**C0URSE OUTLINE**

**BCT 2305 DATA COMMUNICATIONS**

1. **PURPOSE**

**1.1 COURSE OBJECTIVES**

**1.2 COURSE DESCRIPTION**

Communication components. Circuit and packet switching, layered network architecture, ISO Network protocols such as TCP/IP, SPX, Device interface standards, Data transmission media characteristics, data representation and modulation schemes, Error control schemes, error correction schemes, information compression techniques. Information encryption. Data communication networks. High speed data communication systems, such as ISDN, HDSN, ATM. Signaling. Performance analysis of data communication systems. Flow control and alternate routing strategies and algorithms. Various types of networks and interconnections, and network security and privacy. Traffic engineering, planning and forecasting methodologies as applied to data communications.

**1.3 TEACHING METHODOLOGY**

The course will be taught using lectures, case studies with practicals, class presentations and research assignments.

**1.4 COURSE EVALUATION**

Continuous assessment tests (CATs) will constitute 30% of the total marks and University examinations 70% to make a total of 100 marks. All deadlines for submission of assignments MUST be observed.

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| **1.5 CORE TEXTBOOKS**  **1.6 SUPLEMENTARY READINGS**  **REFERENCES BOOKS** |

**Week 1-3: Overview and Network Models –** Definition, components of communication - representation- text, numbers, images, audio, video – Data flow – simplex, half duplex, full duplex – Network attributes – performance, reliability, security – Physical structure – type of connections, topology – Categories – LAN, WAN, MAN – Inter connection - circuit, packet – protocols – standards – layered approach – ISO OSI model – functions of layers.

**Week 4-6:** Data Transmission-Physical Layer and Media -Analog and digital – data, signals – Periodic analog signals – sine wave, phase, wave length, time and frequency domains, bandwidth – digital signals – bit rate, bit length – digital transmission – base band, broad band – impairments – attenuation, distortion, noise – analog to digital – PCM– Transmission modes – parallel, serial , asynchronous, synchronous – digital to analog – ASK, FSK, PSK – analog to analog – AM, FM, PM – Multiplexing – FDM, WDM, TDM. Transmission Media . Guided Media – twisted pair, co-axial, fiber optic – unguided – wireless – radio, micro wave, infrared – switched networks – circuit switched – packet switched – datagram, virtual circuit – switch – structure – space division – time division – structure of packet switch

**Week 7-8:** Data link layer. Error Detection and Correction. Data Link Control and Protocols.- terms – types of errors, redundancy, detection versus correction, coding – coding schemes – block code , parity check – cyclic codes – CRC– check sum – forward error correction Random and Controlled Accesses. forward error correction –framing – character oriented, bit oriented – flow and error control – DLL protocols – Simple, Stop and wait – HDLC – Point to point protocol– ALOHA, CSMA, CSMA/CD.

**Week 9-10:** Network and Transport layer. Logical Addressing. IPv4 and IPv6 Protocols.. Address Mapping, Error Reporting, and Multicasting . Packet Delivery, Forwarding, and Routing Transport layer 20. Transport layer in the Internet (UDP, TCP, SCTP) (23) 21. Congestion control and Quality of Service (QoS).

**Week 11: Application layer Domain Name System (DNS). Remote Logging, Electronic Mail and FTP.. World Wide Web and HTTP. Network Management. Multimedia**

**Week 12 : Security . Cryptography . Message Security, User Authentication, and Key Management. Security Protocols, Virtual Private Networks (VPNs) and Firewalls**