The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title] Computer Communication Networks

[Course Code] COMP4621

[No. of Credits] 3-credit

[Any pre-/co-requisites] Prerequisite(s): COMP 2611 OR [(ELEC 2300 OR ELEC 2350) AND (COMP 2011 OR COMP 2012H)]

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Course Description

Principles of computer network architectures and communication protocols; the OSI and the Internet reference models; switching and multiplexing techniques; Network applications, data link, network, transport layers with their instantiation in the Internet; local area networks and medium access control protocols; network applications programming and networks protocol monitoring. Background in Probability and statistics is derieable.

List of Topics

- ❖ Introduction
    - ▪ Internet architecture, network edge and core, performance
    - ▪ Protocols
    - ▪ Circuit Switching
    - ▪ Packet Switching
    - ▪ Delay in the Internet
    - ▪ Layered architecture
- ❖ Application Layer
    - ▪ Application layer protocols
    - ▪ Client-Server vs Peer to Peer
    - ▪ Examples of Client-server Application layer protocols: HTTP, DNS
    - ▪ Peer-to-Peer or P2P Application Example
    - ▪ Socket programming.
- ❖ Transport Layer
    - ▪ Transport layer services
    - ▪ Multiplexing and Demultiplexing
    - ▪ UDP
    - ▪ Reliable data transfer (RDT) principles: Stop-and-Wait
    - ▪ Window based pipelined RDT
        - ❖ Go-Back-N (GBN) Protocol
        - ❖ Selective Repeat (SR) Protocol
    - ▪ TCP Basics, Round-Trip Time Estimation and Timeout
    - ▪ TCP Reliable data Transfer
    - ▪ Fast Retransmit, TCP Flow Control & TCP Connection Management

- The basic principles of congestion control
    - TCP congestion control
- ❖ Network Layer: The Data Plane
    - Forwarding and routing
    - Fragmentation and Reassembly
    - IP addressing
- ❖ Network Layer: The Control Plane
    - Control Plan of Network layer Protocols
    - Distance Vector Routing
    - Link State Routing and OSPF
    - Border Gateway Protocol (BGP)
- ❖ Link Layer
    - Link Layer Services
    - MAC layer addressing
    - Multiple access protocols
    - Random Access
    - Switch vs. Router

Ethernet and link-layer switches

Assessments:

Assessment Task	Contribution to Overall Course grade (%)
Mid-Term or equivalent work	25%
Final Exam	40%
Homework (3)	20%
Project	15%
Total	100%

Required Texts and Materials

Computer Networking: A Top-Down Approach. James Kurose and Keith Ross, Pearson (8th Ed.)

[Optional] Additional Resources

Reference books (for socket programming)

Unix Network Programming: The Sockets Networking API. Volume 1 3rd edition, W. Richard Stevens, Bill Fenner, Andrew M. Rudoff. Addison Wesley.