

**City University of Hong Kong
Course Syllabus**

**offered by Department of Computer Science
with effect from Semester A 2017/18**

Part I Course Overview

Course Title: Computer Networks

Course Code: CS3201

Course Duration: 1 semester

Credit Units: 3 credits

Level: B3

Arts and Humanities

Proposed Area:
(for GE courses only)

Study of Societies, Social and Business Organisations

Science and Technology

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) Nil

Exclusive Courses:
(Course Code and Title) CS3270 Fundamentals of Computer Networks and the Internet

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to introduce some of the fundamental concepts in data communication and computer networks. The framework of the course is the layered architecture, with the lower layers up to and including the transport layer as the main focus. Examples will be drawn liberally from the Internet to illustrate abstract concepts so that students can understand how a computer network actually works.

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.	Identify and describe the key transmission level technologies used in communication networks.	20%			
2.	Apply the concepts of layered architecture in assessing the placement of network devices, protocols and services.	15%			
3.	Explain the working of error control and medium access control protocols in the data link layer and apply them to both wired and wireless local area networks.	15%			
4.	Explain the role of routing, congestion and flow control, naming and internetworking in the context of a global network such as the Internet, and the common protocols used to implement these functions.	25%			
5.	Compare the services provided by the UDP/TCP transport layer protocols and explain the mechanisms used to provide a reliable data transport service on an unreliable IP network.	10%			
6.	Analyze the application of network technologies in designated scenarios and explore how these technologies can be deployed to support the Quality of Service requirements of current and future applications.	15%	✓	✓	
		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.)

Teaching pattern:

Suggested lecture/tutorial/laboratory mix: 2 hrs. lecture; 1 hr. tutorial.

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5	6	
Lecture	Explain key concepts.	✓	✓	✓	✓	✓	✓	2
Tutorials	The tutorials provide an opportunity for the students to discuss and deepen their understanding of material learned during the lecture. In particular, questions will be formulated in the form of specific scenarios to help the students to apply concepts learned and to encourage them to propose creative solutions.	✓	✓	✓	✓	✓		1

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	5	6		
Continuous Assessment: <u>30%</u>								
Assignments	✓	✓	✓	✓	✓	✓	18%	
Quiz	✓	✓	✓				12%	
Examination [^] : <u>70%</u> (duration: 2 hours)								
							100%	

* The weightings should add up to 100%.

[^] For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

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. Assignments	Ability to apply concepts learned in lectures to solve problems in data communications and computer networks.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Quiz	Ability to solve short questions in data communications and computer networks.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Ability to apply concepts learned in lectures to solve problems in data communications and computer networks, including modelling, analysis of performance, specification evaluation of appropriate technology for specific network scenarios.	High	Significant	Moderate	Basic	Not even reaching marginal levels

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

1. Keyword Syllabus

(An indication of the key topics of the course.)

Data transmission. Coding. Modulation techniques. Common network devices and configurations. Layered network architecture: The OSI and Internet TCP/IP reference models. Data link layer: error control and flow control issues. Sliding window protocols. LANs and medium access protocols. Network layer issues: addressing, routing, congestion and flow control. Internetworking. Transport layer issues. Case study based on TCP/UDP and IP protocols.

Syllabus:

1. Introduction to data communications and networks

Data communications and networking concepts. Basic terminology. Network technologies.

2. Basic communications theory

Bandwidth limited channels. Coding. Modulation. Digital vs analog transmission. Digital to analog conversion and sampling. Common transmission medium. Structure of the telephone network. Introduction to multiplexing and switching.

3. Layered network architecture

Services and protocols. Connection-oriented vs connectionless service. The OSI Reference Model and the Internet TCP/IP model.

4. Data link layer

Error detection and recovery procedures. Idle RQ vs continuous RQ, selective repeat and go-back N strategies. Sliding window protocols. Link utilization. Medium access control: random access vs controlled access protocols. LAN switching. Ethernet as a case study.

5. Network layer

Switching: circuit, message and packet switching, virtual circuit vs datagram switching. Addressing: IP addressing scheme, Address Resolution Protocol, Network Address Translation. Routing: hierarchical routing, linked state and distance vector. Congestion control and flow control algorithms for virtual circuit and datagram subnet. Internetworking at both the link and network layer: bridge/switch vs router. Internet Protocol and the Internet Layer as case studies.

6. Transport layer

Connection establishment and three-way handshake. Elements of reliable transport protocol: error and congestion control. TCP as a case study.

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.	Tanenbaum A. and Wetherell D. J. (2010). <i>Computer Networks</i> . Prentice Hall, 5 th edition.
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2.2 Additional Readings

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

1.	Kurose, J. F. and Ross, K. W. (2012). <i>Computer Networking: A Top Down Approach</i> . Addison-Wesley, 6 th edition.
2.	Stallings, W. (2013). <i>Data and Computer Communications</i> . Prentice Hall, 10 th edition.
3.	Comer, D. (2014). <i>Computer Networks and Internets</i> . Prentice Hall, 6 th edition.
4.	Forouzan, B. A. (2013). <i>Data Communications and Networks</i> . McGraw Hill, 5 th edition.