

Course Title: **Communication Networks**

ECTS: 5 CP

Type: Lecture 4 hours per week, including laboratory exercises

Responsible: Prof. Dr.-Ing. Carsten Roppel

Learning Outcomes:

Understand basic design principles and architecture of communication networks, reliable transmission, quality of service requirements and traffic management. You are able to apply design principles to the Internet Protocol suite and the telephone network. Gain practical experience in working with a protocol analyzer software in laboratory exercises.

Content:

1 Design Principles

The OSI Reference Model, Network Topologies, Circuit Switching and Packet Switching, Error Detection and Correction, Automatic Repeat Request (ARQ), Dimensioning: Queueing Models for Packet Switched Networks and Circuit Switched Networks

2 Transport, Access and Local Area Networks

Synchronous Digital Hierarchy (SDH), Digital Subscriber Line (DSL), Cable Modems, LANs

3 Quality of Service and Traffic Management

Performance Parameters at the Application/Packet/Bit Level, Traffic Parameters, Leaky Bucket, Token Bucket, Traffic Control Functions

4 Internet Protocol (IP)

Basic Concepts, Addressing and Routing, Transport Protocols (TCP, UDP), Quality of Service and Traffic Management (IntServ, DiffServ, MPLS), Voice over IP (VoIP), IP Version 6

5 Real-Time Services over Packet-Switched Networks

Voice over IP (VoIP), Real-Time Transport Protocol (RTP), Session Initiation Protocol (SIP), Real-Time Streaming Protocol (RTSP), Line Emulation

6 Asynchronous Transfer Mode (ATM)

Basic Concepts, Protocol Reference Model, Packet Switches, Traffic Management

7 Integrated Services Digital Network (ISDN)

ISDN Access (Basic Rate Access, Primary Rate Access), Switch Architectures, Signalling

Prerequisites

Basic knowledge in mathematics, electrical engineering and information technology.

Examination

Written examination (in English), 120 min

Recommended Reading:

Bertsekas, D., Gallager, R.: Data Networks. Prentice-Hall, 1992.

Keshav, S.: An Engineering Approach to Computer Networking: ATM Networks, the Internet, and the Telephone Network. Addison-Wesley, 1997.

Roppel, C.: Grundlagen der digitalen Kommunikationstechnik. Hanser, 2006.

Stallings, W.: Data & Computer Communications. Prentice-Hall, 2006.

Tanenbaum, A. S.: Computer Networks. Prentice-Hall, 2010.

