

International Information Technology University JSC

Faculty of Information Technology

Department of Computer Engineering and Information Security

Approved

Vice-Rector for Academic and

Educational Affairs of IITU JSC, PhD

Umarov T.F.

« ___ » _____

2019

SYLLABUS (ACADEMIC PROGRAM)

Course: KS 2219 Computer Networks (Cisco 1)

Major: 5B070400 Computer Systems and Software Engineering

Year: 2, **Semester:** 4; **Number of ECTS credits:** 5

Lectures: 15 hours

Laboratory classes: 15 hours

Practical classes: 15 hours

TSIS: 15 hours

SIS: 90 hours

Total: 150 hours

Final assessment form: Complex Examination

Almaty 2019

Academic Program of the course «KS 2219 Computer Networks (Cisco 1)» has been developed on the basis of the State Standard for Higher Education and the Curriculum of the major.

Academic program has been reviewed at the meeting of «Computer Engineering and Information Security» department.

Minutes № 1 dated «27» August 2019

Head of the Department _____ PhD, Assoc. prof. N.T. Duzbayev

Course designer _____ MSc, senior-lecturer A.Ye. Mishina

The academic program has been approved at the meeting of IITU AMC

Minutes № 1 dated «29» August 2019

Head of IITU AMC, Vice-Rector
for Academic and Educational Affairs
of IITU JSC, PhD

_____ T.F. Umarov
signature

Head of the Department
for Academic Affairs

_____ A.K. Mustafina
signature

1. General information	
Faculty	Information Technology
Major code and title	5B70400 Computer Systems and Software Engineering
Year, semester	2, 4
Subject category	Compulsory Elective
Number of Credits	5
Language of Delivery	English
Prerequisites	Information and communication technology
Postrequisites	Routing and switching essentials
Lecturer	Mishina Aigerim Yerzhanovna, senior lecturer, master degree in CSSE, office #409, 330-85-66 ext. 2039, e-mail: a.mishina@iitu.kz
Instructors	Alshynov Shynggys Kairatuly, senior lecturer, master degree, office #409, 330-85-66 ext. 2039, e-mail: s.alshynov@iitu.kz Janybekova Saltanat, lecturer, master degree, office #409, 330-85-66 ext. 2039
2. Goals and objectives of the course	
<p>The goal of this course is to introduce the fundamental networking concepts and technologies, and to develop the skills in planning and implementing small networks across a range of applications.</p> <p>The objectives of the course is to</p> <ul style="list-style-type: none"> – develop both the practical and conceptual skills that build the foundation for understanding basic networking; – examine human versus network communication and see the parallels between them; – introduce the two major models used to plan and implement networks: OSI and TCP/IP; – assist in gaining an understanding of the "layered" approach to networks; – examine the OSI and TCP/IP layers in detail to understand their functions and services; – describe the various network devices and network addressing schemes; – discover the types of media used to carry data across the network. <p style="text-align: center;">Learning outcomes of the course</p> <p>Students successfully completing the course will be able to:</p> <ol style="list-style-type: none"> 1. Explain how devices access local and remote network resources 2. Explain how switching operates in a small to medium-sized business network 3. Create and configure various network topologies using the Cisco Packet Tracer environment 4. Build and configure lab network topologies using network devices, such as routers and switches 5. Design an IP addressing scheme to provide network connectivity for a small to medium-sized business network. 	
3. Course description	
<p>This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP addressing, and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. The course provides multimedia learning tools, including videos, games, and quizzes, address a variety of learning styles and promote increased knowledge retention. Hands-on labs and Cisco® Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem solving skills. Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.</p> <p>Expected results: By the end of the course, students will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.</p>	
4. Course policy	

Students are not allowed to use cell phones during classes, browse the social networks and play on-line games. Cheating will not be tolerated. Students caught cheating will receive a “0” for the assignment.

Attendance/participation is assessed based on the number of lessons attended by students. Each student must attend 80% of all lessons, or she/he won’t be eligible to pass final exam.

The student gains points for each performed assignment, including laboratory works. If student misses classes, he/she will not be able to gain mark, unless he/she will perform and defend the assignment during office hours or additional classes. In case the student is not able to attend the lessons for some reason, he will be responsible for learning all material, which was learnt during unattended lessons. If the student did not attend more than half of the lessons without reasonable excuse, the teacher has a right to mark him as “not graded”, and the student will not be admitted to exam.

5. Literature

Basic literature:

1. CCNA Routing & Switching: Introduction to Networks. On-line e-book at www.netacad.com
2. Lammle, T. CCENT ICND1 Study Guide: Exam 100-105, Sybex, 3rd edition, 2016
3. Andrew Tanenbaum, David J. Wetherall, Computer Networks, Pearson, 5th edition, 2012

Supplementary literature:

1. IP addressing and subnetting workbook. - Student Version
2. CCNA Routing and Switching: Introduction to Networks. Student Packet Tracer Manual.
1. CCNA Routing and Switching: www.netacad.com Introduction to Networks. Student Lab Manual.

Course Content

Lecture, practical/seminar/laboratory session plans

Abbreviation	Meaning
TSIS	Teacher-supervised independent study (CPCII)
SIS	Students’ independent study (CPC)
P	Project
PA	Practical assignment
LW	Laboratory Work
MCQ	Multiple choice quiz

Week No	Course Topic	Reference Materials	Practice sessions (1 h/w)	Lab. Sessions (1 h/w)	TSIS (1 h/w)	SIS (3 h/w)
1	Networking today	Basic [1][2] Suppl. [2][3]	PS 1	LS 1	TSIS 1	SIS 1
2	Basic switch and end device configuration	Basic [1][2] Suppl. [2][3]	PS 2	LS 2	TSIS 2	SIS 2

3	Protocols and models	Basic [1] Suppl. [2][3]	PS 3	LS 3	TSIS 3	SIS 3
4	Network layer. Address resolution.	Basic [1] Suppl. [2][3]	PS 4		TSIS 4	SIS 4
5	Basic router configuration.	Basic [1][2] Suppl. [2][3]	PS 5	LS 4	TSIS 5	SIS 5
6	Address resolution. ICMP	Basic [1] Suppl. [2][3]	PS 6	LS 5	TSIS 6	SIS 6
7	Data link layer	Basic [1] Suppl. [2][3]	PS 7		RK 1	SIS 7
8	Ethernet switching	Basic [1] Suppl. [2][3]	PS 8	LS 6	TSIS 7	SIS 8
9	Physical layer	Basic [1][2] Suppl. [2][3]	PS 9	LS 7	TSIS 8	SIS 9
10	IP addressing and subnetting	Basic [1] Suppl. [2][3]	PS 10	LS 8	TSIS 9	SIS 10
11	Transport layer	Basic [1] Suppl. [1-3]	PS 11	LS 9	TSIS 10	SIS 11
12	Application layer	Basic [1] Suppl. [1-3]	PS 12	LS 10	TSIS 11	SIS 12
13	Network security fundamentals	Basic [1] Suppl. [2][3]	PS 13	LS11	TSIS 12	SIS 13
14	Build a small network	Basic [1] Suppl. [2][3]	PS 14	LS12		SIS 14
15	Course review	Basic [1] Suppl. [2][3]	PS 15		RK 2	SIS 15
Total hours		135	15	15	15	60

List of assignments for Student Independent Study

№	Assignments (topics) for Independent study	Hours	Recommended literature and other sources (links)	Form of submission
1	Research IT and Networking Job Opportunities (L 1.9.3)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
2	Research Networking Standards (L 3.4.4)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
3	Install and Use Wireshark to View Network Traffic (L 3.7.9, L 3.7.10)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
4	Build a Switch and Router Network (L 10.4.4)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
5	Subnetting Scenario (PT	4	Main [1][2]	Packet Tracer

	11.7.5)		Supplementary [2][3]	activity
6	Use Ping and Traceroute to Test Network Connectivity (L 13.3.2)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
7	Use Wireshark to Examine Ethernet Frames (L 7.1.6)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
8	View Wired and Wireless NIC Information (L 4.6.6)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
9	Configure IPv6 Addresses on Network Devices (L 12.9.2)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
10	Observe DNS Resolution (L 15.4.8)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
11	Design and Build a Small Network (L 17.8.1)	4	Main [1][2] Supplementary [2][3]	Packet Tracer activity
12	Research IT and Networking Job Opportunities (L 1.9.3)	4	Main [1][2] Supplementary [1][2][3]	Packet Tracer activity

List of practice tasks

- Practice 1: Network Representation (PT 1.5.7)
- Practice 2: Configure Initial Switch Settings (PT 2.5.5)
- Practice 3: Investigate the TCP-IP and OSI Models in Action(PT 3.5.5)
- Practice 4: IPv4 addressing
- Practice 5: Configure Initial Router Settings (PT 10.1.4)
- Practice 6: IPv6 addressing
- Practice 7: PT assessment Basic Device Configuration (10.4.3)
- Practice 8: Identify MAC and IP Addresses (PT 9.1.3). Examine the ARP Table (PT 9.2.9). IPv6 Neighbor Discovery (PT 9.3.4)
- Practice 9: View Network Device MAC Addresses (PT 7.2.7)
- Practice 10: Connect a Wired and Wireless LAN (PT 4.6.5)
- Practice 11: Configure IPv6 Addressing (PT 12.6.6)
- Practice 12: TCP and UDP Communications (PT 14.8.1)
- Practice 13: Configure Secure Passwords and SSH (PT 16.4.6)
- Practice 14: Troubleshooting Challenge (PT 17.8.3)
- Practice 15: Skills Integration Challenge (PT 17.8.2)

List of laboratory tasks

- Lab 1. Navigate the IOS (PT 2.3.7)
- Lab 2. Implement Basic Connectivity (PT 2.7.6)
- Lab 3. Basic Switch and End Device Configuration (L 2.9.2)
- Lab 4. Connect a Router to a LAN (10.3.4)
- Lab 5. Build a Switch and Router Network (L 10.4.4)
- Lab 6. Verify IPv4 and IPv6 Addressing (PT 13.2.6)
- Lab 7. View the Switch MAC Address Table (PT 7.3.7)
- Lab 8. Connect the Physical Layer (PT 4.7.1)

- Lab 9. Implement a Subnetted IPv6 Addressing Scheme (PT 12.9.1)
- Lab 10. Interpret show Command Output (PT 17.5.9)
- Lab 11. Secure Network Devices (PT 16.5.1)
- Lab 12. Secure Network Devices (L 16.5.2)

List of TSIS tasks

- TSIS 1. IOS modes
- TSIS 2. Commands for basic switch configuration
- TSIS 3. Basic Switch and End Device Configuration (L 2.9.2)
- TSIS 4. Number systems
- TSIS 5. Troubleshoot Default Gateway Issues (PT 10.3.5)
- TSIS 6. Subnet an IPv4 Network (PT 11.5.5)
- TSIS 7. Use Ping and Traceroute to Test Network Connectivity (PT 13.2.7)
- TSIS 8. VLSM Design and Implementation Practice (PT 11.9.3)
- TSIS 9. Creating cables
- TSIS 10. Identify IPv6 Addresses (L 12.7.4)
- TSIS 11. Troubleshoot Connectivity Issues (PT 17.7.7)
- TSIS 12. Configure Network Devices with SSH (L 16.4.7)

Period	Assignments	Number of points	Total
1 st attestation	Online tests (5 chapters) – Bonus task	5	5
	Lab1	5	100
	Lab2	5	
	Lab3	5	
	Lab4	5	
	Lab5	5	
	Lab6	5	
	Practice1	5	
	Practice2	5	
	Practice3	5	
	Practice4	5	
	Practice5	5	
	Practice6	5	
	Assessment1	10	
Assessment2	10		
RK1	20		
2 nd attestation	Online tests (5 chapters) – Bonus task	5	5
	Lab7	5	100
	Lab8	5	
	Lab9	5	
	Lab10	5	
	Lab11	5	
	Lab12	5	
	Practice7	5	
	Practice8	5	
	Practice9	5	

	Practice10 Practice11 Practice12 Assessment3 Assessment4 RK2	5 5 5 10 10 20	
Final exam	Exam - Practical part Exam - Test	50 50	100
Total	0,3*1stAtt+0,3*2ndAtt+0,4*Final		100

*If the number of absences exceeds 20%, student will be automatically scheduled for a Retake (summer semester)

Achievement level as per course curriculum shall be assessed according to the evaluation chart adopted by the academic credit system:

Letter Grade	Numerical equivalent	Points (%)	Grading scheme
A	4,0	95-100	«Excellent»
A-	3,67	90-94	
B+	3,33	85-89	«Good»
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	«Satisfactory»
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	
F	0	0-49	FX (25-49) «Fail» with re-exam
			F (0-24) «Fail»