COURSE DESCRIPTION CARD - SYLLABUS

Course name
Management of telecommunications networks and services [N2EiT1>ZSiUT]

Course

Field of study
Electronics and Telecommunications

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
10

Number of credit points

4,00

Coordinators

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Lecturers

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Prerequisites

Student should be familiar with the terms related to telecommunication and computer networks, and should understand technical meaning of these terms. Should has in-depth knowledge of the architecture, construction, and operation of different kind of computer and telecommunication networks, as well as the structure and functionality of networking devices. Should be able to use and understand the specialistic literature in English (books, technical journals), and be able to prepare and present a presentation on the implementation of a task (problem solving) in the field of network issues.

Course objective

Familiarize students with the network management standards, terminology, and protocols. To present a survey of selected network management software and systems. Enhance in students the ability in selection of network and service management tools and to familiarise them with good practices in the network management area included in ITIL.

Course-related learning outcomes

Knowledge:
1. Has knowledge in the field of methods and standards of technical management of networks and services

networks.
2. Has knowledge of IT tools and protocols used in the area
network management.
3. Knows the basic concepts used in the area of network management and understands technical ones the meaning of these concepts.
4. Has practical knowledge of the structure and content of LSAs.

Skills:
1. Familiarizes himself with the standards developed for the management of networks and services networks. He knows international standardization organizations. He can use it properly
network management concepts.
2. Can make a choice and apply IT tools in practice
network and service management.
3. Can ensure the continuity of offering IT infrastructure work and offering network services by ensuring the cooperation of specialists under the LSA agreement.

Social competence:
1. Is aware of the need for a professional approach to solving problems
and taking responsibility for the technical solutions they propose.
2. Understands the dilemmas associated with work in the field of network management. He can think in a way
enterprising.
3. Can formulate their own opinions on the currently used and available solutions in the field management of networks and network services.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In terms of lectures: a written exam in the form of a multiple-choice test, containing at least 50 questions covering the issues discussed during the lectures. Questions may be scored differently depending on the number of correct answers. Exam passing threshold: more than 50% of points (dst grade). Grading scale according to the percentage division, i.e. more than 60% of points - dst plus, more than 70% of points - db, etc. As an support in preparation for the exam, students receive a set of slides presented during lectures and a set of issues.

In terms of the project: based on own elaboration in the form of a description of a proposed solution to the problem or a presentation on the topic indicated by the teacher (the form and quality of the prepared materials is assessed) and the final colloquium. The final grade is the arithmetic mean of the two grades. Final test in the form of a multiple-choice test, containing at least 20 questions covering the issues discussed during the exercises. Questions may be scored differently depending on the number of correct answers. Test passing threshold: more than 50% of points (dst grade). Grading scale in accordance with the percentage division, i.e. more than 60% of points - dst plus, more than 70% of points - db, etc.

Programme content

The course covers the following issues: standardization in network and service management, functional management areas, management based on the OSI model, manager-agent model, application layer of the management system, TMN, SLA agreements, ITIL, tools used in network management, protocols: SNMP , NetFlow, IPFix, selected management systems, MIBBrowser, BER, network controller.

Course topics

Lectures cover the following topics:
1. Discussion of organizational issues related to the course: form of classes, program of the course, credit rules and literature. Introduction to network management. The concept of network management and functional areas of management. Standardization in the area of network and service management.
2. Management based on the OSI model. Primitives and parameters. Layer management, layer operations, systems management. The SMAP process and its components.
3. Manager - agent model. Relations between the manager and the agent. Manager and agent functions. Agent construction. Definition of managed objects. MIB database. MIT tree.

4. Application layer of management system. Service elements. Management information model. A notation for the object definition. ASN.1 notation. Systems management functions. TMN.
5. Management of network services: General characteristics of the SLA (Service Level Agreement). Service parameters included in SLAs. Methods for controlling parameters defined in SLAs.
6. Tools used in network management: management platforms, management systems, network analyzers, TTS systems (Trouble Ticketing Systems). A survey of applications used in network management area.
7. General characteristics of ITIL (Information Technology Infrastructure Library). Rules for ensuring continuity of offering IT services in accordance with ITIL principles. Incident and problem management. Organization and operation of the Service Desk.

Projecs cover the following issues:
1. SNMP and RMON protocols - construction, operation, parameters, applications.
2. NetFlow and IPFix protocols - construction, operation, parameters, applications.
3. DMTF (Distributed Management Task Force) - scope of activities and recommendations.
4. Management systems: Zabbix, Zenoss, Nagios, OpenNMS and others.
5. Service life cycle, incident and problem management (ITIL).
6.Organization of network and service management in practice - proposed solutions.
7. Preparation of the SLA.

Teaching methods

Lectures: multimedia presentation; additional examples are given on the board.
Projecs: presentations of elaborations prepared by students, discussion of the problems presented in students' presentations, detailing the issues.

Bibliography

Basic:
1. J. Kleban, Slides for lectures in the course: Network Management
2. W. Stallings, Protokoły SNMP i RMON. Vademecum profesjonalisty, Helion, Gliwice, 2003
3. A. Clemm, Network Management Fundamentals, Cisco Press, 2006
4. ITIL Incident Management, https://www.invensislearning.com/resources/itil/what-is-incident-management
5. ITIL Problem Management, https://www.invensislearning.com/resources/itil/overview-of-problem-and-event-management
5. Service Desk in ITIL, https://www.invensislearning.com/resources/itil/what-is-service-desk-in-itil
6. Service Level Agreement, https://www.bmc.com/blogs/sla-template-examples/

Additional:
1. P. Czarnecki, A. Jajszczyk, J. Lubacz, Standardy zarządzania sieciami, OSI/NM, TMN, Wydawnictwa EFP, 1996
2. U. Black, Network Management Standards, SNMP, CMIP, TMN, MIBs, and Object Libraries, McGraw-Hill, 1995
3. J. Larmouth, ASN.1 Complete, Morgan Kaufmann, San Francisco, 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	40	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00