



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Optimization of computer networks

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### Course

Field of study

Electronics and Telecommunications

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

english

Requirements

elective

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### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

0

Projects/seminars

-/-

### Number of credit points

4

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### Lecturers

Responsible for the course/lecturer:

prof. Piotr Zwierzykowski

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Responsible for the course/lecturer:

dr. Maciej Sobieraj

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### Prerequisites

The student starting the subject should have a basic knowledge of the construction and operation of computer networks. In particular, he/she should know the basic protocols ensuring communication in the network (ARP, IP, RIP, OSPF, DHCP, NAT). He/She should also be able to obtain information from specified sources and be willing to cooperate as part of a team.



### Course objective

Providing students with basic knowledge about the methods, technologies and protocols used in the process of network optimization. Developing the skill of choosing the right method for the optimization problem being solved.

### Course-related learning outcomes

#### Knowledge

1. has detailed knowledge of virtual local area networks and communication between them
2. has knowledge of techniques and protocols ensuring redundancy and security in computer networks
3. has knowledge of architectures and techniques for introducing QoS to the computer network

#### Skills

1. is able to plan and configure mechanisms and protocols to increase the reliability of networks built of switches
2. has the ability to configure basic security in switched networks

#### Social competences

Student understands that knowledge and skills regarding the protocols and technologies used in network optimization are constantly changing.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The oral exam consists of answers to at least 5 questions. The lecturer asks questions. The questions relate to issues from the set of 45 issues known to students (given during the lecture). The assessment of the answer to the question takes into account the extent of the answer and understanding of the problem by the student. Each question answer is graded on a scale of 2 to 5. The final grade of the oral exam is the average of the grades for each answer. The exam is passed when the average rating is higher than 2.75.

### Programme content

The topics of the lecture include the following issues:

1. Enterprise network architecture.
2. Switched networks.
3. Virtual local area networks (VLAN) and private virtual private networks (PVLAN).
4. InterVLAN routing.
5. Spanning tree protocols - role, types, restrictions, guards and parameters.
6. Mechanisms and protocols increasing reliability in the company network.



7. Methods of securing switched networks.
8. Advanced services in the switched networks.
9. QoS mechanisms in the company network.
10. Example network project - case study.

The following issues are discussed during the laboratories:

1. Configuration and efficient use of VLAN and PVLAN.
2. Technologies, protocols and methods ensuring redundancy in company networks: LACP, FHRP (HSRP, VRRP and GLBP), STP (PVST +, Rapsid-PVST +, MST).
3. Methods of securing networks built of switches: access security (also AAA), port security, tree security, solutions based on port and object tracking, access control lists.

### Teaching methods

Depending on the topic discussed and the interest of students, the lecture is conducted in one of three forms: a traditional lecture, a problem lecture, or a conversational lecture.

Laboratory exercises: exercises are conducted in the laboratory of the Cisco Network Academy. During the course students configure network devices in accordance with the requirements of the exercise.

### Bibliography

#### Basic

James F. Kurose, Keith W. Ross: Computer Networking: A Top-Down Approach, 7/E, Pearson, 2017

#### Additional

1. Richard Froom, Erum Frahim: Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide: (CCNP SWITCH 300-115), Cisco Press, 2015
2. Gary A. Donahue: Network Warrior, O'Reilly Media, 2011
3. Kevin Dooley, Ian J. Brown: Cisco Cookbook, O'Reilly Media; 2010
4. Priscilla Oppenheimer: Top-Down Network Design, Cisco Press, 2010



### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	58	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) <sup>1</sup>	42	2,0

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