Course Name : Fiber Optics

Course Code	Course Type	Regular Semester	Lecture (hours/week)	Seminar (hours/week)	Lab. (hours/week)	Credits	ECTS
CMP 218	B	Spring	2.00	0.00	2.00	3.00	6.00

Lecturer	Anxhela Gjecka, Msc
Assistant	
Course language	Albanian
Course level	Bachelor
Description	The course aims to examine the basic principles used for data transmission via fiber optic cables; covers light theory, refraction, reflection, critical angle, cable modality, optical source operation, optical transmitter circuits, optical detector operation, optical receiver circuits, optical amplifier analysis, optical multiplexing techniques, FO systems design and optical networks.
Objectives	At the end of this course the student will be able to: Know the principles of operation of optical fibers and their characteristics Describe how optical fibers transmit optical light Identify the components of optical fibers Describe the technical advantages of optical fibers Describe the differences between monomode fibers (single mode) and multimode (multimode) Explain the refractive index Describe the advantages and disadvantages of copper and fiber optics Identify different cable constructions: Simplex, Zipcord, Tightpack, Breakout and Armored Cables Describe different cable installation modules Demultiplexing in fiber optic systems Identify different fiber optic connectors Demonstrate different fiber optic connection techniques Describe fiber optic security procedures Test and solve fiber optic cable problems, test source, OTDR, tracker of the inspection microscope
Core Concepts	Monomode fibers 2. Multimode fiber 3.Laseri 4. Optical amplifiers 5. Optical sources

Course Outline

Week	Topic
1	Introduction to telecommunications and fiber optics. Optical fibers - Basic concepts. Fiber classification, structure, properties. Step-index fiber.
2	Light sources and transmitters. Basic innovations. LEDs. Laser diodes. Working principle. Superluminishente diodes. Characteristics of laser diodes. DFB laser diodes.
3	Extinction; Loss from bending; Emissions; absorption; Calculations for total extinction; Extinguishing measurement. Intermodal and chromatic dispersion.
4	Optical Fiber. A deeper lookThe propagation of electromagnetic waves: Wave equations; Ways. Modal theory. Linear polarization (LP) modes. Cutoff wavelength.
5	Fibrates singlemode. Working principle. Extinctions: Losses from bends; diffusion and absorption. Chromatic dispersion
6	Conventional fibers with displaced and flattened dispersion. Dispersion of polarization modes (PMD).
7	Modal theory. Compensation for chromatic dispersion in singlemode optical fibers. Nonlinear effects on a single mode fiber. Mixing four waves (FWM). Tendencies in fiber design.
8	Intermediate exam

9	Light sources and transmitters. A deeper look. Transmitter modules. Functional block diagrams and typical circuits of an optical transmitter. Optical receivers. P-n, p-i, and avalanche photodiodes.
10	Signal-noise ratio and equivalent noise power. Sensitivity and Quantum limit. Functional block diagrams and typical circuits of an optical receiver. Design of receiving circuits.
11	Fiber optic networks: Components of fiber optic networks. Point-to-point connections. Transmitters and receivers in fiber optic networks.
12	Fiber-rich fiber amplifiers, EDFA. Other types of optical amplifiers. Passive components, switches and functional modules of fiber optic networks
13	Optical fiber optic network architecture. Networks, Protocols and Services
14	SONET / SDH Networks and WDM / DWDM Networks. Optical fiber network management and their future.
15	Repetition, presentation of course assignments
16	Final Exam

Prerequisites	The student must attend the course at a minimum rate of 75%.
Literature	• R. Miho, Komunikimet me fibraoptike, 2011, Julvin 2, ISBN 99927-0-141-2; • G. P. Agraëal, Fiber Optic Communication Systems, 1998, J. Ëiley& Sons, Neë York, ISBN 0-471-17540-4; • J. C. Palais, Fiber Optic Communications, 1998, Prentice Hall, ISBN 0-13-895442-9; • P. Tomsu Ch. Schmutzer, Next Generation Optical Netëorks, 2002, Prentice Hall, ISBN 0-13-028226-x; • J. G. Proakis, M. Salehi, Communication Systems Engineering, 2002, Prentice Hall, ISBN 0-13-061793-8
References	• Optical Fiber Communications by John Senior, 3rd Edition, Prentice Hall, 2009; • Fiber Optic Communications, by Joseph Palais, fifth edition, Prentice Hall, 2004 • Fiber optics: principles and practices, by Abdul Al-Azzaëi, CRC press,2006

Course Outcome

1	Graduates with sufficient theoretical and practical training for a successful profession and with the ability to apply basic scientific knowledge in the use of optical fibers.
2	Graduates with professional skills and training in the description, formulation, modeling and analysis of fiber optic problems, with consideration for appropriate analytical solutions in all necessary situations.
3	Graduates with the necessary technical, academic and practical knowledge, and application confidence in the design and evaluation of machinery or mechanical systems or industrial processes with a view to productivity, feasibility and social and environmental aspects.
4	Ability to identify potential sources of information or knowledge about a given issue.
5	Graduates with the practice of selecting and using appropriate techniques and tools in fiber optic problems, and the ability to use information technologies effectively.
6	Ability to design and conduct experiments, data collection, analysis and drawing conclusions.

Course Evaluation

In-term Studies	Quantity	Percentage
Midterms	1	30
Quizzes	0	0
Projects	1	20
Term Projects	0	0
Laboratory	0	0
Class Participation	0	0
Total in-term evaluation percent		**50**
Final exam percent		**50**
Total		**100**

ECTS Workload (Based on Student Workload)

Activities	Quantity	Duration (hours)	Total (hours)
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64
Study hours outside the classroom (Preparation, Practice, etc.)	14	4	56
Duties	1	6	6
Midterms	1	4	4
Final Exam	1	4	4
Other	4	4	16
Total Work Load			**150**
Total Work Load / 25 (hours)			**6.00**
ECTS			**6.00**