Computer Networks

Lecture 1:

Introduction to the Course
and to the Domain of Computer Networks

What for Do We Learn the *Computer Networks*?

Basic course

- terminology
- reference models
- data transmission
    - problems
    - mechanisms
- communication protocols
    - those widely used in the Internet
    - their functionality
- administration & monitoring of network devices

Advanced courses

- programming communicating applications
- programming network devices
- network and systems security
- radio networking
- and others more specific

To be able to

- understand technical documentation
- talk with professionals
- to solve problems in network communication
- design a small network

Jobs

- network administrator
- network architect/designer
- communicating application developer
- network device designer/programmer
- security auditor

Plan of the Course

 # hours Subject

1   L1: Introduction to the course and to the domain of computer networks

2   L1&2: Basic terms and network reference models

2   L2&3: Review of today's network technologies

Tutorial 1: Forwarding tables, transmission time

1   L3: Computer links (signals, coding, framing)

2   L4: Addressing (MAC, EUI, IPv4, IPv6, port numbers, DNS, URL)

Tutorial 2: Bit coding, representation of IP addresses

1   L5: Packet transmission issues (fragmentation, reliability, network congestion)

Tutorial 3: Frame synchronisation, error rate, CRC

2   L5&6: ARP, IPv4, ICMP, DHCP, IPv6

4   L6&7: Routing (taxonomy, mechanisms, protocols)

Tutorial4: Routing tables

1   Test 1

2   L8: Queuing, scheduling, quality of service

2   L9: Ethernet

Tutorial 5: Learning switch tables, Spanning Tree Protocol

2 L10: TCP

Tutorial 6: TCP state machine, retransmissions, congestion control

1 L11: Other transport protocols (MTCP, UDP, RUDP, SCTP, RTP, Wireless TCP)

1 L11: DNS

2 L12: Multicast solutions

1 L13: MPLS, GMPLS

1 L13: Software Defined Networking

Tutorial 7: Flow tables

1 L14: Network management

2 L14&15: Network security issues

1 Test 2

Supplementary Documents

Lecture slides

- S3-Other_LANs_2h   Token Ring, Token Bus, WiFi

- S6-Pictures-of-routers

- S10-BSD_sockets_1h

- S11-Application_protocols_4h   TFTP, FTP, HTTP, Electronic mail protocols

Tutorial slides

- T1-Forwarding_transmission-time

- T2-Bit-coding_IP-addresses

- T3-FrameSync_BitErrors_CRC

- T4-Routing

- T5-Switch-tables_STP

- T6-TCP

- T7-Flow_tables

Grading and Evaluation

There will be

- 2 tests – max. 20 points for each
- 10 laboratory exercises – max. 6 point for each

The maximum score is 100 points

Who reaches <u>more</u> than 90 points can classify ECONE without writing the exam

There will be 2 exams

- If you write two of them, then the second result will overwrite the first one
- The final score is: exam_points + 0.5 * semester_points

To classify ECONE:

- more than 50 points as the final score **<u>and</u>**
- at least 37 points from laboratory exercises

Final score	Mark
< 50	2
51 - 60	3
61 -70	3.5
71 - 80	4
81 -90	4.5
91 - 100	5

Bibliography

1. Peter Dordal, *An Introduction to Computer Networks*, Loyola University Chicago (2014). https://open.umn.edu/opentextbooks/textbooks/353

2. Olivier Bonaventure, *Computer Networking: Principles, Protocols and Practice*, Universite catholique de Louvain (2011). https://open.umn.edu/opentextbooks/textbooks/computer-networking-principles-protocols-and-practice

3. L. Peterson, B. Davie, *Computer Network: A Systems Approach*, 5th Edition, Elsevier (2011). http://booksite.elsevier.com/9780123850591/index.php

4. D. U. Comer, *Internetworking with TCP/IP,* 6th Edition, Pearson (2014).

5. D. U. Comer, *Computer Networks and Internets,* 6th Edition, Pearson (2015).

6. J. F. Kurose, K. W. Ross, *Computer Networking A top-Down Approach Featuring the Internet*, 6th Edition, Addison Wesley (2012).

7. W. R. Stevens, *TCP/IP Illustrated*, Volume 1, *The Protocols*. Addison Wesley (2011).

8. A. S. Tanenbaum, D. J. Wetherall, *Computer Networks*, 5th ed. Prentice Hall (2011).

What Is a Computer Network?

It is a <u>digital</u> telecommunications network that allows nodes
- to exchange information
- to share resources
- to cooperate

The traditional telecommunication – was about signals

The modern telecommunication – is about transmission of
- signs and signals
- messages
- words and writings
- images and sounds
- information of any nature

by wire, radio, optical or electromagnetic systems

| Telecommunication | | Informatics |

Information and communications technology (ICT)
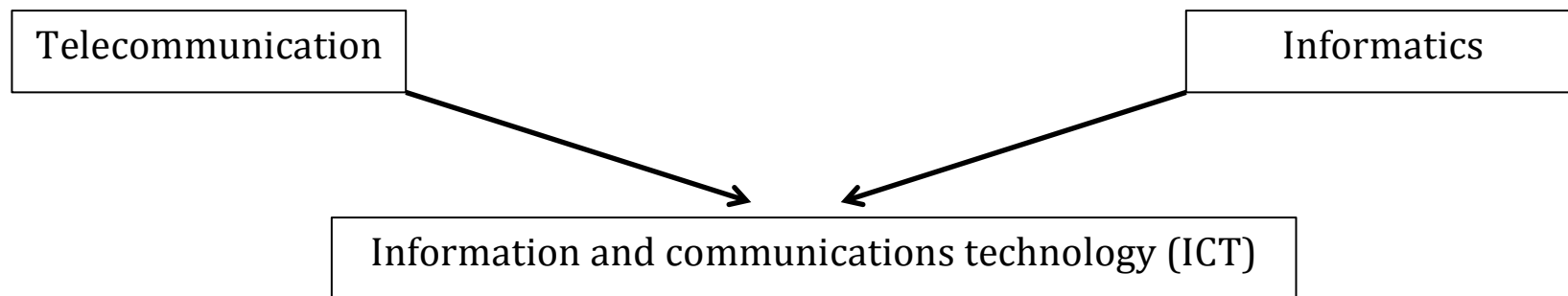
Summary

The lecture
- points the knowledge you should master
- explains techniques you should understand

You should
- learn and repeat
- discuss the issues

There are questions at the end of each lecture slides

    use them for repetitions ☺

Questions

1. What is a computer network?

2. What is it ICT?

3. What for do we learn the computer networks?

4. What jobs can you do if you master the computer networks?