STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Optical Signal Processing and Transmission		**1010803111010834611**
Field of study **Communications Technologies**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**
Elective path/specialty **-**	Subject offered in: **English**	Course (compulsory, elective) **elective**
Cycle of study: **Doctoral studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **-**		No. of credits **2**
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 %) **100 2%** **100 2%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Has a systematic knowledge, together with theoretical background, of optoelectronics and opto-telecommunication.
2	**Skills**	Is able to formulate a design specification, analyze the operation of, evaluate and compare design solutions for fiber optics communication systems. Is also able to propose the configuration and implementation of such systems.
3	**Social competencies**	Is aware of the main problems and challenges facing photonics and optical telecomunication in the 21st century.

Assumptions and objectives of the course:

Understending of theoretical foundations and operations of all optical processing and transmission techniques. Understending current limitations and development trends.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. He has in-depth knowledge in the field of all optical signal processing and transmission - [SD_W02]

Skills:

1. Able to independently formulate and verify research hypotheses - [SD_U02]

Social competencies:

1. Can in an understandable way to disseminate knowledge of the achievements of science and technology - [UD_K03]

Assessment methods of study outcomes

Oral examination

Course description

Optical nolinearity
Major nonlinear effects in optical fibers
Self-Phase Modulation (SPM)
Cross-Phase Modulation (XPM).
Four-Wave Mixing (FWM), parametric gain
Nonlinear Optical-Loop Mirrors (NOLM), Sagnac type interferometers
Mach-Zehnder configuration
Semiconductor optical amplifiers - nonlinear properties
Cross Gain Modulation (XGM)
EDFA based optically controlled switches and gates
Ultrafast optical switching techniques
Wavelength conversion of WDM channels
All optical multiplexing
High-speed optical signal processing
All-optical regeneration schemes
SAW based optical signal processors

Advanced optical data modulation formats
Light modulation devices: PM, IM, EAM and MZM
Amplitude Shift Keying transmitters and receivers
Phase Shift Keying transmitters and receivers
DQPSK system advantages and limitations
100G PolMux 16QAM optical system: Bandwidth limitation, Chromatic dispersion, Polarization crosstalk, LDs phase noise problems

Basic bibliography:

1. G. P. Agraval, Nonlinear Fiber Optics, Academic Press, Londyn
2. IEEE Photonics Technology Letters, A publication of the IEEE Photonics Society
3. IEEE Journal of Lightwave Technology, A joint IEEE / OSA publication

Additional bibliography:

1. J. M. Senior, Optical Fiber Communications: Principles and Practice, Prentice Hall, N. York, 2009
2. E. Desurvire, Erbium Doped Fiber Amplifiers, John Wiley & Sons Ltd.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Selfstudy	45

Student's workload

Source of workload	hours	ECTS
Total workload	60	2
Contact hours	17	1
Practical activities	0	0