411 CNE Course Syllabus

Course Code	411 CNE
Course Name	Fiber Optics Communications
Credit Hours	3
Contact Hours	4
Instructor Name	Dr. Attaullah Khawaja

Text Book (title, author, and year)
• Optical Fiber Communication, Mc Graw hill, 2e, Gerd Kieser 1991 • Optical fiber communication, John M Senior, 3e, 2009

Specific Course Information	
Catalog Description	The course introduces basics of light waves and their propagation, modes, elements of optical systems, basic optical networks, and a design approach to point-to-point fiber links, star, bus and ring topologies.
Prerequisites	Wireless Communication, CNE 322
Co-requisites	NIL
Required/Elective	Required

Course Learning Outcomes	
1	To list the mathematical methods needed for modelling fiber optics and dispersion calculation
2	To explain the optical fiber basics, wave propagation mechanism, and their designing issues.
3	To design transmitter and receiver for optical fiber communications and conduct experiments for implementing them.
4	To conduct experiments and develop experimental skills for optical fiber communications to meet desired needs using realistic constraints.
5	To recognize the impact of optical fiber and its necessity for modern communication networks.
6	To perform calculations for optical fiber link and dispersion using modern simulation tools.
7	To exhibit the liability and professionalism when using modern issues of fiber optic communications.

Mapping course LOs to the SLO.												
Course LOs #	Student Learning Outcomes											
	a1	a2	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
1	√											
2			√									
3			√	√								
4				√	√							
5						√						
6							√					
7									√			

List of Theory Topics

Introduction to optical fiber: Fiber Types, Optical Fiber Modes and Configurations, Wave Representation in a Dielectric **Slab** Waveguide, Mode Theory for Circular Waveguides.
Signal Degradation in Optical Fibers: Attenuation, Absorption, Losses, Signal Distortion in Optical Waveguides, and Information Capacity Determination.
Source-to-Fiber: Power Launching, Equilibrium, Numerical Aperture, Lensing Schemes for Coupling Improvement, Non imaging Microsphere, Laser Diode-to-Fiber Coupling, Fiber-to-Fiber Joints, LED Coupling, Fiber Splicing Techniques, Optical Fiber Connectors**.**
Basic Applications and Types of Optical Amplifiers, Semiconductor Optical Amplifiers, EDFA Architecture, EDFA Power-Conversion Efficiency and Gain, Operational Principles of WDM.

List of Lab Experiments

1. Introduction to Optical Fiber Lab.
2. Study of 650 nm Single Mode Fiber Optic Analog link and Digital Link.
3. Measuring Bending and attenuation losses.
4. FM and PWM and power coupling.
5. Setting up the LED Source and Optical Power Meter (OPM).
6. Installation of ST Type Connector.
7. Splice and fuse the given optical fiber cables using Fusion Splicer?
8. Finding Numerical Apertures
9. Measuring Optical Power with OPM and Oscilloscope.
10. Transmitting and receiving Analog Signal over a fiber optic cable.
11. Transmitting and receiving Digital Signal over a fiber optic cable.