COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modeling, design, and analysis of computer networks

Course

Field of study

Computing

Year/Semester

1/ 2

Area of study (specialization)

Computing microsystems

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

Learning outcomes from the first-cycle studies, defined in the resolution of PUT Senate, especially outcomes: K1_W1-2, K1_W6-15, verified in the process of recruitment to second-cycle studies - these outcomes are presented in the internet service of the department cat.put.poznan.pl.

Learning outcomes from the first-cycle studies, defined in the resolution of PUT Senate, especially outcomes K1_U1-2, K1_U4, K1_U7-8, K1_U14-20, K1_U22-23, K1_U26, verified in the process of recruitment to second-cycle studies - outcomes presented in internet service of the department cat.put.poznan.pl.

Learning outcomes from the first-cycle studies, defined in the resolution of PUT Senate, especially outcomes K1_K1-9, verified in the process of recruitment to second-cycle studies - outcomes presented in internet service of the department cat.put.poznan.pl.

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 advanced and in-depth knowledge from the area of modeling, design and analysis of computer networks, theoretical fundamentals in this area, and methods, tools and programming environments used to their implementation - [K2_W1]

2. have well-ordered, theoretically based general knowledge related with the key topics from the area of modeling, design and analysis of computer networks - [K2_W2]

3. have advanced detailed knowledge on selected topics of modeling, design and analysis of computer networks - [K2_W3]

4. have knowledge about advanced methods, techniques and tools used in the solution of complex engineering tasks and performing research works in the area of computer networks and networking technologies - [K2_W3]

5. has knowledge about development trends and the most important new achievements in area of modeling, design and analysis of computer networks, and other selected related scientific disciplines - [K2_W6]

Skills

1. is able to use, in order to formulate and solve engineering tasks and simple scientific problems from the area of modeling, design and analysis of computer networks, analytical, simulation and experimental methods - [K2_U4]

2. is able - during the formulation and solving of engineering tasks - to integrate knowledge from the area of modeling, design and analysis of computer networks (if necessary also the knowledge from

other scientific disciplines) and use a system approach, taking into account non-technical issues - [K2_U5]

3. is able to evaluate the usefullness and possibility of new achievements (methods nad tools) and new computing products in the area of modeling, design and analysis of computer networks - [K2_U6]

4. Is able - according to given specification, cnsidering non-technical issues - design a system from the area of modeling, design and analysis of computer networks, and implement this system - at least in part - using appropriate methods, techniques and tools, adapting existing tools or performing new tools - [K2_U11]

5. is able to cooperate in a team, which implements the system from the area of modeling, design and analysis of computer networks, accepting in it various roles - [K2_15]

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 use the newest knowledge in the area of computer networks in order to solve research and practical problems - [K2_K2]

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 exam, 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 and configuration task,

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.

iv. evaluation of implementation of SNMP agent.

v. evaluation of a computer network design.

Programme content

The lecture should cover the following topics

1) Introduction (modeling of computer networks, stages of computer network design, areas of the management of computer networks)

2) Modeling of data flow in computer networks (analysis of delays, computation of network capacity, designation of network throughput, problem of the optimal distribution of resources)

3) Control of the network variables and parameters (routing rules, designation of the shortest route, maximization of the flow in a network)

4) Computer network design - stage 1 (designation of needs and aims of the investor of the network: business aims and limits analysis, technical aims and trade-offs analysis)

5) Computer network design - stage 2 (logical network design: designing of network topology, addressing and naming models, selection of routing protocols)

6) Computer network design - stage 3 (physical network design: selection of technologies and devices in local area networks, selction of technologies and devices in wide area networks)

7) Computer network design - stage 4 (testing, optimizing and documenting your network design: testing, optimizing, documenting)

8) Areas of the management of computer networks (accidents management, resource utilization management, configuration and naming management, performance management, security management)

9) SNMP protocol (protocol entities, exchanged commands, management information base (MIB), protocol versions, protocol semantics)

10) Remote monitoring of a computer network (RMON)

The lab-classes should cover the following topics:

In the lab-classes each student implements configuration of SNMP agent. SNMP agent deal with the simple technical device. This implementation is preceded by the discussion of SNMP agent, management information base MIB, lexicographical order in MIB base, management systems implemented in Windows and Linux operting systems. Students use also Nagios tool and monitor Linux system.

Students also perform the detailed design of a computer network.

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, implementation of SNMP Agent and computer network design, both verified during laboratory classes.

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. Top-Down Network Design. 3rd edition, P. Oppenheimer, Cisco Press, Indianapolis, 2011

5. SNMP, SNMPv2, SNMPv3, and RMONv1 and 2, 3rd edition, W. Stallings, Addison Wesley 1999

Additional

1. Network Analysis and Troubleshooting, J. Scott Haugdahl, Addison-Wesley, 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	106	4,0
Classes requiring direct contact with the teacher	62	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	44	1,5

[1] delete or add other activities as appropriate