COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer networks 1 [S1Inf1>SK1]

Course

Field of study
Computing

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Student starting this module should have basic knowledge regarding computer systems organization, algorithms and data structures, and operating systems. Skills: He/she should have skills allowing formulation of algorithms and their programming with the use of at least one widely used software tool. He/she should have skills that are necessary to acquire information from given sources of information. Student should understand the need to extend his/her competences and should express cooperativeness in a team. Social competencies: In addition, in respect to the social skills the student should show attitudes as honesty, responsibility, perseverance, curiosity, creativity, manners, and respect for other people.

Course objective

1. Provide students" knowledge regarding computer networks, within the scope of using, configuration, design and programming of local area and wide area networks, and cognition of technical solutions applied in these networks. 2. Develop students" skills in solving simple problems related to the use and configuration of computer networks. 3. Develop students" skills in team work, especially in configuration, design, and programming of technical solutions applied in computer networks.

Course-related learning outcomes

Knowledge:
1. have well-ordered, theoretically based general knowledge on networking technologies - [K1_W4]
2. have knowledge on important directions of computing science, and other related fields of science, especially electronics, telecommunications, and automatics and robotics - [K1_W5]
3. have basic knowlegle about cycle of life of computing science systems, both hardware and software ones, and especially on processes occuring in them - [K1_W6]
4. Knows basic techiques, methods and tools used in a process of solving of computing science tasks, mainly engineering ones, from the field of key issues in computing science - [K1_W7]

Skills:
1. is able to perform the critical analysis of the way of functioning of computing systems and other computing technical solutions an evaluate these solutions, especially: is able to participate in the software inspection and evaluate software architecture from th point of view of non-functional requirements, and is able to systematic performing of functional tests - [K1_U9]
2. is able - according to given specification - to design connection schema, connect and configure selected items of computer network, using appropriate methods, techniques and tools - [K1_U10]
3. is able to secure data against unauthorized access - [K1_U12]
4. is able to organize, cooperate, and work in a team, accepting various roles in it, and is able to define accordingly the priorities used to the implementation of given task from the area of computer networks - [K1_U18]

Social competences:
1. understands that in computing science both knowledge and skills very quickly become out-of-date - [K1_K1]
2. is aware of the meaning of knowledge in solving engineering problems and knows the examples and understands the reasons of malfunctioning computing systems, which led to serious financial and social losses or to the serious loss of health, or even life - [K1_K2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Formative assessment:
a) lectures:
based on answers to questions on previous lectures,
b) laboratory classes:
evaluation of doing correctly assigned tasks,

Total assessment:
a) In terms of lectures
- assessment of knowledge and skills in the form of test.
b) In the field of laboratories in the form of a weighted average of the grades obtained in the semester in the following activities:
- assessment of the student's preparation for laboratory classes (e.g. entrance test, current assessment of the performance of laboratory tasks)
- assessment of knowledge and skills acquired in the laboratory through a test

Programme content

The lecture should cover the following topics
1) Fundamentals of computer networks (historical note, motivation, required properties of a network, network architecture: OSI and TCP/IP, network topologies, network types, network devices, standards).
2) Network access technologies (functions of network interface card: encoding, framing, error detection, reliable transmission, link access methods), local area networks (CSMA/CD - Ethernet, CSMA/CA -wireless networks).
3) Delivery, forwarding and routing (packet switching, forwarding, routing, routing algorithms, RIP and OSPF protocols, cell switching - ATM, switching devices).
4) Internetworking (IPv4 protocol, IPv6 protocol, multicast, domain name system - DNS).
5) Communication protocols (creation, objective, standards, protocol engineering)

6) Internet (structure, addressing, transport protocols: UDP, TCP, standards, applications).
7) Modern technologies of computer networks
The lab-classes should cover the following topics:
1) IPv4 addressing,
2) Advanced IPv4 addressing
3) network architecture
4) Basics of structured cabling
5) key and practical elements of layered network model
6) Networking devices in Ethernet technology
7) basic network protocols (ARP, ICMP, IP etc.)
8) Configuration of Linux network
9) Static routing in Linux networks
10) Static routing in Cisco routers
11) Dynamic routing in Cisco routers
12) Packet filtration in Linux networks
13) Network address translation in Linux networks
14) Introduction to wireless networks

Course topics

As part of the lectures, students are introduced to the fundamentals of computer networks, including their historical background, motivations, requirements, types, and topologies. They also learn about network architectures (OSI and TCP/IP models) and networking devices. The functions of network interface cards are discussed, including encoding, frame recognition, error detection, and reliable transmission. Students also explore the operation of local area networks, such as Ethernet (CSMA/CD) and wireless networks (CSMA/CA).

Subsequent topics cover packet switching – methods of directing network traffic, routing algorithms, and protocols such as RIP and OSPF. Technologies like ATM and switching hardware are also introduced. Students learn about network interoperability, including bridges, IPv4 and IPv6 protocols, multicasting, and the Domain Name System (DNS). The structure and purpose of communication protocols, their standards, and engineering are also discussed. The course further covers the structure of the Internet, addressing methods, relevant protocols, and modern computer networking technologies.

During laboratory exercises, students gain hands-on experience with practical topics such as basic and advanced IPv4 addressing, network architecture, and structured cabling. They work with Ethernet networking devices and analyze essential protocols (ARP, ICMP, IP). Students configure Linux systems for IP networking, and learn both static and dynamic routing (in Linux and on Cisco routers), packet filtering, and network address translation (NAT). Finally, they are introduced to the basics of wireless networking.

Teaching methods

Lectures: multimedia presentation, presentation illustrated with examples presented on blackboard.
Labs: solving tasks, practical exercises with use of network devices, discussion, teamwork, multimedia showcase, configuration task.

Bibliography

Basic
1. TCP/IP Protocol Suite, 4th edition, B.A. Forouzan, McGraw-Hill Education, New York, 2009
2. Computer Networks, 5th edition, A.S. Tanenbaum, D.J. Wetherall, Pearson, Boston, 2011
3. Computer Networking: A Top-Down Approach, 7th edition, J.F. Kurose, K.W. Ross, Pearson Education, Boston, 2016
4. Computer Networks: A Systems Approach, L.L. Peterson, B.S. Davie, 5th edition, Morgan Kauffmann, San Francisco, 2012
Additional
1. Network Analysis and Troubleshooting, J. Scott Haugdahl, Addison-Wesley, 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50