COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer networks 2

Course

Field of study
Computing

Year/Semester
3/ 5

Area of study (specialization)
-

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Knowledge: Student starting this module should have basic knowledge regarding computer systems organization, algorithms and data structures, operating systems, and computer networks 1.

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 formulate and program algorithms used in computer networks with the use of at least one from popular tools - [K1_U11]

4. is able to secure data against unauthorized access - [K1_U12]

5. 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]

3. is able to think and act in an enterprising manner, e.g. finding commercial applications for created software, taking into account not only business benefits, but also social benefits of the performed activity [K1_K3]

Methods for verifying learning outcomes and assessment criteria

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) verification of assumed learning objectives related to lectures:

i. based on the sum of answers and the activity during lectures.

ii. evaluation of student's knowledge and skills obtained in lectures based on written exam, covering from 3 to 5 questions, or from 10 to 15 test questions. In order to obtain positive note, the student should obtain 50% of maximum number of points. During the test, student cannot use any lecture notes, books, etc.

b) verification of assumed learning objectives related to laboratory classes:

i. evaluation of student's skills related to carrying out the lab tasks, configuration task, and final project,

ii. monitoring student's continuing activities during classes,

iii. evaluation of student's skills based on one or two tests, covering from 10 to 15 questions.

Programme content

The lecture should cover the following topics

1) Transport protocols (simple demultiplexer - UDP, reliable data stream - TCP, remote procedure call - RPC, SunRPC, SCTP protocol).

2) Wide area computer networks (technology of WAN, WAN devices, Fundamentals of computer physical and data link layers, examples of WAN networks: X25, frame relay, ISDN, ATM, Gigabit Ethernet).

3) Wireless computer networks (wireless local networks, principle of operation (CSMA/CA protocol), standards, range, frequencies, examples).

4) Mobile IP (addressing, agents, phases, efficiency)

5) Advanced routing protocols (MOSPF, DVRMP, MBONE)

6) Congestion Control (congestion control mechanisms in TCP, congestion avoidance mechanisms)

7) Computer network design (stages of computer network design)

8) Computer networks management (computer network management areas, SNMP protocol, MIB base, manager and agent, remote monitoring RMON, network management systems)

9) Physical layer (introduction to physical layer, digital transmission, analog transmission, bandwidth utilization: multiplexing and spectrum spreading, transmission media, switching)

10) Data link layer (introduction to data link layer, error detection and correction, data link control, media access control, wired LANs: Ethernet, other wired networks, wireless LANs, other wireless networks, connecting devices and virtual LANs)

The lab-classes should cover the following topics:

1) Implementation of network client using socket interface

2) Implementation of iterative network server using socket interface

3) Implementation of concurrent network server using socket interface

4) Handling of common behaviours of socket interface function in the presence of errors and network anomalies

5) Implementation of network applications using graphical user interface

6) Configuration of wireless network in an ad hoc mode

7) Configuration of wireless network using access point

8) Configuration of a bridge connection in a wireless network

9) Configuration of virtual networks in a wireless network

10) Configuration of IPv6 protocol in a Linux system

11) Configuration of DNS server in Linux system

12) Traffic shaping in Linux networks

13) Final project

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 verified during laboratory classes, final project implemented at home.

Bibliography

Basic

1. TCP/IP Protocol Suite, 4th edition, B.A. Forouzan, McGraw-Hill Education, New York, 2009

2. Data Communications and Networking, 5th ed., B.A. Forouzan, McGraw-Hill Education, New York 2012

3. Computer Networks, 5th edition, A.S. Tanenbaum, D.J. Wetherall, Pearson, Boston, 2011

4. Computer Networking: A Top-Down Approach, 7th edition, J.F. Kurose, K.W. Ross, Pearson Education, Boston, 2016

5. 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	125	5,0
Classes requiring direct contact with the teacher	44	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	81	3,0

[1] delete or add other activities as appropriate