COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer networks

Course

Field of study
Artificial Intelligence
Year/Semester
2/ 4
Area of study (specialization)
-
Profile of study
general academic
Level of study
First-cycle studies
Course offered in
English
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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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. has a basic, ordered and well-grounded knowledge essential for important areas of computing science, such as computer networks [K1_W2]
2. has the basic knowledge dealing with life cycle of computing systems, with special consideration of artificial intelligence [K1_W7]

Skills

1. has basic IT in the area of application of computer networks [K1_U2]
2. can do the critical analysis and the way of functioning of IT systems and the methods of operation in artificial intelligence [K1_U7]
3. can - following the pre-defined specification - design and create an IT system by first selecting and then using the available methods, techniques and computer tools [K1_U8]
4. is able to collect, analyze and process the data of various types, protect them againts unauthorized access and make their synthesis to knowledge and conclusions available to solving of a wide range of problem spectrum appearing at work of IT specialists, artificial intelligence specialists, including industrial, business and administration problems [K1_U10]

Social competences

1. understands that in computing science, with special consideration of artificial intelligence, knowledge and skills can quickly become obsolete [K1_K1]
2. has awareness of importance of knowledge and research, related to IT and artificial intelligence, in solving practical problems of key importance for the functioning of individuals, companies, organizations and the entire society [K1_K2]
3. is able to think and act in an entrepreneurial manner, incl. finding the commercial applications for the created artificial intelligence systems, bearing in mind not only economic benefits, but also legal and social aspects [K1_U5].

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 based on one test, 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, message encapsulation, packet switching and circuit switching, protocol, protocol data units, datagram, standard, Internet administration).

2) Functions of network interface card (coding, framing, error detection, reliable transmission, network access method).

3) Network access technologies (wired local area networks: classical Ethernet - CSMA/CD, switched Eternet, Token Ring - FDDI, wireless local area networks: CSMA/CA, point-to-point wide area networks: 56k modems, DSL, cable modem, SONET, PPP, switched wide area networks: ATM - cell switching, Frame Relay; networking devices.

4) Packet switching (packet switching using virtual circuits, packet switching using datagrams, delivery and forwarding of packets, IPv4 protocol, IPv6 protocol, ARP protocol, mobile IP).
5) Routing protocols (RIP, OSPF, BGP).
6) Transport protocols (UDP, TCP, SCTP).
7) Application layer (protocols and applications: DHCP, DNS, Telnet and SSH, FTP and TFTP, WWW and HTTP, SMTP)
8) Computer network management (SNMP protocol).
9) Communication protocols (creation, objective, standards, protocol engineering).

The lab-classes should cover the following topics:

1) IPv4 addressing
2) Advanced IPv4 addressing
3) Layered model and network architecture
4) Basics of structured cabling
5) Communications programming using serial port
6) Networking devices in Ethernet technology
7) ARP Protocol
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

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.

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 2013
3. Computer Networks, 5th edition, A.S. Tanenbaum, D.J. Wetherall, Pearson Education, Inc., Boston, 2011
4. Computer Networks: A Systems Approach, L.L. Peterson, B.S. Davie, 5th edition, Morgan Kaufmann Publishers, Amsterdam 2012
5. Computer Networking: A Top-Down Approach, 7th edition, J.F. Kurose, K.W. Ross, Pearson Education Ltd., Boston, 2017

Additional

1. Network Analysis and Troubleshooting, J. Scott Haugdahl, Addison-Wesley, Boston 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	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) [1]	38	1,5

[1] delete or add other activities as appropriate