EC539 Photonic Devices

C O U R S E I N F O R M A T I O N

Prerequisite		Academic Year & Level		Teaching Methods			Credit Hrs.
		Year	Semester	Lecture	Tutorial	Laboratory	
EC233	-	5	10	2	2	0	3

C O U R S E A I M

The student should be familiar with the photonic devices used in the optical domain: theory and applications.

C O U R S E W E E K L Y C O N T E N T S

1	Introduction to the optical field, the nature of light and the principle of transmitting data over light beams. Differentiation between optical and RF communications
2	All-optical switching, routing and networking. Introduce the main photonic devices required throughout such networks
3	Optical sources: Light production, stimulated absorption, spontaneous emission and stimulated emission
4	Light Emitting Diodes (LEDs); The semiconductor junction diodes, principle of operation
5	Lasers; laser diode, principle of operation, population inversion and amplified spontaneous emission (ASE) noise
6	Comparison between LED and Laser main characteristics; Data rate, coherence, output power, wavelength range, wavelength spectral width and cost.
7	Optical detectors: Introducing the parameters that measures the performance of photodetectors + Mid term Exam.
8	Photoconductors: Undoped semiconductors and practical photoconductive detectors principles of operation and comparison
9	Photodiodes: P-N photodiodes and P-I-N photodiodes principles of operation and comparison. Phototransistors
10	Fiber Bragg Gratings (FBGs); Construction, theory, principle of operation and characteristics.
11	Fiber Bragg Gratings (FBGs); Different types (uniform, chirped, blazed and phase-shifted) and their applications.
12	Optical Amplifiers: Amplification process and comparison between in-line and waveguide amplifiers +Mid term Exam
13	In-line amplifiers: Erbium Doped Fiber Amplifier (EDFA); Construction, principle of operation, performance and characteristics.
14	Waveguide amplifiers: Semiconductor Optical amplifier (SOA); Construction, principle of operation and limitations.
15	Semiconductor Optical Amplifiers (SOAs); Different types, characteristics, parameters, measurements and applications.

S T U D E N T G R A D I N G & A S S E S S M E N T

Weeks	Exams	Assign.	Quizzes	Reports	Present.	Lab.	Total
1 to 7	20 Midterm	←	10 MARKS To be freely distributed among possible assessments			→	30
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

R E F E R E N C E S

Textbook Endel Uiga, Optoelectronics, Prentice-Hall, 1995.

Other

- J. Senior, Optical Fiber Communications :Principle and Practice, 2nd ed., Prrentice-Hall, 1992.
- J. Wilson and J.F.B. Hawkes, Optoelectronics: An Introduction, Prrentice-Hall, 1983.