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 (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Piotr Stępczak
piotr.stepczak@put.poznan.pl

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

To acquaint students with the basic issues underlying optical fiber networks based on the transmission of optical signals in fiber optic communication systems.

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:

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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:
0 - 50 points = 2.0;
51-60 points = 3.0;
61-70 points = 3.5;
71-80 points = 4.0;
81-90 points = 4.5;
91-100 points = 5.0.
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

LECTURES

1. Introduction to optical networks: Architecture of telecommunications networks. Optical networks. Optical layer All-optical networks. Optical packet switching. The evolution of fiber optic networks.
2. Fundamentals of Fiber Optic Telecommunications: Definitions and Units. Optical waveguides. Fiber attenuation. Optical information capacity - dispersion effects. Nonlinear effects. Power budget. System dynamics.
3. Network Passive Optical Components: Optical Connectors. Cables for optical networks. Optical splitters. Optical isolators. Optical filters. WDM multiplexer. Transfer multiplexers.
4. Active elements: Photodiodes and optical receivers. Transmitters, semiconductor lasers, modulators. Optical amplifiers. Optical commutators.
5. Modulation and detection of optical signals: Direct modulation. Intensity modulators: electroabsorption, interference. Direct detection.
6. Architecture of fiber optic networks.
7. Optical transport networks: PDH networks. SDH networks. Wave-multiplexing networks.
8. Fiber Optic Local Area Networks: FDDI. Ethernet. Fiber channel.
9. Optical packet networks.
10. Optical access networks.
11. Directions of development of photonic networks

LABORATORIES

Measurement of the properties of connectors, splitters, optoisolators and optical circulators
Study of optical fibers
Connecting optical fibers

Reflectometric measurements
Measurement of selective elements: interference filters, Bragg filters, tunable filters, WDM multiplexer
Testing the properties of the E / O converter
Study of the properties of the O / E converter
Study of transmission parameters of a single-channel optical link
Study of transmission parameters of the WDM link

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