COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer networks [S2TIIZM1E>SK]

Course

Field of study
Information Technology for Smart and Sustainable Mobility

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
32

Laboratory classes
0

Other
0

Tutorials
16

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Basic knowledge of computer networks, including familiarity with the OSI model, communication protocols (e.g., TCP/IP), IP addressing, and the fundamentals of network devices such as routers and switches. Understanding of operating system fundamentals, particularly in the context of network management and security (e.g., users, permissions, network configuration in Linux/Windows systems). Skills: Problem-solving - especially in algorithmic and mathematical contexts. Basic programming - ability to analyze and create simple scripts in languages such as Python, C++, or Java. Analytical thinking - ability to approach complex problems methodically.

Course objective

The aim of the course is to provide students with fundamental knowledge of computer networking concepts, protocols, and technologies.

Course-related learning outcomes

Knowledge:
The student has advanced and detailed knowledge of selected issues related to the application of

computer networks, in particular is familiar with layered architectures, data transmission, routing techniques and algorithms, protocol classification, random access schemes, token passing schemes, and protocols for wireless local and personal area networks.
The student has knowledge of development trends and the most significant recent achievements in the field of information systems.

Skills:
The student is able to use information and communication technologies applied in the implementation of projects in the field of transport systems.
The student is able to assess the usefulness and applicability of new achievements (methods and tools) in the management and operation of computer networks.

Social competences:
The student is prepared to critically assess their knowledge and understands that in computer science, knowledge and skills quickly become outdated.
The student understands the importance of using the latest IT tools in solving research and practical problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam
Practical work - solving problems

Programme content

Networking. Data transmission. Multiple access networks. Routing and mobility.

Course topics

1. Introduction to networking
Layered architectures. ISO/OSI Reference Model. TCP/IP architecture. Multiplexing techniques. Circuit and packet switching.
2. Data transmission
Encoding and framing techniques. Error control. Retransmission schemes. Sliding window flow control. Examples of data-link protocols.
3. Multiple access networks
Classification of MAC protocols. Random access schemes: ALOHA, Slotted-Aloha. Carrier Sensing Schemes: CSMA, CSMA-CD, CSMACA. Token passing schemes. Ethernet. Protocols for wireless local and
personal area networks: IEEE 802.11, Bluetooth, IEEE 802.15.
4. Routing and mobility
Taxonomy of routing techniques. Routing algorithms: shortestpath routing, distance vector routing, link state routing. Mobility management issues.

Teaching methods

The course is conducted remotely (online) in a synchronous format. Classes may also be held in person. Multimodal presentation. Practical examples, case study.

Bibliography

Basic:
Tanenbaum, A., Feamster, N., Wetherall, D. (2021), Computer Networks; 6th Edition; Pearson.
David A. Patterson and John L. Hennessy (2013). Computer Organization and Design: The Hardware/Software Interface. Morgan Kaufmann; 5th edition

Additional:
ISO/IEC 25010. (2011). Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - System and software quality models. International Organization for Standardization, Geneva, Switzerland.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	48	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	52	2,00