

Faculty of Electrical Engineering / ELECTRONICS, TELECOMMUNICATIONS AND COMPUTERS / Optical communications

Course:	Optical communications			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
142	Mandatory	6	6	3+1+.5
Programs	ELECTRONICS, TELECOMMUNICATIONS AND COMPUTERS			
Prerequisites	There are no strings attached.			
Aims	Students get acquainted with the basic elements of signal transmission by optical communication systems. Types of optical fibers, propagation mechanisms in optical fibers, modulation procedures, measurements on optical fibers, phenomena that limit the speed of signal propagation in optical fibers, basic principles of optical switching systems and wavelength multiplexing including DWDM are studied. Students are also introduced to optical accessories and tools and basic types of fiber optic cables.			
Learning outcomes	After passing this exam, the student will be able to: - Gain a general insight into the concept of optical communications. - Understands the way light propagates through optical fibers and identifies the problems that occur in that process. - Explain the essential characteristics of an optical transmitter and receiver. - Explain the characteristics of network hubs in optical networks. - Understands wavelength multiplexing. - Establishes an optical connection and parameterizes its characteristics.			
Lecturer / Teaching assistant	Prof. dr Zoran Veljović			
Methodology	Lectures, exercises, consultations, independent work.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introduction. Evolution of optical communication systems.			
I week exercises	Challenges in the development of optical communication systems.			
II week lectures	Optical fibers. Propagation through optical fibers. Impulse response of the fiber.			
II week exercises	Analysis of the optical fiber structure.			
III week lectures	Effects of dispersion and attenuation on optical fiber.			
III week exercises	Analysis of dispersion types on optical fiber.			
IV week lectures	Cables with optical fibers. Optical connectors, adapters, optical accessories and tools.			
IV week exercises	Familiarity with different types of optical fibers.			
V week lectures	Optical transmitters, laser amplification, types of laser feedback, dynamic characteristics.			
V week exercises	By getting to know passive optical elements.			
VI week lectures	Optical receivers, photodetectors. Noises.			
VI week exercises	Analysis of operation of optical transmitters.			
VII week lectures	Transmitter and receiver design. Power and bandwidth criterion.			
VII week exercises	Analysis of operation of optical receivers			
VIII week lectures	Colloquium.			
VIII week exercises	Colloquium.			
IX week lectures	Transmission limitations due to linear and non-linear distortions.			
IX week exercises	Analysis of distortion during optical fiber transmission.			
X week lectures	Optical network components.			
X week exercises	Familiarization with optical network components.			
XI week lectures	Optical network with wavelength multiplexing (WDM).			
XI week exercises	Analysis of WDM multiplexes.			
XII week lectures	Optical switches and optical ADM.			
XII week exercises	Analysis of operation of optical switches.			

XIII week lectures	Measurements of optical link parameters.					
XIII week exercises	Measurements of parameters on a specific optical link.					
XIV week lectures	Carrying out professional practice with telecommunication operators.					
XIV week exercises	Carrying out professional practice with telecommunication operators.					
XV week lectures	Defense of seminar papers.					
XV week exercises	Defense of seminar papers.					
Student workload						
Per week			Per semester			
6 credits x 40/30=8 hours and 0 minuts 3 sat(a) theoretical classes 0 sat(a) practical classes 1 excercises 3 hour(s) i 30 minuts of independent work, including consultations			Classes and final exam: 8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts Total workload for the subject: 6 x 30=180 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 36 hour(s) i 0 minuts Workload structure: 128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)			
Student obligations			Regular attendance at all forms of teaching.			
Consultations			In agreement with the students.			
Literature			[1] Aleksandar Marinčić, Optical telecommunications, University of Belgrade, Belgrade, 1997. [2] John M. Senior, Optical Fiber Communications, Principles and Practice, 2nd Edition, Pearson Education Ltd, 1992. [3] M. Bjelica, P. Matavulj, D. Gvozdić, Collection of tasks from optical telecommunications, academic thought, Belgrade, 2005.			
Examination methods			The colloquium carries 50 points, and the final exam 50 points.			
Special remarks						
Comment						
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points