Course Code	ECE34
Course Name	Optical Communications Systems
Credits	4
Course Offered to	UG/PG
Course Description	To introduce students to the fundamental principles of modern fiber-optic communication systems which include components and system design of optical fiber communication and apply these principles to calculate system performance. Topics include step-index fibers, graded-index fibers, fiber modes, single-mode fibers, multimode fibers, dispersion, loss mechanics, fiber fabrication, light-emission processes in semiconductors, light-emitting diodes, laser diodes, modulation response, source-fiber coupling, photo-detectors, receivers, receiver noise and sensitivity, system design, power budget and rise-time budget, Optical networks, wavelength division multiplexing (WDM) and coherent optical communications.

Pre-requisites		
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requiste (Other)
ECE240 Principles of Communication Systems	None	

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)			
CO1	CO2	CO3	CO4
Students are able to analyze, compare the most important devices used in optical communications system: light sources, fibers and detectors from both physical and system point of view.	Students are able to design digital fiber-optic links	Students are able to perform fiber-optic communication system engineering calculations, identify system tradeoffs, and apply this knowledge to modern fiber optic systems.	Students are able to get practical exposure to Optical Communication software tool that will help understand various trade-offs involved when designing an optical communication link.

Weekly Lecture Plan			
Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
Week 1,2	Evolution of Light wave systems, System components, Optical fibers, Step Index & Graded index Mode theory, Fiber modes,	C01	
Week 3-4	Dispersion in fibers, Limitations due to dispersion, Dispersion shifted and dispersion flattened fibers, Fiber Losses and Non-linear effects	C01	
Week 5-6	Basic concepts, LED's structures, Spectral Distribution, Semiconductor lasers, Structures, Threshold Conditions, Transmitter design.	C01 C02	

Week 7-8	Basic Concepts, PIN and APD diodes structures, Photo detector Noise, Signal impairments, Receiver design.	C01 C02	2 Assignments and term paper
Week9	Amplifiers: Basic concepts, Semiconductor optical amplifiers, Raman, Brillouin amplifiers, Erbium doped fiber amplifiers, pumping requirements, Cascaded in-line amplifiers.	C03	
Week 10-11	Power budget and banwidth limited point-to-point lightwave system, OSNR evaluation in high speed optical transmission systems, Dispersion Management, Nonlinearity management.	C03 C04	
Week 12	Basic coherent systems, Coherent detection principles, Homodyne and heterodyne detection,	C03 C04	
Week 13	WDM Lightwave Systems, WDM Components, WDM System Performance Issues	C03 CO4	

*Please insert more rows if required

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Assessment Plan

Type of Evaluation	% Contribution in Grade
Mid-sem	25
End-sem	45
Project	20
Assignment	10

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	G. Keiser, "Optical Fiber Communication Systems", McGraw Hill, New York 2000.
Textbook	John M. Senior, "Optical Fiber Communications: Principles and Practice" (second edition) Prentice Hall of India