

Course Manual NP

F07_Networks and Protocols

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– General information

Long name F07_Networks and Protocols

Approving CModule [NP_BaET](#), [NP_BaTIN](#)

Responsible Prof. Dr. Andreas Grebe
Professor Fakultät IME

Valid from winter semester
2021/22

Level Bachelor

Semester in the year winter semester

Duration Semester

Hours in self-study 60

ECTS 5

Professors Prof. Dr. Andreas Grebe
Professor Fakultät IME

Requirements Boole Operations, AND, OR, XOR
Binary numbers
Basic Computer Architecture
Basic Knowledge of Operating Systems (Unix/Linux preferred)
Basic programming skills

Language German

Separate final exam Yes

Literature

J. Kurose, K. Ross: Computernetzwerke - Der Top-Down-Ansatz, Pearson Studium, 6. Auflage, 2014

A. Tanenbaum: Computernetzwerke, Pearson Studium, 5. Auflage 2012

Douglas Comer: Computer Networks and Internets, Pearson Education Limited, 6 edition, 2015

Internet-Standardisierung: IETF Standards (RFCs), www.ietf.org

LAN-Standards: IEEE, ieeexplore.ieee.org (freier Zugang über TH Köln)

Telekommunikationsstandards: ITU-T Standards, www.itu.int

Web-Standardisierung: W3C Standards, www.w3c.org

Final exam

Details

In a final examination (written, optionally oral), the students demonstrate their competences in summary form. The exam comprises the following sub-areas, in which six taxonomy levels (reproduce, understand, apply, analyze, synthesize, and evaluate) are included.

1.) A good command of basic concepts, concepts and techniques. Typical tasks are multiple-choice questions, open questions, evaluation of statements regarding their correctness.

2.) Application of planning and valuation techniques. Typical tasks are planning tasks of networks or subsystems.

3.) Examination of proposed solutions for correctness, identification of errors in statements or given networks. Typical tasks include the analysis of given network architectures and system statements.

Minimum standard

Achievement of the individual minimum score per exam, typically 50% of maximum score.

Exam Type

EN Klausur

– Lecture / Exercises

Learning goals

| Goal type | Description |
|-----------|---|
| Knowledge | Fundamentals of architectures and topologies of computer networks, metrics, LAN, MAN WAN, communication and layer models according to ISO/OSI, IETF TCP/IP, IEEE, bit transmission and data interconnections, Ethernet technology, IP addressing and subnetting, IP routing and routing protocols, frame switching and virtual LAN, transport protocols, application protocols and communication patterns |
| Skills | Analyze networks and systems using suitable tools and present them graphically. Integrate systems into networks. Planning and setting up (sub)networks. Estimate and analyse the performance of computer networks. Obtaining information from original English sources. |
| Knowledge | Excerpt of the contents: ISO/OSI reference models, TCP/IP model, IEEE model, switch, router, host, transmission media, Ethernet, 100BASE-Tx, 1000BASE-T, ARP, addressing IPv4, IPv6, DHCP, ICMP, switched LAN, virtual LAN (VLAN), static routing, RIP, OSPF, transport protocols UDP, TCP, QUIC, applications DNS, HTTP, FTP, TFTP, Telnet, SSH |

Special requirements

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Accompanying material

Slides for the lecture
Exercises sheets
Tutorials for tools (e.g. Wireshark)
Material collections such as IOS command list, ASCII character table
Optional: Network simulator tool Cisco PacketTracer

Optionally, participation in two Cisco Academy CCNA (Cisco Certified Network Associate) modules is possible. The contents of the CCNA 1 and CCNA 2 modules are then also available as material.

Separate exam

No

Expenditure classroom teaching

| Type | Attendance (h/Wk.) |
|---------------------------|--------------------|
| Lecture | 2 |
| Exercises (whole course) | 2 |
| Exercises (shared course) | 0 |
| Tutorial (voluntary) | 0 |



– Practical training

Learning goals

| Goal type | Description |
|-----------|---|
| Knowledge | Knowing, structuring, classifying, structuring basic concepts and technologies of computer networks, structuring tasks in technical communication, assigning to relevant standardizations and transferred to network design and client/server applications, assigning and naming protocols (applications, transport, network, Ethernet, transmission technology), explaining protocol mechanisms, setting out and structuring tasks and technical parameters. Master network analysis techniques and tools, know network design steps and methods for network planning. |
| Skills | Analyze networks and systems using suitable tools and present them graphically. Integrate systems into networks. Planning and setting up (sub)networks. Estimate and analyse the performance of computer networks. Systematic troubleshooting and correction. Evaluate information from original sources and apply it to networks. |

Expenditure classroom teaching

| Type | Attendance (h/Wk.) |
|----------------------|--------------------|
| Practical training | 1 |
| Tutorial (voluntary) | 0 |

Special requirements

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Accompanying material

Online materials:
Self-learning tasks
Practical instruction per test date
Tutorials for tools (e.g. Wireshark)
Material collections such as IOS command list, ASCII character table
RFC standards (www.ietf.org)
Optional: Network simulator tool Cisco PacketTracer

Optionally, participation in two Cisco Academy CCNA (Cisco Certified Network Associate) modules CCNA1 and CCNA2 is possible. The successful completion of the module-accompanying labs is recognized.

Separate exam

Yes

Separate exam

Exam Type

EN praxisnahes
Szenario bearbeiten
(z.B. im Praktikum)

Details

There are several lab dates with different tasks.

The following tasks have to be completed for each date:

Independent solution of the preparatory self-learning tasks (homework).

Solution of the network design, implementation and analysis tasks in a small team (typically 2 students), if necessary with the help of assistance.

Optional participation in Cisco Academy CCNA (Cisco Certified Network Associate) modules is possible.

The successful completion of selected CCNA 1 and CCNA 2 labs is recognized.

Minimum standard

Successful participation in all lab dates, correct solution of all self-learning tasks and completion of all tasks of the lab date.