STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Network Management		**1010802111010824071**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electronics and Telecommunications	**general academic**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Information and Communication	**Polish / English**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **1**	Classes: **1**	Laboratory: **1**	Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**from field**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Has in-depth knowledge of construction and operation of communication systems. [K2_W01]. Has a wide, systematic knowledge, with necessary mathematical background, of ICT networks and signal transmission methods.[K2_W13}.
2	**Skills**	Knows the rules of operation of Polish and international standardization bodies (ITU, ISO, ETSI,etc.). Knows the standardization procedures. [K2_U08].
3	**Social competencies**	Is aware of the limitations of his/her current knowledge and skills; is committed to lifelong learning.[K2_K04]

Assumptions and objectives of the course:

Knowing and understanding of the network management terminology, standards, ideas and mechanisms used in network management systems. Development of familiarity with selected network management protocols, platforms and systems.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has a basic knowledge of methods and standards related to telecommunication and computer networks management. - [K2_W15]
2. Has a practical knowledge of software and protocols used in the field of network management. - [K2_W15]
3. Knows and understands the technical meaning of the terms used in the field of network management. - [K2_W15]

Skills:

1. Is able to properly use the network management terminology. Is able to interpret correctly the network management standards. - [K2_U14]
2. Is able to write software supporting computer networks management, and to apply ready-to-use mechanisms supporting network management. - [K2_U15]
3. Is able to apply learned methods to analyze and design network and services management systems. - [K2_U18]

Social competencies:

1. Is aware of the necessity to approach solving technical problems with responsibility and professionalism. - [K2_K05]
2. Is aware of the main challenges facing electronics and telecomunication in the 21st century. - [K2_K07]
3. Is aware of the limitations of his/her current knowledge and skills; is committed to lifelong learning. - [K2_K04]

Assessment methods of study outcomes

Formative Assessment:

Classes: Classes passing is based on presentation on selected subject, quality of presentation, discussion after presentation, and written test focused on basic terms used in network managemant area.

Laboratory: Classes passing is based on written tests, prepared software and reports on carried out exercises.

Summative Assessment:

Lectures: Written exam from theory and content of the lectures. Test with open questions, range of scores for each question: 0, 0,5 lub 1. In order to pass the exam, total score needs to be at or above the point required for passing. Overall pass mark - more than 50% of total score. The exam may be taken after labs passing.

Course description

Lectures:

Overall concept of standardized network management and five functional network management areas. The need for standardization in this area. OSI management and OSI RM. Manager ? agent model. Information management base MIB. Managed object definition. Selected service elements. Management information model. CMIP protocol. Network management functions. Architecture, management services and functions of TMN. TMN implementation methodology. TCI/IP network management: SNMP protocol, MIB II. SLA agreements. General presentation of selected network management platforms and systems. Network management using internet mechanisms.

Classes: Management Information Base MIBII. ASN.1 notation, BER coding, SNMP protocol. RMON protocol. NetFlow protocol. Network management systems. IT infrastructure management. ITIL.

Laboratory:

Analysis of SNMP packet exchanging process. MIB structure. BER coding and decoding. BER coder and decoder ? software written by students. SNMP manager ? software written by students. Preparing and sending SNMP messages ? software written by students.

Basic bibliography:

1. A. Clemm, Network Management Fundamentals, Cisco Press, 2006
2. W. Stallings, Protokoły SNMP i RMON. Vademecum profesjonalisty, Helion, Gliwice, 2003
3. J. Larmouth, ASN.1 Complete, Morgan Kaufmann, San Francisco, 2000.

Additional bibliography:

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

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in classes	15
3. Participation in laboratory classes	15
4. Preparation for classes	10
5. Preparation for laboratory classes	10
6. Preparation for lectures	5
7. Preparation for exam	20
8. Passing the Exam	2
9. Discussion on exam results	2

Student's workload

Source of workload	hours	ECTS
Total workload	90	3
Contact hours	50	2
Practical activities	40	1