SYLLABUS

1. **Course name:** Computer and Communication Networks
2. **Course code:** CONE337764
3. **Credits:** 3 credits (3/0/6) (3 theoretical credits, 0 practical credit)

   Duration: 15 weeks (3 main periods and 6 self-study periods) /week)
4. **Instructors:**
   a. Primary instructor: Truong Ngoc Ha, MEng
   b. Secondary instructors:
      - Phan Van Ca, Ph.D
      - Le Minh, MEng
5. **Course conditions**

   Prerequisites: N/A.
   Corequisites: Data Communication, Signal and System.
6. **Course Description :**

   Introduction to analysis and design of computer and communication networks through understanding the network layered architecture and the protocol stack and by conducting hands-on programming and lab activities.
7. **Course Goals:**

Goals	Goal description *(This course provides students:)*	ELOs
G1	Ability to apply knowledge about network architectures, protocol layers, and their service models	01 (H)
G2	Ability to design a basic computer network	02 (M)
G3	Ability to use Cisco Packet Tracer, NS3 software in simulating, analyzing, and solving problems of performance.	03 (M)
G4	Ability to self-study and learn more about advanced techniques.	07 (M)
G5	Ability to present application about computer network..	11 (H) 10 (L)

** Note: H: **H**igh; M: **M**edium; L: Low*

8. **Course Learning Outcomes - CLOs:**

CLOs		Description *(After completing this course, students can have:)*	Outcome
G1	G1.1	Understanding network architectures, protocol layers, and their service models	01
	G1.2	Principles of network applications: Application layer protocols such as HTTP, FTP, and SMTP. Peer-to-Peer File Sharing Protocols and Architectures. ISPs and Domain name systems. Socket API and network socket programming.	01

		Understanding reliable and unreliable transport-layer protocols: GBN and SR. TCP and UDP. Port numbers. Multiplexing and demultiplexing. Flow control and congestion control. Fairness. Delay, jitter, and loss in packet-switched networks. Bandwidth, throughput, and quality-of-service.	01
	G1.3		
	G1.4	Understanding network layer services and protocols: Switching fabric: Routing and forwarding. Queues and buffering.	01
G2	G2.1	Analyze basis of link-layer and its services.	02
	G2.2	Analyze basis of ethernet, hubs, bridges, and switches	02
	G2.3	Analyze efficiency of pure and slotted ALOHA. CSMA, CSMA/CD, and CSMA/CA.	02
	G2.4	Analyze Manchester encoding ATM and MPLS	02
G3	G3.1	Calculate performances: Virtual-circuit and datagram networks. Internet protocol. IPv4 and IPv6	03
	G3.2	Detect data from received code.	03
G4	G4.1	Learn about tunneling. LS and DV algorithms.	07
	G4.2	Understand of Routing in the Internet. RIP, OSPF, and BGP. Broadcast and multicast	07
	G4.3	Compare hubs, bridges, and switches.	07
G5	G5.1	Present and design optimal computer networks.	10
	G5.2	Understand strong points of computer network when comparing with another system.	11

9. Study materials:

a. *Textbooks:*

   [1] James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Addison-Wesley, 6th edition.

b. *References:*

   [2] Sharam Hekmat, "Communication Networks", 2005.

   [3] Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill, 5th Edition.

   [4] Cisco, CCNA Study Guide, Cisco Press, 2000.

10. Student Assessments:

a. *Grading points: 10*

b. *Planning for students assessment is followed:*

Type	Contents	Linetime	Assessment techniques	CLOs	Rates (%)
Midterms					**50**
Q	Knowledge of all chapters.	Week 2-15	Individual paper test in class	G1.1, G1.2, G1.3, G2.1, G4.3	20
M.1	Computer networks and the internet; application Layer;	Week 6	Individual paper test in class	G1.2, G1.4, G1.5, G2.1,	15

				G2.2, G2.3, G3.1, G4.3	
M.2	Network layer and routing	Week 9	Individual paper test in class	G1.3, G2.4, G3.2, G5.1, G5.2	15
Final exam					**50**
F	Content includes all output standards of the course.		Individual paper assessment in class		50

*Note: Q: **Q**uiz; H: **H**omework; P: **P**roject; M: **M**idterm Exam; F: **F**inal Exam;*

11. Course details:

Week	Contents	CLOs
1	***Chapter 1. Computer Networks and the Internet (3/0/6)***	

	Teaching contents: *(3)*
	   1.1 What is the internet, what is a Protocol?
	   1.2 The Network Edge, the Network core
	 Teaching methods:
	   + Theoretical lectures
	   + Questions and discussion
		G1.1, G1.3, G5.2

	Self-study contents: *(6)* 1.3 Access Network and Physical Media	
2	***Chapter 1. Computer Networks and the Internet (cont.)(3/0/6)***	

	Teaching contents: *(3)*
	   1.4 Delay and Loss in Packet-Switching networks
	   1.5 Protocol Layers and their Service models
	 Teaching methods:
	   + Theoretical lectures
	   + Questions and discussion
		G1.2, G1.5, G2.3, G3.1

	Self-study contents: *(6)* 1.6 Internet Backbones, NAPs and ISPs	
3	***Chapter 2. Application Layer (3/0/6)***	

	Teaching contents: *(3)*
	   2.1 Principles of Application-Layer Protocols
	   2.2 The World Wide Web: HTTP
	 Teaching methods:
	   + Theoretical lectures
	   + Questions and discussion
		G1.3, G2.1

	Self-study contents: *(6)* 2.3 File Transfer: FTP	
4	***Chapter 2. Application Layer (cont.) (3/0/6)***	
	Teaching contents: *(3)* 2.4 Electronic Mail in the internet	G1.4, G1.5, G2.1, G2.4

	2.5 The internet's Directory Service: DNS
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion	

	Self-study contents: *(6)* 2.6 Socket Programming with TCP	
5	*Chapter 3. Transport Layer (3/0/6)*	

	Teaching contents: *(3)*
	  3.1 Transport-Layer Services and Principles
	  3.2 Multiplexing and Demultiplexing Applications
	  3.3 Connectionless Transport: UDP
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion
		G1.4, G1.5,
		G2.2, G4.3

	Self-study contents: *(6)* 3.4 Principles of Reliable of Data Transfer	
6	*Chapter 3:* **Transport Layer (cont.)** *(3/0/6)*	

	Teaching contents: *(3)*
	  3.5 Connection-Oriented Transport: TCP
	  3.6 Principles of Congestion Control
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion
		G1.5, G2.2,
		G2.3, 3.1,
		5.1

	Self-study contents: *(6)* 3.7 TCP Congestion Control	
7	*Chapter 4:***Network Layer and Routing** *(3/0/6)*	

	Teaching contents: *(3)*
	  4.1 Introduction and Network Service Model
	  4.2 Routing Principles
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion
		G2.2, G3.1,
		G5.1

	Self-study contents: *(6)* 4.3 Hierarchical Routing	
8	*Chapter 4:* **Network Layer and Routing (cont.)** *(3/0/6)*	

	Teaching contents: *(3)*
	  4.4. Internet Protocol
	  4.5. Routing in the Internet
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion
		G1.2, G1.4,
		G1.5, G2.3,
		G3.1

	Self-study contents: *(6)* 4.6. What is Inside a Router	
9	*Chapter 4:* **Network layer and Routing (cont.)** *(3/0/6)*	

	Teaching contents: *(3)*
	   4.7 IPv4
	   4.8 IPv6
	Teaching methods:
	  + Theoretical lectures
	  + Presentation, questions and discussion
		G1.2, G1.4,
		G1.5, G2.3,
		G3.1

	Self-study contents: *(6)* 4.9 Multicast Routing	
10	*Chapter 5: Link Layer and Local Area Networks (3/0/6)*	

	Teaching contents: *(3)*
	   5.1 The Data link layer: Introduction, service
	   5.2 Error detection and correction
	Teaching methods:
	  + Theoretical lectures
	  + Presentation, questions and discussion
		G1.5, G2.2,
		G2.3, G3.2,
		G4.3

	Self-study contents: *(6)* 5.3 Multiple access protocols and LANs.	
11	*Chapter 5: Link Layer and Local Area Networks (cont.) (3/0/6)*	

	Teaching contents: *(3)*
	   5.4 LAN addresses and ARP
	   5.5 Ethernet: CSMA/CD
	Teaching methods:
	  + Theoretical lectures
	  + Presentation, questions and discussion
		G1.1, G1.2,
		G2.1, G2.2,
		G2.3, G3.1,
		G3.2, G4.1,
		G4,2, G4.3.

	Self-study contents: *(6)* 5.6 Hubs, Bridges and Switches	
12	*Chapter 5: Link Layer and Local Area Networks (cont.)(3/0/6)*	

	Teaching contents: *(3)*
	   5.7 Wireless LANs: IEEE 802.11
	   5.8 The point to point protocol
	Teaching methods:
	  + Theoretical lectures
	  + Presentation, questions and discussion.
		G1.4, G4.1,
		G4.3, G5.1

	Self-study contents: *(6)* 5.9 ATM, X.25 and Frame Relay	
13	*Chapter 6:* **Multimedia Networking** *(3/0/6)*	

	Teaching contents: *(3)*
	   6.1 Multimedia Networking applications
	   6.2 Streaming stored audio and video
	Teaching methods:
	  + Theoretical lectures
	  + Presentation, questions and discussion.
		G1.4, G1.5,
		G2.3, G2.4,
		G3.1, G4.1

	Self-study contents: *(6)* 6.3 RTP	

	Chapter 6: **Multimedia Networking (cont.)** *(3/0/6)*	
14	**Teaching contents:** *(3)* 6.4　　　Beyond best effort 6.5　　　Integrated services **Teaching methods**: **+** Theoretical lectures **+** Presentation, questions and discussion -- **Self-study contents**: *(6)* 6.6　　　RSVP	G1.3, G2.4, G3.1, G3.2
15	*Review*	

12. Learning ethics:

　　Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero point.

13. First approved date: August 1st 2012

Approval level:

Dean	**Department**	**Instructor**

14. Syllabus updated process

1st **time:** Updated content dated, **August 1st 2014**	Instructors Head of department
2nd **time:** Updated content dated, **August 1st 2016**	Instructors Head of department