SYLLABUS

Name: ***Computer networks (AESAu-A>SI5CN24)***
Name in Polish:
Name in English: ***Computer networks***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma.polsl.pl/rau1/course/view.php?id=1120

Short description:

The aim of the course is to present basic information on the construction and functioning of computer networks. Communication devices, standards and protocols used in local wired and wireless networks in relation to ISO / OSI and TCP / IP models will be discussed. Issues related to the creation of local networks and access of devices to the wide area network will be presented. Laboratory classes are an opportunity to acquire practical skills in computer network administration.

Description:

ECTS: 5
Total workload: 125 (65 contact hours / 60 student's own work hours)
Lecture: 30h
Laboratory: 30h
Other (reports revision): 5h
Student's own work: reparation for classes, preparation for tests

Lecture
1. Introduction - the concept of a computer network, ISO/OSI and TCP/IP network models, principles of communication and information exchange in networks, protocols and the need for standardization.
2. Addressing and connecting devices in the network, information exchange and routing protocols, packet data transmission.
3. Transmission media and wireless connectivity, data modulation and coding, physical limitations of cabling and wireless transmission.
4. Physical layers and data links in wired and wireless networks:
4.1. Concentrators and switches, access to the common transmission medium.
4.2. Contested and reservation protocols for link access in wireless networks.
4.3. Linking networks of different standards.
5. Mobility in a wireless network, movement of users in wide area and local area networks, telephone network as a medium for packet data transmission.
6. Multimedia services in packet networks, audiovisual connections, quality of service and traffic queuing, networks with guaranteed bandwidth.
7. Security in computer networks:
7.1. Network security threats.
7.2. Device and user authentication, transmission encryption.
7.3. Data integrity in a computer network.
7.4. Virtual private networks.

Laboratory:
1. The working principles and interactions of network protocols across different layers.
2. Protocol structures and behaviours through packet capture and analysis. IP allocation, domain name resolution, and data transmission.
3. Topics of the laboratory classes:
3.1. Installation and Operation of WireShark.
3.2. Packet Capture and Analysis of Simple HTTP.
3.3. Analysis of DNS, TCP, UDP and IP Protocols.
3.4. Using Single and Double Network Card to Realize Multi IP Computer to Build Experimental Internet.
3.5. Analysis of ARP Protocol.
3.6. Establish a three-layer switch and direct routing using a routing simulator
4. Internet of Things

Bibliography:

1. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach, Seventh Edition, Prentice Hall, New Jersey, 2019.
2. Computer networks. Xie Xiren, Electronic Industry Press

Learning outcomes:

Through the theoretical teaching and experimental training of this course, students will have the following abilities:
1. Knows how to design and construction of a computer network, available network devices and transmission media (K1A_W9, K1A_W10).
2. Knows the issues of computer networks architecture (K1A_W11).
3. Knows and understands the issues concerning the devices included in computer networks, including wireless networks and configuring these devices in local networks (K1A_U11).
4. Is able to connect the devices into a network using various transmission media and configure them accordingly (K1A_U8).
5. Is able to run and configure basic network services to facilitate the connection of other devices to the network (K1A_U13).
6. Is able to use properly selected simulators and computer-aided design tools for simulating, designing and verifying selected elements of computer networks (K1A_U14, K1A_K1).

Assessment methods and assessment criteria:

The basis for passing the course is the laboratory (a positive assessment from the laboratory is necessary). Attendance at the laboratory and performance of individual exercises in the basic scope is obligatory (detailed rules for passing each laboratory exercise are presented during the laboratory classes). The final grade from the subject is a combination of laboratory grades, homeworks and examination scores

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	5	2024/2025-Z	