

# **EE3009 Data Communications and Networking**

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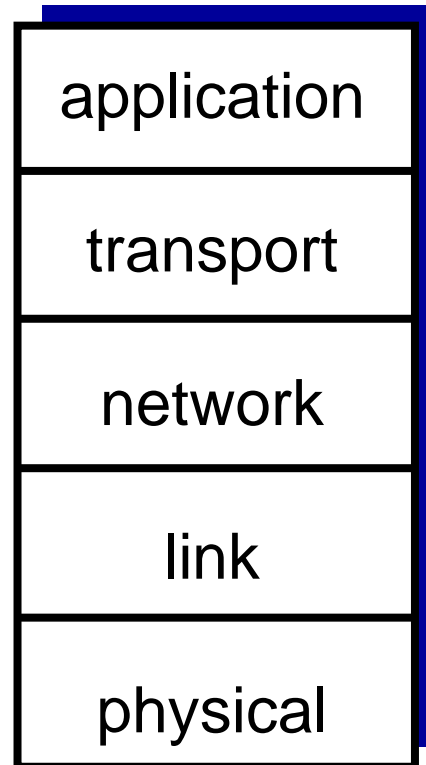
Course materials on Canvas

## **Aims of the course:**

- understand computer networking
- understand the principles of data communication

# **Course Intended Learning Outcomes (CILO)**

1. Describe the architecture of computer networks and explain how internetworking works
2. Explain how information can be represented and sent via communication interfaces and links
3. Explain how reliable data transfer can be achieved in the data link layer
4. Explain the principles and evaluate the performance of medium access control



**5-layer Internet  
protocol stack**

# Syllabus:

## 1 Computer networks and Internet

- network components
- Internet architecture
- performance measure
- protocol
- history

## 2 Transport layer and network layer

- multiplexing and demultiplexing
- connectionless transport
- connection-oriented transport
  
- router
- Internet protocol (IP) – IPv4, IPv6
- generalized forwarding and Software-Defined Networking (SDN)

### 3 Data link layer

- peer-to-peer protocols
  - error detection
  - Automatic Repeat Request (ARQ)
  - flow control
- 
- framing
  - Point-to-Point Protocol (PPP)
  - High-level Data Link Control (HDLC)

## 4 Medium Access Control (MAC)

- multiple access communications
- random access
- scheduling



## 5 Local Area Network (LAN)

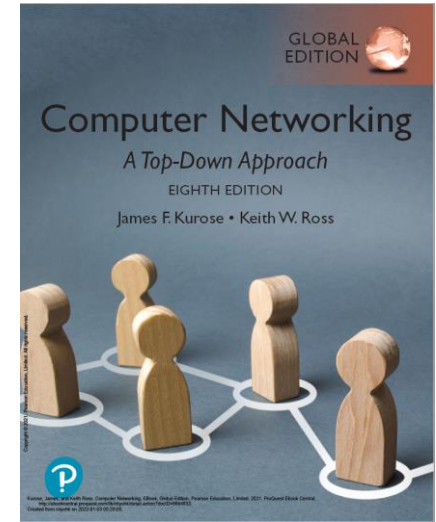
- Ethernet
- Address Resolution Protocol (ARP)
- Virtual LAN (VLAN)
- wireless LAN

## 6 Data transmission

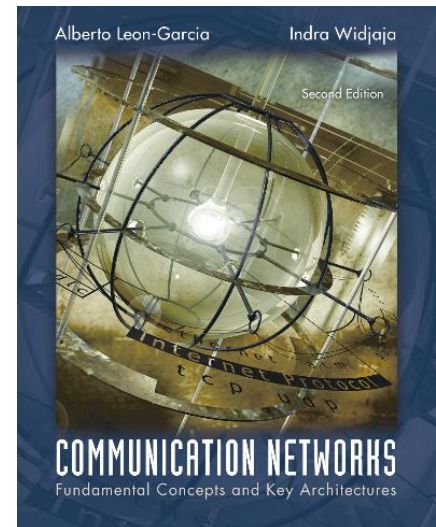
- digital representation
- digital and analog transmission
- asynchronous and synchronous communications
- transmission media

# References

J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 8<sup>th</sup> ed., Pearson, 2021.



A. Leon-Garcia and I. Widjaja, *Communication Networks: Fundamental Concepts and Key Architectures*, 2<sup>nd</sup> ed., McGraw-Hill, 2004.



## **Pre-requisite:**

EE1001 Foundations of Digital Techniques

*This is a first course in computer networking. It only assumes you have basic knowledge in number representation, logic, and Boolean algebra.*

Pre-requisite of:

EE4014 Business Data Communication Networks

EE4017 Internet Finance

EE4221 Cloud Computing Systems

EE4316 Mobile Data Networks

Pre-cursor of:

EE3301 Optimization Methods for Engineering

EE3315 Internet Technology

EE4212 Cryptography and Information Theory

EE4222 Digital Forensics

# Assessment

Continuous Assessment: **50%**

Examination: **50%**

To pass the course, you are required to achieve at least

**30%** of total Continuous Assessment mark

**30%** of total Examination mark

and **75%** laboratory attendance

## **Continuous Assessment:**

4-week Laboratory (starts in Week 4): 10%

In-class exercises: 10%

Quiz (week 5): 15%

Test (week 10): 15%