1. Course Code

2201

2. Course Title

F40e: Fundamentals of Information Networks

3. Teacher

HAMIDULLAH, Sokout

4. Term

Fall 1

5. Course Requirements (Courses / Knowledge for this course) and Important Information

None.

6. Course Overview and Objectives

In this course, you will learn about the technologies and applications of information networks and the Internet, which are indispensable for daily life and various businesses. Learn technologies such as the link layer, network layer, transport layer, and application layer that support the Internet, and understand how applications use them. Meanwhile, you will learn how to perform switing and routing using virtual environment.

7. Course Outline

1 Overview of Information network
2 Layered Structure of Computer Networks
3 Data Link Layer Structure and Frame Structure
4 Various Data Link Layer Technologies
5 IP address v4 and Subnetting IP v4
6 IP v6
7 Cisco Switch Configuration (VLAN, Trunk)
8 Exercises
9 Cisco Router Configuration (Static Routing and Dynamic Routing)
10 Exercises
11 ICMP, TCP and UDP (Transport Layer)
12 World Wide Web and Mail (Application Layer)
13 Security for Network Devices
14 Security for Network Devices
15 Student Presentation
16 Student Presentation

8. Textbooks (Required Books for this course)

None.

9. Reference Books (optional books for further study)

There are many good books for computer networks. Recommended books:
1. Data Communications and Networking
Author: Behrouz A. Forozouzan
2. Title: Computer Networking: A Top-Down Approach
Author: James F. Kurose, Keith W. Ross

10. Course Goals (Attainment Targets)

 (1) To understand mechanism of the each layers of TCP / IP protocol.
 (2) To understand the functions of various network devices and able to perform swithing and routing
 (3) To understand URLs, DNS, HTTP and web server mechanism
 (4) To understnad and Implement security measures on computer network
 (5) To work in a group to research and present about network applications.
 (6)
 (7)
 (8)

11. Correspondence relationship between Educational goals and Course goals

Educational goals of the school			Course Goals
High level ICT skills	Basic academic skills		(1)(2)(3)(4)
	Specialized knowledge and literacy		
Human skill (Tankyu skill)	Ability to continually improve own strengths		
	Ability to discover and resolve the problem in society	Problem setting	
		Hypothesis planning	
		Hypothesis testing	
		Practice	(1)(2)(3)(4)
	Fundamental Competencies for Working Persons	Ability to step forward	
		Ability to think through	(5)
		Ability to work in a team	(5)
Professional ethics			

12. Evaluation

Goals	Evaluation method & point allocation					
	Examination	Quiz	Reports	Presentation	Deliverables	Other
(1)		○		○	○	○
(2)		○			○	○
(3)		○			○	○
(4)				○		○
(5)						
(6)						
(7)						
(8)						
Allocation		20		30	40	10

13. Evaluation Criteria

Examination	
Quiz	Every week multiple choice quizzes are used to evaluate the understanding of students and motivate them for further learning.
Reports	
Presentation	In the final presentation, students will be asked to choose and summarize a scientific research journal paper or thier own ideas related to the course main objectives and contents. The evaluation will be based on participation in the group presentation, the structure of presentation, the relavance of the argument, time managment and relation to the course contents.
Deliverables	Individuale or group assignment will be assigned for the students with focus on learning goals (1, and 2). The evaluation will be based on how the students understand the exercises and participation.
Other	Class Exercises Participation and Team Collaboration

14. Active Learning

	Hourly percentage of active learning within the whole class time	50%
1	Active learning such as problem solving assignment using the knowledge and skills acquired in class.	Sometimes
2	Active learning such as group works and discussions.	Sometimes
3	Outcome presentations and feedbacks.	Sometimes
4	Students actively make decisions on how the class should be conducted.	Not at all

15. Notes

Class materials are offered as pdf files. Your PC (Windows, Mac or Linux) and the Internet connection are required for the class and homeworks.

In this class, we will use Packet tracer as a virtual environment and Virtual box for security part.

16. Course plan

(Notice) This plan is tentative and might be changed at the time of delivery

Lesson 1: Overview of Information network (Lecture 90min.)

Course introduction and overview of various technologies information networks.

 1. Course logistics (learning goal, grade evaluation, etc.)
 2. History of Information networks
 3. Overview of Internet Communication

Lesson 2: Layered Structure of Computer Networks (Lecture 90 min)

Overview of TCP/IP network and its layered structure

 1. Layered Structure of Information Network
 2. Details of each Layer
 3. Standards for Information Network
 4. Digital representation of various information

Lesson 3: Data Link Layer Structure and Frame Structure (Lecture 90 min)

Data Link Layer Structure and Frame Structure

 1. Ethernet (Wired LAN)
 2. Mac-sub Layer
 3. Message Delivery options

Lesson 4: Various Data Link Layer Technologies   **(Lecture 90 min)**

Various Data Link Layer Technologies

1. Ethernet
2. Wireless LAN
3. Cellular Network

Lesson 5: Network of Network : The Internet   **(Lecture 30 min.,
Exercise 60 min.)**

Understand how the Internet IP address is used.

1. IP packets
2. Communication inside a network segment
3. Communication to another network segment
4. IP v4

Lesson 6: Subnetting and IPv6   **(Lecture 30 min.,
Exercise 60 min.)**

IPv6, the next generation network technology

1. Subnetting with IPv4
2. Background of the deployment of IPv6
3. IPv6 address and operation
4. Transition to IPv6

Lesson 7: Swithing   **(Lecture 30 min.,
Exercise 60 min.)**

Cisco Switch Configuration (VLAN, Trunk)

1. Cisco Swith Configuration
    a. VLAN
    b. Trunk

Lesson 8: Swithing Exercises   **Exercise 90 min.)**

1. Exercises using virtual environment (Cisco Packet Tracer)

Lesson 9: Routing   **(Lecture 30 min.,
Exercise 60 min.)**

Cisco Router Configuration (Static Routing and Dynamic Routing)

1. Cisco Router Configuration
    a. Static Routing
    b. Dynamic Routing concepts

Lesson 10: Routing Exercises   Exercise 90 min.)

1. Routing Exercises using virtual environment (Cisco Packet Tracer)

Lesson 11: Reliable Communication: TCP(Transport Layer)   (Lecture 90 min)

The function and behavior of TCP and UDP

1. ICMP, TCP and UDP
2. NAPT (Network Address and Port Translation)

Lesson 12: World Wide Web and Mail (Application Layer)   (Lecture 90 min)

Web mechanism and its security. E-mail systems

1. HTML
2. Dynamic Web
3. Secure Internet communication: SSL/TLS
4. Electric Mail

Lesson 13: Security for Network Devices   (Lecture 60 min., Exercise 30 min.)

Security of the Internet

1. Security for Network Devices (Stateless Firewall)

Lesson 14: Security for Network Devices   Exercise 90 min.)

Security of the Internet

2. Security for Network Devices (Statefull Firewall)

Lesson 15-16: Groups Presentation   (Presentation 180 min)

Groups of Student select a theme related to network applications, research about it, and present the results.