POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Programming and Configuration of Network Nodes [S1Teleinf1>PiKWS]

Course

Field of study
Teleinformatics

Year/Semester
4/7

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
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Students starting this course should have basic knowledge of computer networks, programming, IP protocol and basic routing and switching mechanisms. They should have logical thinking skills, allowing them to independently analyze technical documentation and be able to search the Internet for the missing and necessary information. They should also understand the need to expand their competences as well as update and gain new experiences. In addition, in the field of social competences, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

Provide students with basic knowledge in the field of network node architectures, their functionality and characteristics, methods of their design, commissioning, testing and management. To acquaint students with selected aspects of programming and configuration of modern network nodes, both those used for production and prototyping, of scientific and research nature. Practical presentation of mechanisms faced by administrators and designers of computer network nodes.

Course-related learning outcomes

Knowledge:
Has a basic and structured knowledge of the construction, operation and performance evaluation of LAN, VLAN, WLAN and WAN networks as well as their standards and development directions.
Has structured knowledge of the architecture of processors and network devices, configuration and programming of network nodes, traffic management mechanisms, quality and reliability mechanisms, and network operating system drivers

Skills:
Can define the basic parameters and properties of signals and telecommunication systems, compare transmission media and methods of signal transmission and coding in various links, as well as design simple
wired and wireless networks, optimizing the operation of network devices under the imposed restrictions.
He can organize networks and supervise their work, and use technologies that enable safe data transmission in
ICT networks.
He can solve common problems regarding the optimal design of a local network and the selection and configuration of network devices, taking into account their architecture and technical requirements, as well as
undertake the tasks of launching a local computer network.
Can ensure the optimal flow of traffic in the ICT network and configure network devices using domain and inter-domain routing protocols
He can solve typical technical problems in the field of construction and operation of computer systems, operating systems, basics of database management and computer networks, taking into account economic aspects.

Social competences:
Is aware of the threats to the security of network systems and understands the need to use solutions supporting data protection.
Is aware of the importance of decisions made and understands the social, economic and environmental consequences of an engineer's activity.

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

In the field of the laboratory:
on the basis of the assessment of the current progress in the implementation of exercises and / or the final test
(carried out practically or orally), Passing the final test for 50% of the points obtained.
In the scope of the lecture:
On the basis of the final test carried out orally or in writing, Passing the final test for 50% of the points obtained.

Programme content
LECTURES:
Architecture of a computer network node, hardware and software components
Functions and tasks of the network node, software implementing them.
Hardware programming in common hardware programming languages
Characteristics of traffic handling in a network processor, in a dedicated system.
Hardware, performance evaluation mechanisms and measurements.
Functionalities and capabilities of network processors.
The use of FPGA prototype cards to prepare network nodes
Hardware layer communication with OS software.
Examples of configurations, ways of delivering the configuration, elements of its content.
Scripts, shell programs.
Elements of hardware and software virtualization and network functions.
Mechanisms of errors, gaps, lifting and ensuring security.
Methods, characteristics of remote access, mechanisms of auto-configuration.
Programmability of computer network nodes,
Mechanisms of SDN, NFV

Mechanisms of redundancy and security.
LABORATORY EXERCISES
Presentation of the plan of laboratory exercises. Getting to know the devices and the structure of the laboratory network. Overview of the evaluation principles. Presentation of health and safety regulations.
Basis of hardware programming
Configuration of the laboratory network and workstations as its nodes
Mechanisms for ensuring and verifying local and remote access to devices
Configuration of selected services on routers
Traffic analysis and performance measurements in the Ethernet / IP network using software and hardware tools
Passing
Usage of Xilinx ISE,XPS, Vivado and newer IDE for HDL for Spartan and Virtex FPGA programming
Examples of node implementations - Juniper, Alcatel-Lucent, DELL, Huawei devices
Functionalities and possibilities of NetFPGA 1G and NetFPGA10G cards.
Software for dedicated hardware devices (e.g. NetFPGA card firmware, its driver in the OS).
Examples of SK nodes / devices implementation on the NetFPGA card.
Working with network devices from Alcatel-Lucent, Cisco, Juniper Networks, DELL, Huawei
Spirent and Wireshark analyzer and other utilities

Teaching methods

Conversational lecture, multimedia presentation, supplemented with current examples, www links to resources on the Internet,
laboratory exercises: launching sample solutions in the network in the laboratory, analysis of their configuration

Bibliography

Basic:
Internet
A. Tanenbaum, Computer Networks. Prentis Hall
W. Odom CCNP ROUTE , CCNP SITCH, Cisco Press
T. Adelstein, B. Lubanovic, Linux System Administration,O'Reilly
Z. F. Xu Designing and Implementing IP/MPLS-Based Ethernet Layer 2 VPN Services An Advanced Guide for VPLS and VLL, Wiley Publishing
D. Hanks, H. Reynolds, Juniper MX Series, O'Reilly Media

Additional:
Bauer Michael D., Linux - Bezpieczeństwo serwerów, O'Reilly Media

Breakdown of average student's workload

	Hours	ECTS
Total workload	86	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	41	1,00