SYLLABUS

1. **Course name:** Data Comunication
2. **Course code:** DACO430664E
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: Nguyen Ngo Lam, M.Eng.
   b. Secondary instructors:
      - Pham Hong Lien, Assoc. Prof, Ph.D
      - Dang Phuoc Hai Trang, M.Eng.
      - Nguyen Van Phuc, M.Eng.
5. **Course conditions:**
   a. Prerequisites: N/A.
   b. Corequisites: Signals and Systems.
6. **Course Description:**

   This course provides fundamental knowledge about transmitting and receiving of communication, both digital and analog data; multiplexing and demultiplexing techniques; switching techniques; error detection and correction; data link control.
7. **Course Goals:**

Goals	Goal description *This course provides students:*	ELOs
G1	Knowledge about data communication network: network topologies, line configuration, the OSI model, analog and digital transmission, transmission media, multiplexing, switching, error detection and correction, data link control and protocols.	01 (H)
G2	Ability to realize, calculate and solve problems: spectrum, channel bandwidth, capacity, attenuation, data stream rate, line coding, channel coding.	02 (M)
G3	Ability to apply knowledge about data communication to solve problems in communication systems network.	07 (M)

   ** Note: H: **H**igh; M: **M**edium; L: Low*
8. **Course Learning Outcomes - CLOs:**

CLOs		Description *After completing this course, students can have:*	ELOs
G1	G1.1	Represent the functionalities, concepts, standards and technologies involved with voice and data network services and voice/data integration.	01, 02
	G1.2	Represent the concept and importance of TCP/IP layered architecture.	01
	G1.3	Represent circuit & packet switching technologies and their deployments in public networks.	01
	G1.4	Represent the MAC, wired and wireless local networks such as Ethernet,	01

		Token rings and Wi-Fi.	
G2	G2.1	Perform link level analysis including error detection, error control and flow control.	02, 07
	G2.2	Formulate and solve data communication problems: channel bandwidth, capacity, attenuation, data stream rate.	02, 07
G3	G3.1	Use data communication techniques for analysis how Internet clients and servers are able to communicate with each other.	07

9. Study materials:

 a. *Textbooks:*

 [1] Behrouz A. Forouzan, *Data communications and networking*, McGrawHill, 5th, 2012.

 b. *References:*

 [2] Nguyen Viet Hung, *Data Communication*, HCMUTE, 2012.

 [3] Fred Halsal, *Data communication, Computer networks and open Systems*, 2003.

 [4] A.Bruce Carlson; Paul B. Crilly**,** *Communication systems*, McGrawHill International, 2002.

 [5] Bemard Sklar, *Digital communication – Fundamentals and Applications*, 1999.

10. Student Assessments:

 a. *Grading points*: 10

 b. *Planning for students assessment is followed:*

Type	Contents	Line time	Assessment techniques	CLOs	Rates (%)
Midterms					**50**
M	Knowledge of chapters 1-6.	Week 7th	Individual paper test in class	G1.1; G1.2; G2.2	20
M	Knowledge of chapters 7-10.	Week 12th	Individual paper test in class	G1.3; G2.1 G2.2; G3.1	20
Q/H	Knowledge of all chapters.	Week 1st-15th	Mini test (class/homework/LMS)	Some CLOs	10
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
	Chapter 1: **Overview**	
1	**Teaching contents:** *(3)* 1.1 Overview of data communication system. 1.2 Types of connections. 1.3 Network Topologies.. 1.4 Direction of data flow. 1.5 Network categories.	G1.1

	1.6 Internetworks	
	Teaching methods: + Theoretical lectures + Questions and discussion	
	Self-study contents: *(6)* + Data communication systems's detailed block diagram. + Practice set 1.	G1.1
	Chapter 2: **Network Models**	
2	**Teaching contents:** *(3)* 2.1 TCP/IP Protocol. 2.2 The OSI Model. **Teaching methods**: + Theoretical lectures. + Questions and discussion.	G1.2
	Self-study contents: *(6)* + Practice set 2	G1.2
	Chapter 3: **Digital Transmission**	
3	**Teaching contents:** *(3)* 3.1 Transmission modes. 3.2 Digital to Digital conversion. 3.3 Analog to Digital conversion. **Teaching methods**: + Theoretical lectures. + Group discussion. + Questions and discussion.	G1.1; G2.2; G3.1
	Self-study contents: *(6)* + CMI, HDBn, BnZS codes. + Practice set 3	G1.1; G2.2
	Chapter 4: **Analog Transmission**	
4	**Teaching contents:** *(3)* 4.1 Digital to Analog conversion. 4.2 DTE-DCE Interface. 4.3 Modems **Teaching methods**: + Theoretical lectures + Questions and discussion	G1.1; G2.2; G3.1
	Self-study contents: *(6)* + Analog to Analog conversion. + ADSL modem, Optical Modem. + Practice set 4	G1.1; G2.2
5	*Chapter 5:* **Multiplexing and Spectrum**	
	Teaching contents: *(3)*	G1.1; G2.2;

	5.1 Introduction		G3.1
	5.2 Frequency-Division Multiplexing		
	5.3 Time-Division Multiplexing		
	5.4 Application of multiplexing		
	Teaching methods:		
	+ Theoretical lectures		
	+ Questions and discussion		
	+ Group discussion.		
	Self-study contents: *(6)*		G1.1; G2.2
	5.5 Wavelength-Division Multiplexing		
	5.6 Frequency Flopping Spread Spectrum FHSS		
	5.7 Direct Sequence Spread Spectrum DSSS		
	+ Practice set 5		
6	*Chapter 6:* **Transmission Media**		
	Teaching contents: *(3)*		G1.1; G2.2; G3.1
	6.1 Guided media		
	6.2 Unguided media		
	6.3 Attenuation.		
	Teaching methods:		
	+ Theoretical lectures		
	+ Questions and discussion		
	Self-study contents: *(6)*		G1.1; G2.2
	+ Attenuation in coaxial and twisted – pair cable.		
	+ Practice set 6		
7	**Review and Test**		
8	*Chapter 7:* **Switching**		
	Teaching contents: *(3)*		G1.3; G2.2; G3.1
	7.1 Introduction		
	7.2 Circuit switching.		
	7.3 Packet switching.		
	Teaching methods:		
	+ Theoretical lectures		
	+ Questions and discussion		
	Self-study contents: *(6)*		G1.3; G2.2
	+ Switch structure.		
	+ Practice set 7		
9	*Chapter 8:* **Error Detection and Correction**		
	Teaching contents: *(3)*		G1.1; G2.1; G2.2; G3.1
	8.1 Introduction		
	8.2 VRC code		

	8.3 LRC code	
	8.4 CRC code	
	8.5 Checksum code.	
	8.6 Hamming code	
	Teaching methods:	
	+ Theoretical lectures	
	+ Questions and discussion	
	+ Group discussion.	
	Self-study contents: *(6)* + CRC-32 code + Practice set 8	G1.1; G2.1; G2.2
	Chapter 9: **Data Link Control (DLC)**	
10	**Teaching contents:** *(3)* 9.1 Controlled access. 9.2 Flow control. 9.3 Error control. **Teaching methods**: + Theoretical lectures + Questions and discussion + Group discussion.	G1.1; G2.1; G2.2; G3.1
	Self-study contents: *(6)* + Practice set 9	G1.1; G2.1; G2.2
	Chapter 10: **Data Link Protocols**	
11	**Teaching contents:** *(3)* 10.1 Unsynchronous protocol 10.2 Synchronous protocol. **Teaching methods**: + Theoretical lectures + Questions and discussion	G1.1; G2.1; G2.2; G3.1
	Self-study contents: *(6)* + Practice set 10	G1.1; G2.1; G2.2
12	**Review and Test**	
	Chapter 11: **Media Access Control MAC**	
13	**Teaching contents:** *(3)* 11.1 Overview of Random access 11.2 Overview or Controlled access **Teaching methods**: + Theoretical lectures + Questions and discussion	G1.4; G3.1
	Self-study contents: *(6)* + Multiple access	G1.4

14	*Chapter 12:* **Overview of Data Communication Network**		

	Teaching contents: *(3)*
	  12.1 Overview of Ethernet network
	  12.2 Overview of SONET
	  12.3 Overview of ATM
	  12.4 Overview of IEEE 802.11
	  12.5 Overview of WiMAX
	Teaching methods:
	  + Theoretical lectures
	  + Questions and discussion
		G1.4; G3.1	

	Self-study contents: *(6)*
	  + Overview of Telephone
	  + Overview of Cellular Telephony
		G1.4	

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: 01/01/2012

14 Approval level

Dean	**Department**	**Instructor**
Nguyen Minh Tam, Ph.D	Nguyen Ngo Lam, M.Eng	

15 Syllabus updated process:

1st time: Updated content dated: 15/01/2014 *Contents:*	**Instructor:** **Head of department:** Vo Minh Huan, Ph.D
2nd time: Updated content dated*:* 15/01/2016 *Contents:*	**Instructor:** **Head of department:** Phan Van Ca, Ph.D
3rd time: Updated content dated*:* 06/05/2017 *Contents:*	**Instructor:** Dang Phuoc Hai Trang, M.Eng **Head of department:** Phan Van Ca, Ph.D