



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fiber-Optic Networks [S1Teleinf1>SŚ]

Course

Field of study

Teleinformatics

Year/Semester

2/3

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

4,00

Coordinators

dr inż. Piotr Stępczak

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Lecturers

Prerequisites

The student starting this course should have systematic knowledge of mathematical analysis, algebra, basic areas of physics in the field of optics, basics in the field of teleinformatic networks and telecommunications necessary for understanding, analysis, evaluation of signal modulation and operation of electrical circuits. He should also have the ability to obtain information from the indicated sources in Polish or English; be able to integrate the obtained information, interpret it and draw conclusions, and be ready to cooperate within the team

Course objective

The course aims to acquaint students with the basics of optical fiber networks, which base on the transmission of optical signals in fiber-based communication systems. The lectures utilize multimedia materials and straightforward demonstration examples. Meanwhile, the laboratory part provide hands-on experience in testing the basic components of fiber optic networks..

Course-related learning outcomes

Knowledge:

Can calculate the properties of the network regarding the power budget and dynamics.

Can, in accordance with the assumptions and technical documentation, design and implement a simple fiber-optic network.

Skills:

Has knowledge of fiber optic systems and technology.

Has an ordered and theoretically founded knowledge of passive and access fiber optic networks.

Has the knowledge needed to design, configure and maintain teleinformatic optical networks.

Social competences:

He notices changes resulting from technological progress and understands the need to update knowledge and constantly improve professional competences.

Is aware of the responsibility for their own work and is able to submit to the rules of working in a team.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In the field of lectures:

knowledge assessment verified on the basis of 2 tests in the form of a test with open and closed multiple-choice questions. Each test allows you to get a maximum of 50 points. Passing the course requires obtaining a minimum of 51 points. a total of 2 colloquia.

The grades are determined on a point scale:

<51 - 2,0 (F); 51 do 60 - 3,0 (E); 61 do 70 - 3,5 (D) ; 71 do 80 - 4,0 (C); 81 do 90 - 4,5 (B); 91 do 100 - 5,0 (A)

In the field of laboratory exercises:

the skills acquired during the classes are verified with reports created during the exercise and the final test consisting of 8 - 12 test questions. The final grade consists of the average grade from the reports and the grade for the test.

Programme content

The program covers the fundamental topics discussing optical networks at the physical layer. Sets of components, both active and passive, responsible for the functional properties of optical signal transmission in various network configurations are analyzed and studied, which determine the range and bit rate in this network.

Course topics

LECTURES

1. Introduction to Optical Networks: Architecture of Optical Telecommunications Networks. Optical layer. All-optical networks. Optical packet switching. The evolution of fiber optic networks.
2. Basics of fiber optic telecommunications: Definitions and units. Optical waveguides. Fiber attenuation. Information capacity of optical fiber – dispersion effects. Nonlinear effects. Optical link power transfer. Optical link bandwidth transfer.
3. Optical path components: Cables for fiber optic networks. Optical connectors. Optical splitters. Optical isolators. Optical filters. WDM multiplexers. Transfer multiplexers.
4. Active components - basic configurations: E/O and O/E converters. Optical receiver ID. Optical transmitter IM. Modulators - basics. Optical commutators. Optical amplifiers – basic configuration.
5. Optical signal modulation and detection: Direct modulation. Intensity modulators: electro-absorption, interference. Direct detection.
6. Measuring instruments in fiber optic network.
7. Optical transport networks: PDH and SDH networks. Wave-multiplied networks.
8. Fiber optic local area networks: FDDI. Ethernet. Fiber channel.
9. Optical packet networks.
10. Optical access networks.

LABORATORIES

Measurement of properties: connectors, splitters, optoisolators, optical circulators
 Optical fibre testing
 Fiber optic splicing
 Reflectometric measurements
 Measurement of selective elements: interference filters, tunable filters, WDM multiplexers
 Testing the properties of the E/O and O/E converter
 Testing the transmission parameters of a single-channel optical link
 Testing of WDM link transmission parameters

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board; presentations in the form of lecture material are made available in PDF files

Laboratory exercises: work with measuring sets - practical exercises. Each of the exercises has an instruction, according to which students carry out individual exercises. The instructions also contain additional questions related to the study topics.

Bibliography

Crucially:

J. Siuzdak, Systemy i sieci fotoniczne, WKŁ, 2009

J. C. Palais, Fiber optic Communications, Pearson Prentice Hall, 2005

K. Perlicki, Pomiary w optycznych systemach telekomunikacyjnych, WKŁ, 2002

Additional:

R. Ramaswami, Optical Networks: A Practical Perspective, Elsevier, 2010

J. Senior, Optical Fiber Communications – Principles and practice, third ed. Prentice-Hall 2009

K. Perlicki, System transmisji optycznej WDM, WKŁ, Warszawa 2009

Breakdown of average student's workload

	Hours	ECTS
Total workload	116	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	56	2,00