computer simulation of communication systems.

Course objective

The course aims at providing informations related to the design, operation and implementation of

wireless systems using spread spectrum transmission technique. Both commercial and military applications are covered, with emphasis on cellular 2G/3G CDMA systems.

Course-related learning outcomes

Knowledge

Knows and understands the theoretical foundations of spread spectrum transmission technique.
Knows the basic building blocks and signal processing methods of the spread spectrum communication system.

Skills

Is able to design and develop the spread spectrum communication system for commercial and military applications.

Social competences

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written/oral exam consisting of 5-6 questions, based on the list of 25 topics shared during the course duration. 50% of the total number of points necessary to pass.
Laboratory classes: continuous evaluation of tasks assigned by the teacher, evaluation of final project; final grade calculated as an average of all partial grades in the range 2-5 (D-A)

Programme content

Lectures:
1. Introduction to spread spectrum systems.
2. Pseudonoise sequences - properties and generation.
3. Direct sequence spread spectrum technique.
4. Frequency hopping spread spectrum technique.
5. UWB and MC-CDMA systems.
6.RAKE receiver - time diversity reception.
7. Joint detection techniques.
8. Capacity of CDMA systems.
9. Synchronization in spread spectrum systems.
10. CdmaOne (IS-95) standard - design of uplink and downlink.
11. UMTS standard - design of uplink and downlink.

Laboratory classes:
1. Pseudonise sequence generation and properties.
2. DS.-CDMA system performance in AWGN channel - single user case.
2. DS.-CDMA system performance in AWGN channel - multi user case.
2. DS.-CDMA system performance in multipath channel - single user case.
2. DS.-CDMA system performance in multipath channel - multi user case.

Teaching methods

Lecture: multimedia presentation
Laboratory classes: practical exercises using Matlab simulation environment, student projects assigned by the teacher

Bibliography

Basic

J. G. Proakis, Digital Communications, McGraw-Hill, Inc., New York 1995
J. S. Lee, L. E. Miller, CDMA Systems Engineering Handbook, Artech House Publishers, Boston-London 1998

Additional

R. C. Dixon, Spread Spectrum Systems with Commercial Applications, John Wiley & Sons, Inc., New York 1994
R. Prasad, CDMA for Wireless Personal Communications, Artech House Publishers, Boston-London 1996

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	70	3,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam, project preparation) [1]	55	2,0

[1] delete or add other activities as appropriate