COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optotelecommunication [S1EiT1>OPTO]

Course

Field of study
Electronics and Telecommunications

Year/Semester
2/4

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
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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

Lecturers

Prerequisites

Systematic knowledge of mathematical analysis, algebra and theory of probability. Detailed, systematic knowledge of the fundamentals of circuit theory, together with the necessary mathematical background; this knowledge allows him/her to understand, analyze and evaluate the operation of electrical circuits. Ability to extract information from English language literature, databases and other sources. Ability to synthesize gathered information, draw conclusions, and justify opinions. Awareness of the limitations of his/her current knowledge and skills; is committed to further self-study.

Course objective

The aim of the course is to familiarize students with the fundamental principles and techniques used in optical communication and transmission of optical signals in telecommunications systems based on optical fibers.

Course-related learning outcomes

none

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In terms of lectures: written examination after the 4th semester on the content of the lecture in the form of answers to 10-15 open questions (variously scored - 2 or 3 points) covering the issues discussed during the lectures. The threshold for passing the exam: 50% of points (dst grade). The grading scale is consistent with the percentage division, i.e. from 60% of points - dst plus grade, 70% of points - db grade, etc. As an aid in preparing for the exam, students receive a set of slides presented during lectures.
In terms of projects: skills acquired during design classes in semester 5 are verified by design tasks of varying degrees of complexity of the system diagram with the selection of elements from a defined set of catalog cards, justified by correct accounting analysis.
In terms of laboratory exercises: the skills acquired during laboratory classes in semester 5 are verified by reports created during the exercise and a final test consisting of 6-9 questions (test and open questions scored differently - 1 or 2 points). The final grade consists of the average grade from the reports and the grade from the test.

Programme content

The program provides knowledge of the principles and techniques used in optical communication and the transmission of optical signals in optical fiber-based telecommunications systems.

Course topics

Lecture / project: Principles of light propagation. Step index, graded index, and single-mode optical fibers, numerical aperture and acceptance angle. Modes in optical waveguides. Mode and chromatic dispersion. Transmission characteristics. Non-linear effects. Methods of measuring attenuation and dispersion. Optical fibre cables, installation principles. Connecting fibres, joints and connectors. Optical sources, light-emitting and laser diodes, principles of operation, parameters. Photodiodes and optical receivers. Basic elements of an optical transmission system. Design principles. The idea of WDM, WDM couplers, optical filters, OTDM. Fibre optic networks.
Laboratories: Modes in optical waveguides. Optical spectrum analysis. Fiber optic couplers. Fiber fusion splicing. OTDR measurements. Digital fiber optic transmitter / receiver. Single wave system.

Teaching methods

1. Lecture: multimedia presentation illustrated with examples on the board and simple demonstration layouts; lecture material made available in PDF files.
2. Project: calculation of fiber optic transmission system with given parameters, based on parameters of selected elements on available data sheets.
3. Laboratory exercises: working with measuring sets - practical exercises. Each exercise is equipped with instructions according to which students complete individual tasks. Instructions include theoretical introduction and additional questions in the field of studied issues.

Bibliography

Basic
1. J. Senior, Optical Fiber Communications. Principles and Practice, Prentice Hall, 1992.
2. J.C. Palais, Fiber optic communications, Prentice-Hall, 1998.
3. J. Siuzdak, Systemy i siecie fotoniczne, WKŁ, 2009.
4. K. Perlicki, Pomiary w optycznych systemach telekomunikacyjnych, WKiŁ, 2002.
Supplementary
1. J. Siuzdak, Wstęp do współczesnej telekomunikacji światłowodowej, WKiŁ, 1997.
2. K. Perlicki, System transmisji optycznej WDM, WKŁ, 2009.
3. K. Booth, S. Hill, Optoelektronika, WKŁ, 2001.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	90	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00