ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS
DEPARTMENT OF INFORMATICS

Computer and communication networks

Erasmus Course
Fall Semester, 2026-2027

Synopsis: The goal of this course is to provide an overview of networking technologies and protocols following the layered architecture, from basic connectivity to network applications, in one semester.

Learning Objectives: Upon completion of the course, students will be able to:

- Understand the different architectural layers and building blocks of Computer and Communication Networks, including the physical, medium access control, network, transport, and application layers
- Solve problems related to the design and operation of organizational and wide-area networks at the physical and logical levels.
- Understand how the TCP/IP protocols influence the performance of network applications.
- Use network traffic analysis tools to identify network problems.
- Evaluate the performance of modern network technologies with basic performance metrics and understand trends in the area of communication networks.
- Obtain a basic understanding of security mechanisms
- Obtain a basic understanding of wireless communications and networking.

Instructors: Iordanis Koutsopoulos (jordan AT aueb.gr), Vasilios A. Siris (vsiris AT aueb.gr) and George Xylomenos (xgeorge AT aueb.gr).

Teaching Assistant: Chalima Dimitra Nassar Kyriakidou, Ph.D. Candidate (dnassar AT aueb.gr).

Lectures: Friday 09:00-13:00 (classroom T108, 1st floor). Address: Trias 2, GR 113 62, Athens

Tutorials: During regular lecture hours for exercises, remotely for Wireshark (date/time to be announced).

Prerequisites: Students should have a basic understanding of Computer Systems.

Assignments: (a) Homework: we will assign a set of exercises based on the tutorials; similar exercises will be part of the final exam. (b) Wireshark project: we will assign a set of tasks to complete using Wireshark based on the tutorials; there will be an oral exam for this.

Grading: The final grade of the class will be calculated as follows:

- 80% final written exam
- 10% homework
- 10% Wireshark project

If the grade in the final written exam is less than 4 out of 10, the final grade will be the exam score (that is, the programming project's grade will not be added).

Course Syllabus: Overview of the technologies, architecture and protocol philosophy of the Internet. Basic connectivity technologies, local area switching networks and Virtual Local Area

Networks (VLANs). Physical layer: analog and digital transmission systems, digital modulation, coding, transmission media, multiplexing, performance limits, channel capacity. Data link layer: error control, error detection and correction, standards and protocols. Multiple access: channelization, multiple access protocols (Aloha, CSMA/CA, CSMA/CD). Local area networks (Ethernet, Fast Ethernet, Gigabit Ethernet, WiFi, VLANs), switches and their operation, scheduling policies. MAC and IP addresses. Network layer of the Internet: the TCP/IP protocol family, Internet addresses and subnetting, control protocols, routing algorithms (Bellman-Ford, Dijkstra), routing protocols (OSFP, BGP), and hierarchical routing, high-speed packet forwarding. Protocols and services at the application and transport layers, error, flow and congestion control schemes. Web-based applications and Content Distribution Networks (CDNs). Wireless and mobile networks: Wireless LANs, 4G and 5G cellular networks, mobility management. Introduction to computer network security: Message integrity, digital signatures, authentication, TCP and network-layer security.

Electronic announcements: Class announcements, presentations and any other auxiliary materials will be uploaded to E-Class (http://eclass.aueb.gr/). It is recommended to register for the course in E-Class (https://eclass.aueb.gr/courses/ERASMUS165/) so that you receive announcements by email.

Office hours: Will be announced.

Books and Reading Material: The course materials will be based on:

- J. F. Kurose and K. W. Ross, “Computer Networking: A Top-Down Approach”, 9th edition, Pearson, 2025.

An alternative textbook is:

- A. S. Tanenbaum, N. Feamster and D. J. Wetherall, “Computer Networks”, 6th edition, Pearson, 2021.