Course Title: WANs and Communication Protocols

Course Code: EE3016

Units: 3

Level: B3

Course Aims and Objectives:
The aim of this course is to explore both the architectural principles and the mechanisms required for the exchange of data among computers, workstations, servers, and other communication systems. It is also to examine the internal mechanisms and technologies that have been developed to support voice, data, and multimedia communications over Wide-Area Networks (WANs).

The primary objective of this course is to provide both a high-level theory and detailed analysis of protocols, operation, standards, technologies, for WANs. The course also focuses on the practical application of the technology, rather than a dry review of the standards or a parochial view of the technology from the protocol level.

Intended Learning Outcomes:
On completion of this course, the students will be able to

1. Encode data for error detection and evaluate the performance of various ARQs
2. Explain and describe the principles of circuit switching
3. Analyze and design circuit switches
4. Recognize the design principles of the wide area networking technologies covered in this course
5. Apply the routing algorithms covered in this course

Syllabus:
Data Link Layer
Data Link Design Issues, Error Detection and Correction, ARQ Protocols, Window Flow Control, HDLC Data Link Control, Point-to-Point Protocol

Circuit Switching
Circuit-Switching Networks; Digital Switching Concepts: Space-Division and Time-Division Switching; Routing in Circuit-Switched Networks; The Telephone System.

Packet Switching
Packet Switching Techniques; Virtual Circuits and Datagrams; Comparison of Circuit Switching and Packet Switching; Routing and Congestion Control; X.25 Networks: Packet Format, Flow and Error Control.

Frame Relay
Origins and Structure of Frame Relay Network; Frame Relay Protocol Architecture; Frame Relay Call Control; Congestion control

ISDN
Overview of ISDN; ISDN Interfaces and Functions; ISDN Protocol Architecture: Physical, Data Link and Network Layer

Broadband ISDN and Asynchronous Transfer Mode (ATM)

Optical Networking
General telecommunications concepts, Optical Burst Switching, Alternative technologies for the optical Internet

Laboratory Experiment:
Implementation of data link protocol, selected laboratory exercises from CCNA

Teaching Pattern
Duration of course: 1 semester
Suggested lecture/tutorial/laboratory mix: Lecture Hour 26 Hours
   Tutorial Hour 8 Hours
   Laboratory Hour 18 Hours

Assessment Pattern:
Examination duration: 2 hours, at the end of the semester
Percentage of coursework, examination, etc.: 30% CW
   70 % Exam

For a student to pass the module, at least 30% of the maximum mark for the examination must be obtained, and a laboratory attendance of at least 75% recorded.

Pre-requisites: (Please quote course code and title)
EE3015 Computer Networks
   or
EE2310 Networking I
   or
EE3010 Data Communications and LANs

Pre-cursor: (Please quote course code and title)
Nil

Exclusive Course: (Please quote course code and title)
EE4010 WANs and Communication Protocols (For BEECE & BEECE2 Students ONLY)

Equivalent Courses: (Please quote course code and title)
Nil

Equivalent Old Course Code and Title: (Please quote course code and title)
EE3311 Networking II
   or
EE4010 WANs and Communication Protocols

Textbook:

Reference Book

Dr Sammy Chan/sw


