Title **Computer networks (Technologie sieciowe)**	Code **1010331451010330644**
Field **Computer Science**	Year / Semester **3 / 5**
Specialty **-**	Course **core**
Hours Lectures: **3** Classes: **1** Laboratory: **1** Projects / seminars: **-**	Number of credits **5**
	Language **polish**

Lecturer:

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Faculty:

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Status of the course in the study program:

core

Assumptions and objectives of the course:

The main objective of the course is to provide knowledge on different computer networks technologies, including: transmission media, network hardware, methods and principles of communication, communication protocols in ISO/OSI layers. Additionally students have to obtain skills in making decisions on computer network design, installation and configuration.

Contents of the course (course description):

Lecture
Computer networks classification (LAN, MAN, WAN, wired, wireless). Communication models (point to point, broadcast, multicast, connection oriented, connectionless, peer to peer, client-server). Modes of transmission: synchronous, asynchronous, isochronous, narrowband, wideband. Topology. Media parameters and applications: twisted pair, coaxial, fiber, infrared, radio bands. Structured cabling. Multilayer transmission model. Physical and link layers. Communication channel access methods: CSMA/CA, CSMA/CD, token passing. Network hardware: network interface card, modem, hub, switch. Main technologies: Ethernet, ATM, IEEE 802.11. Last mile networks (ISDN, DSL, GSM, UMTS, CATV, PLC). Internetwork layer, IPv4, host addressing. Routers and switches. Routing algorithms and protocols. ICMP. IPv6. Transport layer, TCP (ports, sockets, circuit opening and closing). UDP.

Classes
(2h) Link layer. Transmission parameters analysis (delay, throughput) based on Ethernet and WAN networks.
(2h) Internetwork layer. IP addresses management, routing table aggregation. Network and subnetwork addressing.
(2h) Internetwork layer. Routing table optimization with distance-vector algorithms. Count to infinity problem and its solutions.
(2h) Internetwork layer. Routing table optimization with Dijkstra algorithm.
(2h) Transport layer. TCP analysis: throughput calculation, optimum window calculation, timeout calculation (Jacobsen algorithm).
(2h) Transport layer. Throughput analysis with slow start and congestion avoidance algorithms, fast TCP implementations.
(2h) Application layer. Network parameters analysis in IP telephony systems. Codecs, bandwidth calculation, header compression.
(1h) Colloqium (test).

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Laboratory
(2h) Network configuration, basic network parameters analysis (ipconfig, netstat, ping, tracert, arp).
(2h) Experiments with basic network protocols (Ethernet, IP, TCP) with protocol monitoring program (Wireshark).
(2h) Routing tables optimization for different network topologies (experiments with simulation tools).
(2h) Application layer protocol analysis (HTTP, SIP).
(2h) Fundamentals of network programming, TCP connection configuration.
(5h) Communication protocol design and implementation.

Introductory courses and the required pre-knowledge:

foundations of computer science, operating systems, electronics, data coding and transmission

Courses form and teaching methods:

Lecture with multimedia presentation
Classes
Laboratory

Form and terms of complete the course - requirements and assessment methods:

Lecture: written examination after semester 6 (theoretical and conceptual knowledge assessment)
Classes: colloquium (test)
Laboratory: short written tests before experiments, evaluation of experiments and reports

Basic Bibliography:

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Additional Bibliography:

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