COURSE DESCRIPTION CARD - SYLLABUS

Course name

ICT networks

Course

Field of study

Automation and robotics

Year/Semester

1/2

Area of study (specialization)

Automation and robotics systems

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

12

Laboratory classes

12

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: A student starting this subject should have basic knowledge of computer networks, information technologies, the basics of computer science and electronics, microprocessor systems as well as signal and information processing.

Skills: She or he should have the ability to solve basic problems in the design of information systems and the ability to obtain information from specified sources. She or he should also understand the need to expand her/his competences and be ready to cooperate in a team.

Social competences: In addition, she or he should exhibit qualities such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture and respect for other people.

Course objective

1. Providing students with knowledge about the construction, design, use and administration of ICT networks.

2. Developing students' ability to solve problems in the implementation of ICT components.

3. Developing teamwork skills in students.

Course-related learning outcomes

Knowledge

1. A student has specialized knowledge in the field of remote and distributed systems, real time systems and network techniques - [K2_W3]

2. A student has knowledge of development trends and the new, most important achievements in the field of automation and robotics and related scientific disciplines - [K2_W12]

Skills

1. A student can use information and communication techniques - [K2_U8]

2. A student is able to assess the usefulness and possibility of using new achievements (including techniques and technologies) in the field of automation and robotics - [K2_U16]

Social competences

1. A student is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for the decisions taken - [K2_K2]

2. A student is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which the devices and their components can function - [K2_K4]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
Formative assessment:

a) in the scope of lectures:

based on answers to questions about the material discussed in previous lectures

b) in the scope of laboratories:

based on an assessment of the current progress of task implementation.

Summative assessment:

a) in the scope of lectures: the verification of the assumed learning outcomes is carried out by:

i. assessment of knowledge and skills demonstrated on the multiple-choice written test (20 test questions), 2 open questions and a problem task; on the test the student can get 30 points, for a positive grade she or he must get at least 16 points,

ii. discussion about test results,

b) in the scope of laboratories: verification of assumed learning outcomes is carried out by:

i. assessment of student's preparation for individual sessions of laboratory classes ("entrance" test) and assessment of skills related to the implementation of laboratory exercises,

ii. continuous assessment, during each class (oral answers) - rewarding the increase in the ability to use known principles and methods,

iii. assessment of the laboratory reports prepared partly during the classes and partly at home; this assessment also includes teamwork skills.

Obtaining additional points for activity during classes, in particular for:

i. discuss of additional aspects of the issue,

ii. effectiveness of applying the acquired knowledge while solving a given problem,

iii. ability to work as part of a team that practically performs a specific task in the laboratory,

iv. comments related to the improvement of teaching materials,

v. indicating students' perceptive difficulties enabling ongoing improvement of the didactic process.

Programme content

The lecture program includes the following topics:

1. Introduction: terminology, standards, ISO-7498 standard (OSI: Open System Interconnection reference model), layered network model, extended description of ICT network layers, inter-layer communication, encapsulation and decapsulation, TCP / IP model, software: development, trends, future: network software, distributed systems, mobile systems, "cloud" and "fog" processing.

2. Routing protocols: router operation principle, routable protocols, static and dynamic routing, static and dynamic addressing (RARP, BOOTP, DHCP protocols), ARP protocol, routing protocols (RIP, IGRP, EIGRP, OSPF).

3. Subnets, Internet Protocol v6.

4. Wide are networks (WAN): technologies, standards, devices, circuit and cell-switched services, modems, xDSL services, data transfer in cable TV networks, wireless networks: IEEE 802.11 standard, 3G standards, LTE networks, 5G.

5. Security in computer networks: types of attacks, firewalls, proxy servers, SSL, HTTPS, IPSEC protocols, 3DES, RSA data encryption algorithms, certificates, virtual private networks (VPN), rules for the systems, networks and connections security.

6. Real-time networks, field networks, industrial Ethernet networks, time sensitive networking (TSN), Open Platform Communications Unified Architecture (OPC / OPC UA) standard.

Laboratory classes are conducted in the form of six 2-hour exercises that take place in the laboratory. Exercises are carried out by 2-person teams.

The program of laboratory classes includes the following issues:

1. Computer network client configuration, ARP, DHCP protocols

2. Computer network simulator,configuration of a router

3. Project of extended LAN network, subnetting, practical classes

4. Internet telephony: Voice over Internet Protocol (VoIP), hardware configuration, network traffic analysis, testing of connection quality

5. Wireless networks, network address translation (NAT) technique, advanced configuration of a Wi-Fi router

6. Virtual LANs (VLANs), remote configuration of 100Mbit / 1Gbit data link layer switches, link aggregation

Teaching methods

1. Lecture: multimedia presentation illustrated with examples on the board

2. Laboratory classes: solving tasks, configuring of network components, performing of measurements, discussion, teamwork

Bibliography

Basic

1. Kurose J., Ross K. W., Sieci komputerowe. Ujęcie całościowe, Helion 2010

2. Bradford R., Podstawy sieci komputerowych, WKŁ 2009

Additional

1. ISO, IEEE, ITU-T, ANSI standards, RFC (Request for Comments) documents

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2
Classes requiring direct contact with the teacher	25	1
Student's own work (literature studies, preparation for laboratory classes, preparation of laboratory reports, preparation for tests) [1]	25	1

[1] delete or add other activities as appropriate