COURSE DESCRIPTION CARD - SYLLABUS

Course name
Switching systems [S2EiT1-SKiTI>SKOM]

Course

Field of study
Electronics and Telecommunications

Year/Semester
2/3

Area of study (specialization)
Computer Networks and Internet Technologies

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

prof. dr hab. inż. Wojciech Kabaciński
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Lecturers

Prerequisites

He has extensive knowledge of probability theory, optimization, graphs and mathematics and basic knowledge of telecommunications network structures. He can understand use professional literature in English (books, technical and scientific journals, notes applications, catalogues, manuals and standards, etc.). Can prepare a scientific study and present presentation (in Polish or English) on the implementation of the task (solving the problem) in the field electronics and/or telecommunications, can discuss the presented problem. Can use optimization methods to solve problems encountered in electronics i telecommunications.

Course objective

Familiarizing students with the construction and functions of various types of commutation nodes used in telecommunications networks (switches, routers, optical distribution boxes, optical multiplexers transfer systems), rules of their control and required characteristics for evaluation of nodes.

Course-related learning outcomes

Knowledge:

1. Has structured knowledge in the field of construction of commutation nodes in networks telecommunications.
2. Knows methods of evaluation and comparison of knots.
3. Has knowledge about the methods of controlling the operation of commutation nodes.

Skills:

1. Can assess and compare selected operating parameters of commutation nodes.
2. Is able to prepare experiments to assess the working parameters of commutation nodes.
3. Can propose various algorithms for controlling the operation of the switching node.

Social competence:
1. Can work in a team in the implementation of projects related to commutation systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

.The knowledge gained during the lectures is verified by the final test. The test has a form written and consists of 45-60 test questions. Each question has four answers to choose from one is correct. The student receives 1 point for the correct answer and 0 points for 0 points wrong answer or no answer. Passing the test from 50% of the points. For students who have number of points close to passing, an additional oral question is possible.
The final assessment from the laboratory depends on the prepared simulation program and report final. The simulation program should implement all the features discussed in during thematic exercises. The final report should contain a theoretical description implemented topic and discussion of the results achieved. Final grades: 5.0 - in the program In the simulation, all the features discussed during the exercises were implemented correctly thematic; 4.5 - simulation program has no implemented routing, other features they work properly; 4.0 - two features are missing in the simulation program and the others work correctly; 3.5 - the basic features in the simulation program are working correctly and have also been one or two other features are implemented but not working properly; 3.0 - software the simulation one has implemented only essential features; 2.0 - the simulation program does not work or not it was prepared by the student.

Programme content

Lectures: What are commutation systems, their functions and types. General structure and types of knots. Flap switching - terminology, characteristics, topologies. Switching bays with channel switching - bays crossbar, Closa, Benes. Algorithms for channel-switched bay control - path selection connection. Algorithms for controlling fields with channel switching - retuning and commutation algorithms simultaneous repackaging. Switching fields in packet switching systems - construction of IP router i ATM switches. Buffering in packet switched systems. Evaluation of caching methods. Flap crossbar and packet scheduling algorithms in VOQ fields. Multi-section fields and scheduling algorithms packages in multi-section boxes. Packet classification algorithms. Optical commutation elements. Optical distribution boxes and optical transfer multiplexers. Optical switching fields. Optical fields commutation. Issues of energy assessment of commutation bays and commutation systems.
Laboratories: students perform exercises on the following topics: field control algorithms circuits allowing to choose the shortest and cheapest connection path, retuning algorithms and repackaging - practicing and writing software, combinatorial properties of switching fields, optical switching fields - table exercises and software writing.

Teaching methods

Lecture: lectures are conducted in the form of a conventional lecture with the use of presentations multimedia previously made available to listeners. Some lectures or parts of them are conducted in the form of problem lectures or seminars attended by students in solving problems or examples, especially where evidence is being conducted mathematical theorems.

Laboratory: classes are conducted using the practice method and the project method. Depending on the topic,
the teacher assigns blackboard tasks to students, demonstrates exemplary solutions from using the presentation. Then students are given problem tasks that require solutions, including the preparation of simulation experiments. The host serves consultations in the preparation of the simulation program.

Bibliography

Basic
1. H. J. Chao and B. Liu, High Performance Switches and Routers. John Wiley & Sons, Inc., 2007.
2. W. Kabaciński: Nonblocking Electronic and Photonic Switching Fabrics. Springer, 2005.
Additional
1. A. Pattavina, Switching Theory. John Wiley & Sons, Inc., 1998.
2. W. Kabaciński, M. Żal: Sieci Telekomunikacyjne, WKŁ, 2008.
3. A. Jajszczyk, Wstęp do telekomutacji, WNT, 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	2,00