

City University of Hong Kong
Course Syllabus

offered by Department of Electronic Engineering
with effect from Semester A in 2020/2021

Part I Course Overview

Course Title: Data Communications and Networking

Course Code: EE3009

Course Duration: One Semester (13 weeks)

Credit Units: 3

Level: B3

Proposed Area:
(for GE courses only)

Arts and Humanities

Study of Societies, Social and Business Organisations

Science and Technology

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) EE1001 Foundations of Digital Techniques

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) Nil

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

The aim of this course is to provide students with an understanding of the basic principles of data communications and IP networking.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Describe the architecture of computer networks and explain how internetworking works.		✓		
2.	Explain how information can be represented and sent via communication interfaces and links.		✓	✓	
3.	Explain how reliable data transfer can be achieved in the data link layer.		✓	✓	
4.	Explain the principles and evaluate the performance of medium access control.		✓	✓	
		100%			

* If weighting is assigned to CILOs, they should add up to 100%.

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Key concepts are described and illustrated	✓	✓	✓	✓			2 hrs/wk

Tutorial	Key concepts are worked out based on problems or software tools	✓	✓	✓	✓			1 hr/wk
Laboratory	Key concepts are applied to set up networks	✓						3 hrs/wk (4 weeks)

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4			
Continuous Assessment: 50%							
Tests (min.: 2)	✓	✓	✓	✓		30%	
#Assignments (min.: 3)	✓	✓	✓	✓		10%	
Lab Exercises/Reports	✓	✓	✓	✓		10%	
Examination: 50% (duration: 2 hrs , if applicable)							
Examination	✓	✓	✓	✓		50%	
						100%	

* The weightings should add up to 100%.

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. Also, 75% laboratory attendance rate must be obtained.

may include homework, tutorial exercise, project/mini-project, presentation

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair(C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. Constructive Alignment with Major Outcomes

MILO No.	How the course contribute to the specific MILO(s)
1	Knowledge of mathematics and engineering is applied to perform functions in protocol layers, e.g., error checking codes, IP address allocation.
5	The students will develop the ability to identify and formulate engineering problems when modelling the performance of ARQ and MAC protocols.
10	The students will learn to use network traffic capturing tool.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Computer Networks and Internet

Components of a small network, circuit switching, packet switching, Internet architecture, access networks, ISP, routers, Internet exchange and backbone, performance measures, protocol layering, encapsulation/de-capsulation.

Data Transmission and Transmission Media

Digital representation of information, digital and analog transmission, transforming data to signals, transmission modes, multiplexing, asynchronous/synchronous communications, error detection and correction, transmission media: guided and wireless.

Data Link Layer

Reliable data transfer and ARQ: stop-and-wait, go-back-N, selective repeat; Data Link Controls: framing, point-to-point protocol, HDLC data link control.

Medium Access Control

Random access: ALOHA, slotted ALOHA, CSMA, Collision Detection and Avoidance; Scheduling; Channelization.

Local Area Networks

LAN Structure, interconnection using switches; LAN standards: Ethernet, VLAN and Wi-Fi.

Network Layer: Data Plane

Network data and control plane; Router: structure and design principles; Internet Protocol: IPv4, addressing, datagram fragmentation, NAT, IPv6; Address resolution; Generalized forwarding and SDN.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	N/A
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2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	James F. Kurose and Keith W. Ross: Computer Networking: a top-down approach, 7 th Edition, Pearson Education Inc., 2016.
2.	Alberto Leon-Garcia and Indra Widjaja: Communication Networks: fundamental concepts and key architectures, 2 nd edition, McGraw Hill, 2004.
3.	Douglas E Comer: Computer Networks and Internets, 5 th Edition, Prentice Hall, 2009.
4.	Mark Dye, Rick McDonald, Antoon Ruffi: Networking Fundamentals, CCNA Exploration Companion Guide, Cisco Press 2008.