


AMOU UNIVERSITY
“A Vehicle for Peace and Development”
AMOU UNIVERSITY



FACULTY OF COMPUTING AND ICT

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY PROGRAMME

ACADEMIC YEAR 2015/ 2016

COURSE DESCRIPTION

BIT 424	Fiber Optic Communication System	
Contact Hours	52	
Pre-requisite	BIT 326 Local Area Networks BIT 325 Wireless and Mobile Communications	
Purpose/Aim	<ul style="list-style-type: none"> • The course introduce students to the field of fiber-optic communication system like Semiconductor diode lasers, internal modulation, electro-optic modulation, coherent and incoherent detection, optical fibers and their properties, optical amplifiers, communication systems, optical networks, splicing, Wavelength division multiplexing, SONET/SDH, losses in fiber optics and terminators and how to install fiber optics. 	
Course Objective (Indicative Outcomes)	Objective Learning	<ul style="list-style-type: none"> • Understand the functionality of each of the components that comprise a Fiber-optic communication system: transmitter, Fiber, amplifier, and receiver. • Understand the properties of optical Fiber that affect the performance of a communication link. • Understand how semiconductor lasers work, and differentiate between direct modulation and external electro-optic modulation. • Understand how we connect Fiber optics with each other by using connectors, splicing techniques like fusion and mechanical and the Decibel that they do belong. • Understand basic optical amplifier operation and its effect on signal power and noise in the system. • Apply concepts listed above to the design of a basic communication



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	link.
Course Content	<ul style="list-style-type: none"> • Introduction to Fiber Optic Communication System. <p>Historical Developments of Fiber Optics; General Optical Fiber Communication System; Advantages of Optical Fiber Communication; Optical Fiber wave guides; Electromagnetic Spectrums; Ray transmission theory; Reflection, Refraction, Refractive index, Snell’s law, Critical angle, Total Internal Reflection(TIR)</p> <ul style="list-style-type: none"> • Optical Fiber as wave guide <p>Propagation in optical Fiber; Acceptance angle; Numerical Aperture (NA); Types of Rays; Modes of Fiber; Fiber profiles; Step index Fiber; Graded index Fiber; Comparison of step index and graded index; Optical Fiber Configuration; Mode theory for circular waveguide; Maxwell’s Equation</p> <ul style="list-style-type: none"> • Single Mode Fibers <p>Cutoff Wavelength; Mode field diameter and spot size; Fiber material; Fiber fabrication methods; Outside vapour-phase oxidation (OVPO); Vapour phase axial deposition; Double crucible methods</p> <ul style="list-style-type: none"> • Signal Distortion in optical Fiber <p>Attenuation; Attenuation units; Absorption; Absorption by atomic defects; Extrinsic absorption; Intrinsic absorption; Rayleigh scattering losses; Bending loss; Core and cladding losses</p> <ul style="list-style-type: none"> • Information Capacity Determination <p>Group delay; Material dispersion; Wave guide dispersion; Modal dispersion; Signal distortion in single mode; Basic propagation equation; Chirped Gaussian pulses; Polarization mode dispersion</p> <ul style="list-style-type: none"> • Connectors and Splicer’s <p>Connector types; Installing Fiber Optic Connectors; Connector return loss; Fiber splicing; Types of splicing; Fusion of splicing; Mechanical splicing / V Groove; Fiber joints and their problems</p> <ul style="list-style-type: none"> • Optical Sources <p>Light Emitting Diodes (LEDs); LED structure; Light source material; Injection Laser Diode (ILD); Laser Diode modes and threshold condition; Comparison of LED and Laser.</p>



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	<ul style="list-style-type: none"> Optical System Design <p>System design consideration; Multiplexing; System architecture; Point to Point links; Link power budget; System consideration; Rise time budget; Distributed Networks; The National Regulatory Authority</p>		
Learning & Teaching Methodologies	Lectures, tutorials and visiting communication companies whenever possible		
Instructional Materials/Equipment	Classroom with audio visual aids Computer videos		
Course Assessment	Type		Weighting (%)
	Final Examination		60
	Mid Term Examination		20
	Assignment		10
	Attendance		10
	Total		100
Recommended Reading	Title	Author	Publisher
	Guide to industrial Fiber Optics	Forest Groeve S. Anila	Relcom Inc (1999)
Additional Reading	Fiber Optic Data Communication	Casimer DeCusatics	Paughkeepsie
	Fiber Optics	Fidor Mitschke	Springer (2001)
Other Support Material	To get more knowledge about Fiber optics you are recommended to read transmission medium related books and Optical communication books		