COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optotelecommunication [S1EiT1E>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
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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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

Knowledge:
Has a systematic knowledge, together with necessary mathematical background, of light propagation and methods of its description in the fiber.

Has a wide, systematic knowledge of the properties and characteristics of active and passive components of fiber optic system teletransmission, as well as their classification, selection, analysis and design of opto-electronic circuits.
Has a systematic knowledge, together with theoretical background, of optoelectronics and opto-telecommunication.

Skills:
Is able to extract information from Polish or English language literature, databases and other sources. Is able to synthesize gathered information, draw conclusions, and justify opinions.
Is able to evaluate the parameters describing digital signals transmission quality in optical communication channels and fiber optic systems.
Is able to formulate specifications, design and conduct measurements of optoelectronic components parameters. Is able to conduct link analysis, formulate requirements and design an optical fibre link.

Social competences:
Demonstrates responsibility and professionalism in solving technical problems. Is able to participate in collaborative projects.
Is aware of the impact electronics and ICT systems and optical networks will have on the development of the information society

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes are verified as follows:
1. In semester 4, the lecture series ends with a closed choice test consisting of 12 to 16 multiple choice questions from which 80 points can be obtained. The lectures are accompanied by calculus tasks that allow for an extra 20 points. Passing this part requires obtaining at least 40 points.
2. In semester 5, laboratories are evaluated on the basis of reports prepared at each meeting and involvement in laboratory tasks.
3. in semester 5 The project is evaluated by design tasks consisting of the correct selection of elements justified by correct calculating analysis. A total of 100 points can be obtained for the design task. A score of 50% is required to pass.

In semester 5, the course ends with a Written Examination consisting of 8 to 10 open questions, equally scored. Passing the exam requires a score of at least 50%. If necessary, the written exam may be followed by an oral exam.

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. Govind P. Agrawal, Fiber-Optic Communication Systems, John Wiley & Sons, Inc., 1997
Additional
1. R.J. Hoss, Fiber optic communications design handbook, Prentice Hall, 1990

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	98	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	52	2,00