

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Optical Fiber Communication Systems		Code 1010802111010830206
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: Polish / English	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: 1 Laboratory: - Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr inż. Jan Lamperski email: jlamper@et.put.poznan.pl tel. +48 61 665 3809 Faculty of Electronics and Telecommunications ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of optics, photonics and optical communications.
2	Skills	Describe the basic components required for the construction of optical links.
3	Social competencies	Is aware of limitations of possessed knowledge the need for lifelong learning He understands the need for professionalism in solving problems the importance of a professional approach to the development of the information society Understanding the importance of photonics in the development of telecommunications systems
Assumptions and objectives of the course: To provide students with theoretical and practical knowledge and understanding of optical communication systems. To prepare students to design, operate and maintain optical fiber systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Understands the operation of optical fiber communication components. - [-K2_W08, K2_W13] 2. Understands the principles of optical transmission systems. - [-K2_W08] 3. Understands system limitations and undesirable effects. - [-K2_W08]		
Skills:		
1. Identify the main parameters of fibers, passive, active devices and submodules that effect the performance of optical communications systems - [-K2_U17, K2_U18] 2. Operate the main components required for optical communication systems. - [-K2_U17] 3. Conduct experiments to develop and analyse an optical transmission system. - [-K2_U17, K2_U16] 4. Describe and analyse a variety of optical communication systems - [-K2_U18]		
Social competencies:		
1. Understands the need for further education. - [-K2_K05] 2. Understanding the importance of all-optical signal processing methods for telecommunications systems. - [-K2_K07] 3. Understands expected future trends in optical communications - [-K2_K07]		

Assessment methods of study outcomes		
Tests, lab project reports, written exam.		
Course description		
<p>1. Optical propagation, acceptance angle, numerical aperture, optical modes, step index and graded index fibers, cut-off wavelength, single mode fibers.</p> <p>2. Transmission characteristics of optical fibers: attenuation, modal, chromatic and polarisation dispersion. DWDM fibers. Photonic cristal fibers.</p> <p>3. Linear and nonlinear propagation effects.</p> <p>4. Passive network components. Integrated optics. Optical switching: technology and characteristics.</p> <p>5. Optical sources and detectors.</p> <p>6. Principles of optical amplifiers and classification. Gain and noise characteristics.</p> <p>7. Application of OA to subscriber loops, trunk and undersea transmission systems.</p> <p>8. Nonlinear device application of OA.</p> <p>9. Multiplexing methods: WDM, TCM, SCM and OTDM.</p> <p>10. Optical multiplexing and amplification as method of upgrading fiber optic transmission systems.</p> <p>11. Coherent optical fiber systems. Principles of coherent detection. Modulation formats. Demodulation schemes. Noise in coherent optical systems.</p> <p>12. Soliton transmission systems. Nonlinear wave motion in optical fibers. Soliton theory. Ultra high speed soliton systems.</p> <p>13. Fiber optic system design methodology. Defining requirements. Component specification. System performance model and analysis. Network availability and cost performance.</p>		
Basic bibliography:		
<p>1. J. M. Senior, Optical Fiber Communications: Principles and Practice, Prentice Hall, N. York, 1994</p> <p>2. G. P Agrawal, Fiber-optic Communication Systems, Wiley-Interscience; 3rd edition, 2002</p> <p>3. J. C. Palias, Zarys telekomunikacji światłowodowej, WKŁ, 1991 (Fiber Optic Communications, Prentice Hall, Pearson Education, Inc., New Jersey 2005</p> <p>4. K. Perlicki, Pomiar w optycznych systemach telekomunikacyjnych, WKŁ, Warszawa, 2002</p>		
Additional bibliography:		
<p>1. K. Perlicki, Systemy transmisji optycznej WDM, WKŁ, 2007</p> <p>2. J. Siudak, Sieci foniczne, WKŁ, 2009</p> <p>3. http://www.invocom.et.put.poznan.pl/~invocom/C/P1-9/swiatlowody_en/index.htm</p> <p>4. http://www.rp-photonics.com/encyclopedia.html</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Participation in classes	15	
3. Selfstudy	43	
4. Exam	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	52	2
Practical activities	30	1