**COURSE OUTLINE FOR DATA COMMUNICATION**

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**Course Code :**

**Contact Hours: 45HOURS**

**Credit Units : (3CU)**

**Pre-requisite: DATA COMMUNICATION**

1. **Course Introduction**

This course introduces the basics of data communication and networking. Students will develop an understanding of the general principles of data communication and networking as implemented in networks connected to the Internet. Specific attention will be given to the principles of network architecture and layering, multiplexing, network addressing, routing and routing protocols. And then finally, WAN technologies such broadband communication and other issues like call billing, technologies used among others.

1. **Goals/Aims**

This course aims to equip students with networking and data communication knowledge and how they can use it to develop networks being integrated with other hardware gadgets like routers, switches to mention but a few.

1. **Learning outcomes**

By the end of this course, the student will be able to:

1. Describe layered communication, the process of encapsulation, and message routing in network equipped devices using appropriate protocols.
2. Manage networks
3. Understand the WAN technologies, voice calls, call centers, billing process and customer management in data communication.
4. **Learning and teaching Methodologies**

* Lectures
* Tutorials
* Lab sessions

1. **Course Assessment**

Class Project presentation………………………………………………………..20%

Group Discussions……………………………………………………………….10%

Individual Test …………………………………………………………………..10

Final Examination………………………………………………………………..60%

Total………………………………………………………………………………100%

1. **Course Contents**
   * 1. **Unit 1: Overview of Network fundamentals [3 Hours]**

Network elements: LAN, WAN, Host, Workstation, Server; Physical topologies: bus, star, ring, mesh, backbone; Physical media: coaxial cable, twisted-pair cable, fiber optics; Common network connectivity devices: NIC, hub, switch, bridge, router, and other devices.

* + 1. **Unit 2: Networking models [6 Hours]**

Layers task, sender, receiver, carrier; The OSI and TCP/IP models, difference between the two models

* + 1. **Unit 3: Data and signals [6 Hours]**

Analog and digital; Periodic analog signals; Digital signals; Attenuation, Distortion, Bandwidth, Throughput, Latency; Digital to digital conversion; Analog to digital conversion.

* + 1. **Unit 4: Transmission media [6 Hours]**
* Guided media: Twisted-pair cable, Coaxial cable, Fiber optics cable, advantages and disadvantages of each;
* Unguided media: Radio waves, Microwaves, Infrared, Bluetooth, Wi-Fi, Wi-Max
* Assignment: Project One
  + 1. **Unit 5/6: Connecting LANs and Wireless LANS [6 Hours]**

Backbone networks; Virtual LAN; Cellular telephony; Satellite network; SONET/SDH (architecture, layers); Frame relay; ATM

* + 1. **WAN Technologies and Customer Management:** **[9 Hours]**
* Broadband Communication Technologies; Billing and Customer Management: Voice Calls and the Billing process, Billing standards, Call detail records and Call Centers, Technologies used in call centers.
* Assignment: Project Two
  + 1. **Unit 7: Domain Naming System [6 Hours]**

Name space; Domain name space; DNS in internet; Resolution, DNS message, Types of records; Remote login, electronic mail and file transfer; E-mail architecture, message user agent, message access agent, message transfers; SMTP, POP, IMAP, FTP, web based mail

* + 1. **Unit 8: Network Management SNMP [6 Hours]**

Network management system: Configuration management, fault management, performance management; SNMP: concept, management concept, structure of management, information management, information base, lexicographic ordering.

* + 1. **Unit 9: Network security [6 Hours]**

Cryptography; Symmetric-Key cryptography; Asymmetric-Key cryptography

* + 1. **Unit 10**: Project Presentation **[3 Hours]**
    2. **Review & Final Exam [3 Hours]**

**h) Recommended text books**

1. Curt M. White (2012), Data Communications and Computer Networks: A Business User's Approach.
2. Andrew S. Tanenbaum (2003), Computer networks. Andrew S. Tanenbaum.
3. Larry L. Peterson et al (2011), Computer Networks: A Systems Approach.
4. Larry L. Peterson et al (2003), Computer Networks: A systems Approach, 3rd Ed. Morgan Kaufmann Pub, Inc.
5. S. Haykin et al (2001), Communication Systems, 4th Ed. John Wiley & Sons.

S. Keshav (1997), An Engineering Approach to Computer Networking, Addison Wesley Longman,