COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optical Networks

Course

Field of study
Electronics and Telecommunciations
Area of study (specialization)

Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
II/IV
Profile of study
general academic
Course offered in
English
Requirements
elective

Number of hours

Lecture
30
Laboratory classes
0
Other (e.g. online)

Tutorials
0
Projects/seminars
15/0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
prof. dr hab. inż. Wojciech Kabaciński,
Wojciech.Kabacinski@put.poznan.pl

Responsible for the course/lecturer:
dr hab. inż. Remigiusz Rajewski,
Remigiusz.Rajewski@put.poznan.pl

Prerequisites

Has a basic knowledge in optimization, probability, and graph theory. Has knowledge in optoelectronics and optical communication, including knowledge required to understand operation of advanced optical communication systems. Has aslo basic knowledge about network topologies, operation, and architectrues. Is able to use bibliography in English (books, scientific and technical journals, application notes, catalogs, instructions, recommendations etc.). Can write research report and prepare

presentation on solving problems in the field of telecommunication networks, can conduct discussion on the presented problem. Can use optimization methods to solve problems in telecommunications.

Course objective

To get students familiar with the designing and operation of optical networks and devices used in such networks.

Course-related learning outcomes

Knowledge

Has general knowledge about architectures and topologies of optical networks.

2. Has general knowledge on devices used in optical networks.

3. Has an idea about future evolution of optical networks.

Skills

1. Can design logical and physical topologies of optical networks.

2. Can evaluate usefulness and chose appropriate network devices.

3. Can evaluate the risk of faults in the network and design methods for their localization.

Social competences

1. He is aware of significance of optical networks in telecommunication network evolution.

2. He is aware if influance of optical natworks on information society.

3. Has competences to work in a team to realize projects on optical networks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lectures is verified by the final exam. This exam is held in the oral or/and written form, depending on the number of students. The oral exam consists of a set of 5 questions, drawn out of at least 10 sets. An answer to each question is marked in 0-5 points. A student must get at least 50% of the points to pass the exam. The written exam consists of 45-60 questions of the multiple-choice type. Students get 1 point per correct answer and 0 points for a wrong answer or lack of an answer. 50% of points are needed to pass the exam. In questionable cases, there is a possibility to correct the mark by answering some questions in oral.

Practical skills acquired during project classes are verified by the final project on designing the example optical network.

Programme content

Lectures: What are optical networks. Types of optical networks. Transport networks. WDM networks. Elements and devices in optical networks. Optical switching nodes. Contention resolution. WDM ring networks: planning, routing and wavelength assignment algorithms. WDM mesh networks: planning,

routing and wavelength assignment algorithms. Elastic optical networks. Protection and restoration methods. Optical access networks: EPON, GEPON, WDM PON.

Project: Topology design of selected optical networks. Designing of some devices in simulation systems.

Teaching methods

Lectures: Lectures are conducted in the traditional form, with computer presentations that are available earlier to students. Some lectures, or their parts, are led as interactive or problem lectures, where students participate in solving some problems or examples, especially in proving of some mathematical theorems.

Project: The students get projects of opitcal networks, which should be designed, planned, and implemented in the simulation software OMNeT++

Bibliography

Basic

1. R. Sivarajan, K.r N. Ramaswami: Optical Networks: A Practical Perspective (Morgan Kaufmann Series in Networking) 2002, 2010

2. T. E. Stern, G. Ellinas, K. Bala: Multiwavelength Optical Networks: Architectures, Design, and Control

3. B. Mukherjee: Optical WDM Networks, Springer. 2006

Additional

1. A. Coiro, M. Listanti, and F. Matera, “Energy-Efficient Routing and Wavelength Assignment in Translucent Optical Networks,” J. Opt. Commun. Netw., vol. 6, no. 10, pp. 843–857, Sep. 2014.

2. N. (Neo) Antoniades, G. Ellinas, and I. Roudas, WDM Systems and Networks. Modeling, Simulation, Design and Engineering. Springer, 2012.

3. V. López and L. Velasco, Elastic Optical Networks. Architectures, Technologies, and Control. Switzerland: Springer International Publishing, 2016.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	58	2,0
Student's own work (literature studies, preparation for exam, project preparation) [1]	42	2,0

[1] delete or add other activities as appropriate