



**Ala-Too International University**  
**Department of Computer Systems and complexes**  
**Course Syllabus for**  
**2025-2026 academic year**  
**Fall semester**

<b>Title of the Course</b>	Computer networks
<b>Course Code</b>	None
<b>Credit</b>	2
<b>Hours in a week</b>	2
<b>Prerequisites</b>	Computer systems and hardware fundamentals
<b>Type of the course</b>	Practical
<b>Recommended for</b>	Software of computer engineering and automated systems
<b>Language of instruction</b>	English
<b>Mode of education</b>	Offline
<b>LMS (Learning Management System)</b>	None
<b>LMS enrollment code</b>	None
<b>Online conference room</b>	None
<b>Physical classroom</b>	C103
<b>Lecturer</b>	Nurbekov Mirlan Nurbekovich
<b>Office</b>	H 209
<b>Office hours</b>	Tu 15:00-17:00; We/Th 16:00-17:00; Fr 08:30-17:00
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## **Course Description**

This course provides a comprehensive study of modern computer networking principles and technologies. It covers the design, configuration, and security of wired and wireless networks, including IP addressing, routing, switching, and network virtualization. Students will also explore cloud networking, IoT, and software-defined networking (SDN). Through lectures, labs, and simulations, they will gain hands-on experience in building secure network infrastructures, deploying virtualized services, and monitoring network performance. The course equips students with the skills and knowledge to design, manage, and protect computer networks in modern IT environments.

## **Student Learning Outcomes (SLOs)**

**SLO.1.** Understand the fundamental principles, architectures, and protocols that govern data communication in computer networks.

**SLO.2.** Identify and describe the functions of key networking components, including routers, switches, firewalls, and wireless access points, within local and wide area network environments..

**SLO.3.** Design and configure network topologies using appropriate addressing schemes, routing methods, and security mechanisms to ensure reliable and efficient communication.

**SLO.4.** Implement and manage secure network infrastructures, applying encryption, authentication, and intrusion prevention techniques across wired, wireless, and cloud-based systems.

**SLO.5.** Monitor, analyze, and troubleshoot network performance and connectivity issues using contemporary tools and diagnostic methods.

**SLO.6.** Evaluate emerging networking technologies—such as virtualization, software-defined networking (SDN), and the Internet of Things (IoT)—and assess their impact on modern IT infrastructures.

## Course Content

Week	Topic	Focus/Lab/Activity
1	Introduction	Course overview, syllabus, grading and class policies
2	Network models and protocols	OSI and TCP/IP models; encapsulation, addressing, ports; protocols (HTTP, FTP, DNS, DHCP).
3	Network devices and topologies	Hubs, switches, routers, access points, star, mesh, hybrid topologies
4	Ethernet and cabling standards	Ethernet frames, MAC addressing, UTP/Fiber, CAT5/6 standards
5	IP addressing and subnetting	IPv4 addressing, subnet masks, CIDR
6	Routing and switching fundamentals	Static vs dynamic routing (RIP, OSPF); VLANs
7	Wireless networks	Wi-Fi standards, access points, SSID, encryption (WPA2/WPA3)
8	Network security essentials	Firewalls, IDS/IPS, VPN basics; Lab: simulate firewall rules & monitor packets with Wireshark.
9	Midterm assessment	Offline test which covers materials from week 2 till week 8
10	Server and cloud networking	DHCP, DNS, web servers; intro to virtualization and cloud (AWS/Azure)
11	Network services and management	SNMP, network monitoring, logs, alerts
12	Network troubleshooting and tools	Ping, traceroute, nslookup, Wireshark and network connectivity issues diagnoses.
13	Data protection and backup in networks	Network-attached storage (NAS), RAID over network, backup strategies, encryption and decryption

14	Emerging networking technologies	SDN, IoT, 5G, edge computing; cloud-native networking and discussion on how AI influences network management
15	Network automation and scripting	Automating network management
16	Final exam	Offline exam which covers materials from week 2 till week 8

### Grading rubric and assessments

Midterm assessment - Test	100 points
Final exam	100 points
Average = Midterm assessment * 0.4 + Final assessment * 0.6	

## **Course policies and academic integrity**

This is a 16-week course instructed by Mirlan Nurbekov. The course instructor reserves the right to make changes to any portion of the syllabus at any time. Any modifications will be communicated in writing to students via the Learning Management System (LMS).

- Students are expected to communicate with the instructor professionally. Mobile phones, social media, and messaging apps (e.g., WhatsApp) should not be used for course-related inquiries. Instead, students should send emails, post comments in the LMS, or visit the instructor during office hours. All course-related announcements and materials will be shared through the LMS.
- Attendance is mandatory. Students are expected to attend at least 70% of the course sessions to be eligible for exams. Active participation in lectures, labs, and discussions is strongly encouraged.
- Students are required to uphold the highest ethical standards in all aspects of the course. Academic dishonesty includes, but is not limited to, cheating on exams, completing work for another student, and plagiarism.
- Plagiarism is a serious academic offense. To avoid plagiarism:
  - Do not copy words from any source without proper quotation and citation.
  - Do not use ideas, concepts, or opinions from any source without citing the source. This includes technical terms, original views, and key concepts.
  - Paraphrasing is allowed, but the source must be cited correctly, and the original meaning must not be misrepresented.

All cases of academic dishonesty will result in a failing grade for the course and will be reported to the Head of the Management Department for administrative review.

All projects, presentations, essays, and assignments must follow the Harvard referencing style. Submissions must be uploaded to the LMS before the specified deadline.

➤ Grading and Assessment:

- Midterm, final, and makeup exams should account for 40–50% of the total course grade, with the remainder coming from projects, presentations, essays, and assignments.
- To pass the course, students must achieve an average grade of at least 50 points, with a minimum of 40 points on the final exam.
- Students who do not pass the final exam are eligible for a makeup exam, which carries the same weight as the final assessment.

➤ Appeals

Students have the right to appeal grades within three working days from the date grades are announced. Appeals may include reviewing exam papers, requesting re-evaluation, requesting grading rubrics, or notifying the instructor of any errors in grade aggregation. Once the grade submission system is closed, grades cannot be changed.

## Main Resources

Kurose, J. F. and Ross, K. W. (2021) *Computer Networking: A Top-Down Approach*. 8th edn. Pearson.

Peterson, L. L. and Davie, B. S. (2019) *Computer Networks: A Systems Approach*. 6th edn. Morgan Kaufmann

Tanenbaum, A. S. and Wetherall, D. J. (2021) *Computer Networks*. 6th edn. Pearson.

Stallings, W. (2020) *Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud*. Pearson

Forouzan, B. A. (2017) *Data Communications and Networking*. 5th edn. McGraw-Hill Education.

## Additional Resources

Cisco Networking Academy. *Networking Essentials and Packet Tracer Labs*. Available at: <https://www.netacad.com/> (Accessed: 10 August 2025).

AWS Training and Certification. *Cloud Networking Fundamentals*. Available at: <https://skillbuilder.aws/> (Accessed: 10 August 2025)

Wireshark University. *Network Analysis and Troubleshooting Tutorials*. Available at: <https://www.wireshark.org/> (Accessed: 12 August 2025).

Cybrary. *Network Security and Ethical Hacking Courses*. Available at: <https://www.cybrary.it/> (Accessed: 12 August 2025)

NetworkLessons.com. *Routing, Switching, and Security Configuration Guides*. Available at: <https://networklessons.com/> (Accessed: 12 August 2025)

Reddit. */r/networking* Community. Available at: <https://www.reddit.com/r/networking/> (Accessed: 12 August 2025)

Cisco DevNet. *Software-Defined Networking and Network Automation Labs*. Available at: <https://developer.cisco.com/> (Accessed: 14 August 2025)