



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Advanced broadcasting techniques [S1EiT1>ZTT]

Course

Field of study

Electronics and Telecommunications

Year/Semester

3/6

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Essentials of digital communication systems (digital modulations), an ability to develop C++ or Matlab code

Course objective

The course aim is to provide students with the knowledge on selected advanced modulation, detection, coding, and decoding techniques, as well as the methods to evaluate the performance of communication systems. The students will get familiar with the Monte Carlo simulation of communication systems.

Course-related learning outcomes

Knowledge:

A student knows BICM, BICM-ID and iteratively-decoded serial turbo-codes.

Skills:

A student can evaluate the performance of a communication system by means of Monte Carlo simulation.

Social competences:

A student understands the need to refer to scientific publications.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Lecture: an oral exam on which a student develops solutions to scientific problems basing on publications, considered on the lecture.

Project: Presentation of a simulation program code and discussion on the simulation results.

Programme content

Selected coding and modulation techniques, simulation of a wireless communication system

Course topics

Trellis Coded Modulation

Radio channel propagation issues, BICM(-ID) technique.

Serially-concatenated turbo codes and iterative decoding.

Systematic vs. non-systematic convolutional codes.

Tailbiting.

Analysis of convolutional code properties.

Monte Carlo simulation of a telecommunication system

Teaching methods

Lecture based on selected scientific publications.

Regarding the project part, a student judges the performance of a telecommunication system by means of a simulation experiment (Monte Carlo method).

Bibliography

Basic

Zehavi "8PSK trellis codes for a Rayleigh Channel" IEEE Trans. on Commun. Vol. 40, no. 5, May 1992

X.Li, J.A. Ritcey "Bit-interleaved coded modulation with iterative decoding using soft feedback" E. Letters 14th may 1998, vol.34, No. 10

X. Li, J.A. Ritcey "Trellis coded modulation with bit interleaving and iterative decoding" IEEE Journal on Selected Areas of Communication, vol. 17, no. 4, April 1999

Paul Gray, "Serially concatenated TCM", Doctor and Philosophy Dissertation, Univ. of South Australia, March 1999

M. Krasicki "Sposób transmisji sygnałów wykorzystujący kodowaną modulację z przeplotem bitowym" Patent 2014.

Additional

G. Ungerboeck "Channel coding with multilevel/phase signals", IEEE Trans. Inf. Theory, vol. IT-28, No. 1, Jan. 1982

B. Rimoldi, "A decomposition approach to CPM", IEEE Trans. Inf. Theory, vol. 34, No. 2, March 1988

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	31	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	44	1,00