POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

Course name
QoS in packet networks [S1EiT1>JUwSP]

Course

Field of study	Year/Semester
Electronics and Telecommunications	4/7
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other
15	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

A student joining this course should know the concepts characterizing telecommunications and computer networks and understand the technical meaning of these concepts. A student should have an organized basic knowledge of the structure, functioning and standards of various types of computer and telecommunications networks. She/He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

Provide students with knowledge about algorithms, protocols and architectures supporting the quality of service in packet networks and network design methods with varying quality of service.

Course-related learning outcomes

Knowledge:
1. The student has a basic knowledge of development trends in the field of techniques used to ensure diversified and guaranteed quality of service.
2. The student has ordered detailed knowledge of multi-service packet networks with differentiated quality of services.

3. The student has an organized, mathematically founded broad knowledge in the field of designing and optimizing packet networks with differentiated quality of service.

Skills:
1. A student is able to solve typical problems related to the design of packet networks with differentiated quality of service.
2. A student is able to configure network devices in order to implement a network with a guaranteed quality of service.
3. A student is familiar with the principles of operation in the field of standardization of technical solutions in the field of packet networks, knows international and national standardization organizations in the field of packet networks (IETF, IEEE, ETSI, ITU-T, 3GPP).

Social competences:
1. A student knows the limitations of his own knowledge and skills, understands the need for further studying in the field of algorithms, mechanisms and principles of designing and maintaining networks with a differentiated guaranteed quality of service.
2. A student understands that the knowledge and skills in the field of methods and techniques of ensuring differentiated quality of service very quickly become obsolete.
3. A student is aware of the need for a professional approach to solving network problems and taking responsibility for the proposed ICT projects. She/he can effectively participate in team projects.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
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

1. The lecture will cover the following issues:
- Basic concepts and models of traffic engineering;
- Parameters defining the quality of service in packet networks;
- Algorithms for: traffic acceptance, traffic shaping, packet scheduling, buffer management, flow control and congestion control;
- Multi-criteria routing algorithms;
- Architectures of Integrated Services and Differentiated Services;
- Mechanisms to ensure differentiated service quality in MPLS-TE networks;
- Mechanisms to ensure differentiated service quality in Carrier Ethernet networks.
2. The following exercises will be conducted as part of the laboratory classes:
- Preparation of software for network dimensioning based on the Kaufman-Roberts formula;
- Implementation of the selected multi-criteria routing algorithm;
- Configuring packet scheduling mechanisms in DiffServ networks;
- Configuration of packet classification mechanisms, their labeling and traffic shaping in DiffServ networks;
- Configuration of support mechanisms to ensure differentiated service quality in MPLS-TE networks;
- Design and implementation of a layer 3 virtual private network with guaranteed quality of service.

Course topics

- Basic concepts and models of traffic engineering;

- Parameters defining the quality of service in packet networks;
- Algorithms for: traffic acceptance, traffic shaping, packet scheduling, buffer management, flow control and congestion control;
- Architectures of Integrated Services and Differentiated Services;
- Mechanisms to ensure differentiated service quality in MPLS-TE networks;
- Mechanisms to ensure differentiated service quality in Carrier Ethernet networks.

Teaching methods

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

Bibliography

Basic
1. www.ietf.org
2. Modeling and Dimensioning of Mobile Networks, Stasiak M., Głąbowski M., Wiśniewski A., Zwierzykowski P., Wiley, 2011.
Additional
1. Curriculum available on the cisco.netacad.net platform as part of the Cisco Network Academy run at the Institute of Communication and Computer Networks.
2. MPLS-Enabled Applications, Ina Minei, Jualian Lucek, Wiley, 2011

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