

Computer Networks Course Syllabus

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- Course ID: A05055
- Hours: 48 (lecture: 32; lab: 16)
- Credits: 2.5
- Practice: 1 week
- Applicable:
 - Information Engineering
 - Electronics and Information Engineering
 - Electronic Science and Technology
 - Computer Science and Technology

Course nature and pre-requisites

This course introduces students comprehensive concepts of computer networking. Upon finishing this course, students should have clear understanding about

- Basic Concepts of Data Communication
- Network Infrastructure
- ISO/OSI RM
- TCP/IP Protocol Suite
- Network management
- Network Security

Chapters

1. Introduction to Networks

- History and Evolution of Computer Networks
- The Definition of Computer Networks
- The Classification of Computer Networks
- Network Topologies
- Typical Computer Networks
- Data Communication Services
- The Application of Computer Networks

2. Physical Layer

- Basic concepts in Physical Layer
- Basic concepts in Data Communication
- Transmission media
- Multiplexing
- Data Transmission Systems
- Broadband Access Technology

3. Data Link Layer

- PPP Based Data Link Layer
- PPP Protocol
- Broadcast Based Data Link Layer
- Broadcast Based Ethernet
- Extended Ethernet
- Fast Ethernet
- Other LAN Techniques

4. Network Layer

- The two services provided in Network Layer
- Internet Protocol
- Subnet and Supernet
- ICMP
- Routing Protocols
- IP Multicasting
- VPN and NAT

5. Transmission Layer

- Transmission Layer Protocols
- UDP
- TCP
- How TCP works
- TCP header
- Implementation of TCP transmission
- TCP Flow Control
- TCP Congestion Control
- TCP Connection Management

6. Application Layer

- DNS
- FTP
- TELNET
- WWW
- EMail
- DHCP
- SNMP
- Process Communication over Networks

7. Network Security and Management

- The Importance of Network Security
- Network Security Strategy Design
- Detecting Security Problem
- Firewalling
- Backup/Restore
- Anti-Viruses
- Network Management

8. Audio/Video Services Over Internet

- Concepts
- Streaming
- Interactive Audio/Video
- Improve “Best Effort” Service

9. Wireless Networks

- WLAN
- WPAN
- WMAN

10. Next Generation Internet

- IPv6 (IPng)
- MPLS
- P2P File Sharing

Time Arrangement

1. Introduction: 2 hrs
2. Phy Layer: 6 hrs (lectures: 4, lab: 2)
3. Data Link Layer: 8 hrs (lectures: 6, lab: 2)
4. Network Layer: 12 hrs (lectures: 8, lab: 4)
5. Transport Layer: 10 hrs (lectures: 6, lab: 4)
6. App Layer: 6 hrs (lectures: 4, lab: 2)
7. Network Security 4 hrs (lectures: 2, lab: 2)

Lab tutorial

1. Data transmission media, 2 hrs
2. Data link layer device configuration, 2 hrs
3. Network layer device configuration, 4 hrs
4. Transport layer device configuration, 4 hrs
5. Application layer protocols, 2 hrs
6. Network security, 2 hrs

Practical

1 week campus network based network construction and configuration work, focus on network layer and application layer.

Grading

- Examination: 50% (Closed book, written)
- Homework: 20%
- Lab: 20%
- Class: 10%

Textbook and references

- *Computer Networks*, Xie Xiren, Electronics Engineering Press.
- *Computer Networks*, Andrew S.Tanenbaum, Tsinghua University Press.
- *Computer Networks Lab Tutorials*, Xie Qian, Electronics Engineering Press.
- *Computer Network Tutorials*, Du Yu, People's Post and Telecommunication Press, 1st edition Jan 2002.
- *Computer Network Practical Tutorials*, Wang Li, Zhang Yuxiang, Yang Lianghuai, Tsinghua University Press, 1st edition Dec 1999.

Focals

- Network Infrastructure
- ISO/OSI RM
- TCP/IP Protocol Suite
- Network management
- Network Security

Requirements on assignments, lab work and practice

There will be weekly homework assignments. The assignments are due at the beginning of the class on the day specified on the assignment. In general, no extensions will be granted.

Relations with other courses

- Pre-course: Basic computer skills
- Post-course: Network Construction and Management, Network Programming, Network Security

Special Notes

None.