COURSE DESCRIPTION CARD - SYLLABUS

Course name
Wireless LANs, PANs and MANs [S1EiT1E>SBLPiM]

Course

Field of study
Electronics and Telecommunications

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

The student knows the basics of general communication (radiocommunication), cellular networks and the propagation of communication through various transmission channels.

Course objective

The aim of the course is to provide students with knowledge and skills to consciously use, evaluate, compare and select modern wireless networks from the IEEE 802 family present on the market and / or being in the standardization phase.

Course-related learning outcomes

Knowledge
The student knows the structure, parameters, advantages and disadvantages, and the scope of use of various wireless networks (including solutions from the 802.11, 802.15, 802.16, , LTE-R, TETRA, POCSAC, small-cells family).
Skills
Student is able to design, apply and deploy a network according to the 802.11 standard; Can compare the parameters of different wireless networks; Is able to respond critically and join in the development

of radiocommunication technologies in the standardization or research phase.
Social competences
The student understands the need to learn about emerging new standards for wireless networks; Understands that deploying ever newer radio networks and systems requires the collaboration of diverse teams of engineers; Understands the challenges faced by radiocommunication due to the increasing demand for transmission speed and quality

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired as part of the lecture is verified by a written (and / or oral) exam consisting of several larger or several short, usually descriptive questions; the questions have varying degrees of difficulty, with varying points assigned to them. Passing threshold - 50% of points possible to pass. The following grading scale is used: <= 50% 2.0; 51% -60% 3.0; 61% -70% 3.5; 71% -80% 4.0; 81% -90% 4.5; 91% -100% 5.0. Exam issues, on the basis of which questions are developed, will be sent to students by e-mail using the university e-mail system.
Skills acquired as part of the laboratory are verified based on the student"s preparation for the laboratory and the results of work obtained in the laboratory. Assessment of student preparation can take the form of a test checking knowledge, and assessment of the results of work - based on prepared reports. The final grade takes into account all the partial grades obtained, as well as the student"s commitment and attitude during classes. A necessary condition is to obtain positive grades for most of the implemented laboratory issues.

Programme content

The course covers the principles of wireless communication systems, key phenomena appearing in the communication channel and multi-access techniques. Students will also learn the foundation of selected communication systems, focusing on LAN, PAN and MAN.

Course topics

Wireless systems, phenomena occurring in the wireless channel, methods of multiple access to the spectrum, MIMO and MMIMO techniques. Cellular networks analyzed from the perspective of small cells (as an alternative to WiFi solutions), also LTE-U, NR-U
WiFi wireless network according to IEEE 802.11 recommendations (including a, b, g, n ac, be, ax), with particular emphasis on the physical layer (OFDM modulation), data link layer, network layer, as well as security-related issues, interference management etc.
Mesh networks, paging networks, trunking networks (TETRA, GSM-R / LTE-R).
PAN wireless networks (Bluetooth, Zigbee, Z-Wave, UWB). Telemetry networks (LoRA, Sigfox etc.)

Teaching methods

1. Lecture: multimedia presentation prepared by the teacher, illustrated with examples given on the board. The lecture is usually conducted in a traditional way, but also partly in the form of a seminar and / or problem-based lecture
2. Laboratory exercises: performing the tasks given by the teacher and described in the form of laboratory instructions - practical exercises using the equipment available in the laboratory. Laboratories can be completed through multimedia presentations or examples given on the board.

Bibliography

Basic
1. Selected fragments of wireless network standards available in the IEEE digital library.
2. Articles in magazines and the Internet given / indicated by the teacher.
Additional
1. Any Wi Fi (802.11) handbook available in Polish or English.
2. Any textbook on Bluetooth, Z-Wave, ZigBee, LoRA, TETRA standards

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