

Course Code
COMP 4621

Course Title
Computer Communication Networks

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.

Prerequisite(s): COMP 2611 or (ELEC2300 or ELEC 2350) and COMP2011 (or COMP2012H); Exclusion(s): COMP 5621, ELEC 3120, ISOM 3180.

Background in Probability and statistics is dericiable.

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

Textbook

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

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.

Grading Scheme

Midterm Exam or equivalent work	25%
Final Exam	40%
Homework (3)	20%
Project	15%
Total	100%

Course Intended Learning Outcomes

- Define the basic principles of computer networks, architecture and protocols.
- Identify the principles of networked applications, including C/S based applications (such as HTTP, FTP, SMTP and DNS) and P2P based applications (such as BT)
- Discuss the major transport layer protocols, such as TCP and UDP.
- Illustrate the principles of routing algorithms and their applications on the Internet.
- Identify basic link layer protocols and the basic medium access mechanism.

Assessment Rubric

N/A