COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optical networks and optical Internet [S2EiT1-SKiTI>SOiIO]

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

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Lecturers

Prerequisites

He has extensive knowledge of probability theory, optimization, graphs and mathematics and basic knowledge of telecommunications network structures. It should also have extensive knowledge in the field of optoelectronics and fiber optic technology, including the necessary knowledge to understand the operation of advanced optical telecommunications systems. 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 operation of optical networks and devices in them used.

Course-related learning outcomes

Knowledge:

1. Has a structured knowledge of the architecture and construction of optical networks.
2. Has structured knowledge in the field of designing optical networks.
3. Has insight into the development trends of optical telecommunications networks.

Skills:
1. Can design the physical and logical topologies of an optical network.
2. Can assess the usefulness or select network devices.
3. Knows the principles of activity in the field of standardization of technical solutions for networks optical.

Social competence:

1. Is aware of the importance of optical networks in the development of telecommunications networks.
2. Is aware of the impact of optical networks on the functioning of the information society.
3. Can work in a team in the implementation of projects related to optical networks.

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 optical networks. Types of optical networks. Transport networks. WDM networks. Network type
B&S. Elements in the optical network: ROADM, OXC, types, configurations, implementations, node architectures.
commutation elements. Switching fields: architectures and parameters, comparison. Commutation nodes packages; OPS, OBS; collision resolution methods. OBS networks. Control and signalling. Algorithms RWA. Network survivability. Network topology design. Protection and recovery. EPON access networks, GEPON, WDM MON.
Laboratory: Laboratory classes are based on the OMNeT++ simulator and include design sample network topologies, writing network control software, implementation sample devices in simulation systems and conducting experiments simulations and comparison of different optical network topologies with RIP and OSPF routing protocols.

Teaching methods

Lecture: lectures are conducted in the form of a conventional lecture with the use of presentations 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. W. Kabaciński: Nonblocking Electronic and Photonic Switching Fabrics. Springer, 2005.
2. T. E. Stern, G. Ellinas, K. Bala: Multiwavelength Optical Networks: Architectures, Design, and Control. Cambridge University Press, 2009.
3. B. Mukherjee: Optical WDM Networks, Springer. 2006.
Additonal
1. R. Sivarajan, K.r N. Ramaswami: Optical Networks: A Practical Perspective (Morgan Kaufmann Series in Networking) 2002, 2010.
2. W. Kabaciński, M. Żal: Sieci Telekomunikacyjne, WKŁ, 2008.

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