

Course Title: Advanced Computer Networks

Course Code: SAK 5306

Credit: 3 (3+0)

Contact Hours: 3 x 1 hours lecture per week

Semester: Sem. I, 2009/2010

Precondition: Approved by Coordanitor

Objective:

At the end of the course, the students will be able to:

1. understanding the concept, architecture and technologies of computer network which linking to the personal computer, workstations, main frame and supercomputer.
2. able to develop a structure of network system.

Synopsis:

This course will discuss the main latest and advanced concepts on local area network and wide area network. They include the characteristics of physical transmission, access control method, network architecture, logical link control architecture; token bus architecture; token ring architecture, fiber distributed data interface architecture and inter-network architecture. Simulation program to develop network systems will be given in detail.

(Kursus ini akan membincangkan konsep terkini dan lanjutan yang utama dalam rangkaian kawasan setempat (local area network) dan rangkaian kawasan luas (wide area network). Ini termasuk ciri-ciri transmisi fizikal, kaedah kawalan capaian, senibina rangkaian, senibina kawalan pepaut logikal, senibina bas token, senibina gelang token, senibina antaramuka data teragih gentian dan senibina antara-rangkaian. Amali membangun sistem rangkaian akan diberikan dengan mendalam.)

Content:

1. Concept of Computer Network
 - The need of speed and QoS
 - Advanced TCP/IP and ATM Network (/ GE)
2. Protocols and TCP/IP Suite
 - The need of a protocol architecture
 - TCP/IP protocol architecture
 - OSI model
 - Internetworking
3. TCP and IP Protocols
 - Transmission Control Protocol (TCP)
 - User Datagram Protocol (UDP)
 - Internet Protocol (IP)
 - IPv6 and it related
4. Frame Relay and ATM (/GE)
 - Packet switching networks
 - Frame relay networks
 - ATM protocol architecture / GE protocol architecture
 - ATM /GE and it related
5. High Speed LANs
 - Emergence of High Speed LANs
 - Ethernet
 - Fiber Channel
 - Wireless LAN
6. Queuing Analysis
 - Why queue analysis
 - Queue model
 - Single server and Multiserver queues
 - Queues with priorities
 - Network of queues

7. Self Similar Traffic
 - Self Similarity
 - Self similar data traffic and example
 - Performance implications of self similarity
 - Modeling and estimation of self similarity data traffics

8. Congestion and Traffic Management
 - Effects of congestion
 - Congestion and control
 - Traffic management
 - Congestion control in packet switching network

9. Link Level flow and Error Control
 - Need for flow and error control
 - Link control mechanism
 - Automatic Repeat Request (ARQ) performance

10. TCP Traffic Control
 - TCP flow control
 - TCP congestion control
 - Performance of TCP

11. Interior Routing Protocols
 - Internet routing principle
 - Distance vector protocol, Routing Information Protocol (RIP)
 - Link state protocol, Open Shortest Path First (OSPF)

12. Exterior Routing Protocol and Multicasts
 - Path vector protocols, Border Gateway Protocol (BGP) and Inter-Domain Routing Protocol (IDRP)
 - Multicasting

13. Integrated and Differentiated Services
 - Integrated services architecture
 - Queue discipline
 - Random early detection
 - Differentiated services

Evaluation:

Course works	60%
Final examination	40%

Text Book

1. Stalling, W. 2002, *High Speed Network and Internets: Performance and Quality of Service*, New York: Prentice Hall
2. Kumar, A., Manjunath, D. and Kuri, J., 2004, *Communication Networking: An Analytical Approach*, Amsterdam: Morgan Kaufmann
3. Hassan M. and Jain, R., 2003, *High Performance TCP/IP Networking*, New Jersey: Prentice Hall
4. Walrand, J. and Varaiya, P., 2000, *High Performance Communication Networks*, 2nd ed, Amsterdam: Morgan Kaufmann

Reference Books

1. Forouzan, B., 2000, *Data Communications and Networking*, 2nd ed. McGraw-Hill
2. Murthy, C., 2004, *Ad Hoc Wireless Networks: Architectures and Protocols*, New Jersey: Prentice Hall
3. Stevens, W. R. 1999. *UNIX Network Programming: Networking APIs, Sockets, and XTI*. Vol. 1, New Jersey: Prentice-Hall
4. Stevens, W. R. 1999. *UNIX Network Programming: Interprocess Communications*. Vol. 2. 2nd edition. New Jersey: Prentice-Hall.
5. Jun-Ichiro Itojun Hagino, 2004, *IPv6 Network Programming*, Berlin: Elsevier Pub. Co.
6. Stallings, W. 1994. *Data and Computer Communications*. New York: Macmillan Publishing Company
7. Martin, J. 1989. *Local Area Networks: Architectures and Implementations*. Englewood Cliffs, New Jersey: Prentice Hall.
8. *Computer Communication*, Elsevier Pub. Co.
9. *IEEE Network*, IEEE Communications Society.
10. *IEEE Transaction on Networking*, IEEE Communications Society.
11. *International Journal of Network Management*, Interscience, Wiley
12. *Any Journal, white papers and RFCs* related to computer network.