UNIVERSITY OF CENTRAL ASIA

UCA STUDENT SYLLABUS

NARYN CAMPUS

COURSE TITLE: Computer Networks

COURSE #: COMP4021

Timing: 90-minute classes

Number of weeks: 15 weeks

Course Faculty (and office number): Dmytro Zubov, office 3.18

Office hours: Monday, Thursday, and Friday 5 pm to 6 pm

Contact information: dmytro.zubov@ucentralasia.org, +996770822135

Prerequisites and/or Corequisites (if applicable): Students must have basic knowledge of computer systems, and the knowledge of C/C++/Java/Python programming language is preferred to practice different lab works related codes. The prerequisite is Computer Architecture. Corequisites are Information Security and Internet of Things.

Last updated: August 29, 2022

Course Description. In this course, students gain a basic understanding of the way networks operate. Students learn about network components and their functions, as well as how a network is structured, and the architectures used to create networks, including the internet. By the end of the course, students can build simple local area networks, perform basic configurations for routers and switches, and implement IP addressing schemes. Students are encouraged to design, implement, and evaluate small-scale software projects in teams of up to three people.

Course Learning Outcomes. Upon the successful completion of this course, students will be able to:

1. Define Computer Networks and basic components of a network system
2. Describe soft-/hardware which makes networks efficient and secure
3. Design simple local area networks
4. Define the differences between protocols, software, and network architectures to select the soft-/hardware configuration
5. Describe how a local area network is installed with appropriate topology and protocols in accordance with specific criteria (reliability, performance, security, budget, etc.)
6. Imitate modern computer networks with Cisco Packet Tracer in the context of real-life projects and Cisco Certified Network Associate (CCNA) certification

Course Organization

- Weekly, classes will take place according to the schedule provided by the registrar office: 90-minute lecture with a short quiz and 90-minute problem-solving session
- Readings (not graded) – Weekly lecture notes and/or book chapters from the textbook/ reference material will be available on Moodle

Core Literacies. Critical thinking, problem solving, teamwork.

Attendance Policy. The university views class attendance as your individual responsibility. You are expected to attend all classes, complete all assignments, and take all exams as scheduled. Instructors will take attendance every class. If you miss more than 10 % of class time, you may not be able to write the final exam or get credit for the course. Each absence from a class session or part of a class session must be justified in writing to the faculty member. If you are late for class, the instructor may mark you as absent. See UCA's Attendance Policy to understand all your rights and obligations.

Academic Integrity. You are reminded that plagiarism (representing another person's ideas, writings, etc., as one's own) is a serious academic offence; the penalty can be as severe as expulsion. Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see UCA's Academic Integrity Policy). All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between UCA and Turnitin.com. See UCA's Academic Integrity Policy to understand all your rights and obligations.

Required Resources/Textbook Readings:

- Lecture notes will be available on Moodle
- Wendell Odom. CCNA 200-301. Cisco Press, 2020

Course Assessments and Grading. The final grade will be computed according to the following weights:

Item	Date Due	Weight
Problem-solving sessions (13 sessions)	By the end of the current week	39
Quizzes (13 quizzes)	By the end of the current week	17
Midterm exam (1 midterm exam)	Midterm exam week	22
Final exam (1 final exam)	Final exam week	22
Total		**100%**

Course Calendar

Week #	Topics	Comments
01	**Introduction to Computer Networks** • Networks Affect our Lives • Network Components • Network Representations and Topologies • Common Types of Networks • Internet Connections • Reliable Networks • Network Trends • Network Security • The IT Professional • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 1:** Cisco Packet Tracer: Installation, Deploying, and Cabling Devices
02	**Basic Switch and End Device Configuration** • Cisco IOS Access • IOS Navigation • The Command Structure • Basic Device Configuration • Save Configurations • Ports and Addresses • Configure IP Addressing • Verify Connectivity • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 2:** Cisco Packet Tracer: Configure Initial Switch Settings
03	**Protocols and Models** • The Rules • Protocols • Protocol Suites • Standards Organizations • Reference Models • Data Encapsulation • Data Access • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 3:** Investigate the TCP-IP and OSI Models in Action

04	**Physical Layer** • Purpose of the Physical Layer • Physical Layer Characteristics • Copper Cabling • UTP Cabling • Fiber-Optic Cabling • Wireless Media • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 4:** Connect the Physical Layer
05	**Data Link Layer** • Purpose of the Data Link Layer • Topologies • Data Link Frame • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 5:** Use Wireshark to View Network Traffic
06	**Ethernet Switching** • Ethernet Frame • Ethernet MAC Address • The MAC Address Table • Switch Speeds and Forwarding Methods • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 6:** Use Wireshark to Examine Ethernet Frames
07	**Network Layer** • Network Layer Characteristics • IPv4 Packet • IPv6 Packet • How a Host Routes • Router Routing Tables • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 7:** View Network Device MAC Addresses
08	**Midterm exam**	
09	**Address Resolution** • MAC and IP • ARP • Neighbor Discovery • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 8:** Identify MAC and IP Addresses
10	**Basic Router Configuration** • Configure Initial Router Settings • Configure Interfaces • Configure the Default Gateway • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 9:** Configure Initial Router Settings
11	**IPv4 Addressing** • IPv4 Address Structure • IPv4 Unicast, Broadcast, and Multicast • Types of IPv4 Addresses • Network Segmentation • Subnet an IPv4 Network • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 10:** Design and Implement a VLSM Addressing Scheme

12	**IPv6 Addressing** • IPv4 Issues • IPv6 Address Representation • IPv6 Address Types • GUA and LLA Static Configuration • Dynamic Addressing for IPv6 GUAs • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 11:** Configure IPv6 Addressing
13	**Internet Control Message Protocol (ICMP). Transport Layer** • ICMP Messages • Ping and Traceroute Testing • Transportation of Data • TCP Overview • UDP Overview • Port Numbers • TCP Communication Process • Reliability and Flow Control • UDP Communication • Quiz	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 12:** Use Ping and Traceroute to Test Network Connectivity. TCP and UDP Communications
14	**Application Layer** • Application, Presentation, and Session • Peer-to-Peer • Web and Email Protocols • IP Addressing Services • File Sharing Services • Quiz • Revision (summary of the course and acquired knowledge, Q&A session), Viva	Lecture notes and/or reference material are provided on Moodle **Problem-solving session 13:** Observe DNS Resolution
15	**Final exam**	

The weekly schedule is subject to change as the course progresses.