



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer networks

### Course

Field of study

Computing

Area of study (specialization)

Advanced internet technologies

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/ 1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

16

Laboratory classes

16

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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### 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](http://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](http://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](http://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 well-ordered, theoretically based general knowledge on networking technologies - [K2\_W2]
2. have advanced detailed knowledge on selected topics of networking technologies - [K2\_W3]
3. knows 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]
4. has knowledge about ethic codes related to research activities led in the area of computer networks - [K2\_W7]

#### Skills

1. is able to evaluate the usefulness and possibility of new achievements (methods nad tools) and new computing products in the area of networking technologies - [K2\_U6]
2. Is able - according to given specification - in the area of computer networks, considering non-technical issues - design complex device, computing system or process and implement this design - at least in part - using appropriate methods, techniques and tools, adapting existing tools or performing new tools - [K2\_U11]
3. is able to prepare and present the research report in polish or english, presenting the results of research or oral presentation concerning the detailed topics in the area of computer networks - [K2\_U13]
4. is able to cooperate in a team, which designs computer network, accepting in it various roles - [K2\_15]



5. is able to define the directions of further self-learning and implement the process of self-education in the area of computer networks [K2\_U16]

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 - [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.

### 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, Token Ring - FDDI, 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) Transport protocols (simple demultiplexer -UDP, reliable data stream - TCP, remote procedure call - RPC, SunRPC, transport protocol efficiency, and SCTP Protocol)
- 8) Wide area computer networks (WAN technology, WAN devices, physical layer and data link layer, examples of WANs: X25, frame relay, ISDN, ATM, Gigabit Ethernet)

The lab-classes should cover the following topics:

- 1) IPv4 addressing,
- 2) Advanced IPv4 addressing
- 3) Layered model and network architecture
- 4) Diagnostic of problems of physical layer
- 5) Data link layer and ARP protocol
- 6) Networking devices in Ethernet technology
- 7) IP, ICMP, and DHCP protocols
- 8) Static routing in Linux networks
- 10) Basic configuration of Cisco routers
- 11) Dynamic routing in Cisco routers
- 12) Packet filtration in Linux networks
- 13) Network address translation in Linux networks

### 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.



## 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 Kaufmann, San Francisco, 2012
5. Data Communications and Networking, 5th ed., B.A. Forouzan, McGraw-Hill Education, New York 2012

### Additional

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

## Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	62	2,5

<sup>1</sup> delete or add other activities as appropriate