COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical aspects of LAN and WAN design [S1EiT1>TAPSLiR]

Course

Field of study
Electronics and Telecommunications

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

A student joining this course should have knowledge of the basics of computer networks. He 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 knowledge about methods of designing local and wide area packet networks. Developing students" ability to solve problems arising in the design of local and wide area networks based on the IP protocol.

Course-related learning outcomes

Knowledge:
1. A student has basic knowledge about development trends in the field of local and wide area network technologies.
2. A student has ordered knowledge of design methods for complex local and wide area networks.
3. A student has knowledge of the basics of standards, architecture, protocols, operation and design of wide and local area packet networks.

Skills:
1. A student is able to solve typical problems related to packet network design and parameterization of network devices.
2. A student is able to use technologies that enable secure data transmission in wide area networks.

Social competences:
1. A student knows the limits of his/her own knowledge and skills, understands the need for further training in the design and operation of packet networks.
2. A student understands that knowledge and skills in the field of packet networks are becoming obsolete very quickly.
3. A student is aware of the need for a professional approach to solving network problems and taking responsibility for the packet network projects that he proposes. He/she can effectively participate in team projects.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired as part of the lecture is verified by an oral and / or written test.
Test issues, on the basis of which questions are prepared, are sent to students by e-mail using the university e-mail system.
The written and / or oral test consists of from 3 to 5 questions for which a descriptive answer is expected. Each answer to a question is rated on a scale of 0 to 5 points. Each question is scored equally.
Passing threshold: 50% of points.
In the case of the oral test, students draw questions from a set of 30 questions. In the case of a written test, questions are selected by the teacher.
Skills acquired as part of the laboratory are verified on an ongoing basis. At the end of each laboratory class, the correctness of configuration of network devices is assessed on a scale of 2 to 5. The final grade is the average of grades obtained from individual laboratory classes.

Programme content

- Investor needs and capabilities analysis;
- Layered network design model;
- Multi-area OSPF and IS-IS protocols;
- BGP protocol;
- Designing the logical topology of campus networks;
- Designing routing solutions for wide-area IP networks;
- Designing secure wide area networks
- IP network design with differentiated service quality.

Course topics

1. The following topics will be discussed as part of the lecture:
- Investor needs and capabilities analysis (traffic, existing infrastructure, financial constraints, etc.);
- Layered network design model;
- Access network technologies;
- Multi-area OSPF and IS-IS protocols;
- BGP protocol;
- Designing the logical topology of campus networks (addressing, VLAN, HSRP / VRRP / GLBP);
- Designing routing solutions for wide-area IP networks using the OSPF, ISIS and BGP protocols;
- Designing secure wide area networks using the IPSec family protocols;
- Designing virtual layer 3 private networks using MPLS;
- Designing virtual layer 2 private networks using MPLS and Carrier Ethernet techniques;
- IP network design with differentiated service quality (DiffServ, OSPF-TE, MPLS-TE, CarrierEthernet);
- Traffic flow management in IP networks using policy based routing and BGP attributes.
2. The following lab exercises will be carried out as part of the laboratory classes:
- Design and implementation of a campus network using the VRRP / GLBP protocol;
- Design and implementation of packet networks with OSPF and IS-IS protocols;
- Design and implementation of a multi-area administrative system with redistribution of routing

information;
- WAN design and implementation with policy-based routing;
- WAN design and implementation with IP SLA (Service Level Agreement) mechanisms;
- Design and implementation of network integration with IPv4 and IPv6;
- Design and implementation of a multi-domain network with traffic flow control using BGP attributes.

Teaching methods

Informative lecture: multimedia presentation, illustrated with examples on the board.
Laboratory exercises: practical exercises in groups using Cisco / Huawei / Juniper routers.

Bibliography

Basic
1. www.ietf.org.
2. http://metroethernetforum.org/.
3. Oppenheimer, P. Top-Down Network Design, 3rd ed. Indianapolis, Indiana: Cisco Press, 2010.
4. Stasiak M., Głąbowski M., Wiśniewski A., Zwierzykowski P., Modeling and Dimensioning of Mobile Networks, Wiley, 2011.
Additional
Curriculum available on the cisco.netacad.net platform as part of the Cisco Network Academy run at the Institute of Communication and Computer Networks.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	31	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	44	1,00