

EC524 Optical Communications**COURSE INFORMATION**

Prerequisite	Academic Year & Level		Teaching Methods			Credit Hrs.
	Year	Semester	Lecture	Tutorial	Laboratory	
EC422 -	5	10	2	2	0	3

COURSE AIM

The course introduces the principal components in the optical communication system, including: optical fibers, light sources, optical amplifiers and light detectors. It also introduces optical transmission and reception. The course plans to construct an adjusted a high capacity and minimum loss optical communication system using different multiplexing techniques.

COURSE WEEKLY CONTENTS

- 1 Historical development: Historical background on communications, communication channels, light sources and detectors. General optical communication system. Advantages of optical fiber communications.
- 2 Optical Fiber Waveguide: Ray theory transmission, Fiber acceptance angle and numerical aperture. Fiber types.
- 3 Electromagnetic theory for optical propagation – Normalized frequency of the optical fiber - Linearly polarized modes in optical fibers.
- 4 Transmission Characteristics in Optical Fibers: Polarization – Attenuation: absorption, scattering, macro bending and micro bending.
- 5 Transmission Characteristics in Optical Fibers: Dispersion: definition and types – Bit rate calculation – Material and Waveguide Dispersion.
- 6 Dispersion modified single-mode optical fibers – Intra modal dispersion – Overall dispersion
- 7 Fiber Fabrication – Fiber Cable Design – Fiber Connection: Couplers + Mid term Exam.
- 8 Fiber Connection: Fiber splicing – Joint Loss: Fresnel reflection.
- 9 Optical Sources: Requirements of light sources - Concept of light emission – spontaneous emission – stimulated emission
- 10 Laser: Operation and types - Injection laser diode – Optical source limitations.
- 11 Wavelength Converter – Optical Amplifiers.
- 12 Light Detectors: Requirements - Photodetectors: Quantum efficiency and responsivity photodiodes + Mid term Exam.
- 13 Optical Transmitter and Receiver: Optical transmitter circuits Optical receiver circuits.
- 14 Optical fiber systems: Devices requirement, Optical fiber communication systems - Digital system, planning considerations.
- 15 Optical Fiber Communication Systems: System Adjustment: power budget and rise time budget.

STUDENT GRADING & ASSESSMENT

Weeks	Exams	Assign.	Quizzes	Reports	Present.	Lab.	Total
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1 to 7	20 Midterm	←	10 MARKS	→	30
To be freely distributed among possible assessments					
8 to 12	←	20	MARKS	→	20
13 to 15	←	10	MARKS	→	10
16 or 17	40 Final				40
Total	Exams	Assign.	Quizzes	Reports	Present.
				Lab.	100

REFERENCES

Textbook Djafar K. Mynbaen and Lowell L. Scheiner, "Fiber-Optic Communications Technology ", Prentice Hall.

Other • Gerd Keiser, "Optical Fiber Communications'.