

**City University of Hong Kong
Course Syllabus**

**offered by Department of Computer Science
with effect from Semester A 2024/25**

Part I Course Overview

Course Title:	<u>Computer Networks and Internets</u>
Course Code:	<u>CS5222</u>
Course Duration:	<u>One semester</u>
Credit Units:	<u>3 credits</u>
Level:	<u>P5</u>
Medium of Instruction:	<u>English</u>
Medium of Assessment:	<u>English</u>
Prerequisites: <i>(Course Code and Title)</i>	<u>Nil</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>Nil</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil</u>

Part II Course Details

1. Abstract

The aims of this course is to (i) introduce the fundamental concepts of computer networks using the TCP/IP Model as a framework; (ii) develop understanding in the structure, operation, and application protocols of the Internet. Specifically this course

- (i) introduces the concept of layered architecture in computer networks and the structure of the TCP/IP model;
- (ii) covers the design issues in providing reliable transport of data in the lower protocol layers and the services provided in the higher layers;
- (iii) examines the characteristics, technologies and current standards in local area networks;
- (iv) covers the main protocol elements of the TCP/IP protocol suit;
- (v) examines the structure, naming and routing aspects of the Internet;
- (vi) examines some of the main Internet application protocols.

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 explain the fundamental technologies for the hardware and software of the internet.		✓	✓	✓
2.	Describe the conceptual and implementation aspects of network applications and its use in most of the application layer protocols such as HTTP, SMTP and FTP.		✓	✓	✓
3.	Investigate the implementation details on both reliable and unreliable services that can be provided by the transport layer protocol and to identify problems about the protocols.		✓	✓	✓
4.	Identify and make critique on the underlying principles of routing algorithms and its related protocols being applied to the Internet.		✓	✓	
5.	Describe the services, principle and specific protocol provided in Local area network.		✓	✓	
		100%			

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 real-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. Learning and Teaching Activities (LTAs)

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

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lecture	Students will engage with the basic concepts, design considerations and methodologies illustrated with case examples.	✓	✓	✓	✓	✓	2 hours of lecture per week
Tutorial	Each week, students will engage in discussions and work on given problems related to the lecture topics.	✓	✓	✓	✓	✓	1 hour tutorial per week
Protocol	Students will investigate and discover various different protocols using software protocol analyzer.		✓				

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		
Continuous Assessment: <u>30%</u>							
Assignments (Problem sets)	✓	✓	✓	✓	✓	15%	
Assignment (Hands-on experiments)		✓	✓	✓	✓	10%	
Research report	✓	✓	✓	✓	✓	5%	
Examination [^] : <u>70%</u> (duration: 2 hours)							
						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.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Assignment (Hands-on experiments)	Capacity to perform hands-on experiments related to Internet fundamental technologies, including HTTP, Web browser, SSL, DNS, Trace Route, etc.	High	Significant	Moderate	Basic	Not even reaching marginal
Assignments (Problem sets)	Ability to understand conceptual knowledge on Internet fundamentals, especially those related to Transport, Network Layer Fundamentals.	High	Significant	Moderate	Basic	Not even reaching marginal
Research report	Ability to research on a computer networking topic and write a report.	High	Significant	Moderate	Basic	Not even reaching marginal
Examination	Ability to understand conceptual knowledge on Internet fundamentals, especially those related to Transport, Network, Link Layer and Wireless and Mobile Networks Fundamentals	High	Significant	Moderate	Basic	Not even reaching marginal

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Assignment (Hands-on experiments)	Capacity to perform hands-on experiments related to Internet fundamental technologies, including HTTP, Web browser, SSL, DNS, Trace Route, etc.	High	Significant	Moderate	Not even reaching marginal
Assignments (Problem sets)	Ability to understand conceptual knowledge on Internet fundamentals, especially those related to Transport, Network Layer Fundamentals.	High	Significant	Moderate	Not even reaching marginal
Research report	Ability to research on a computer networking topic and write a report.	High	Significant	Moderate	Not even reaching marginal
Examination	Ability to understand conceptual knowledge on Internet fundamentals, especially those related to Transport, Network, Link Layer and Wireless and Mobile Networks Fundamentals	High	Significant	Moderate	Not even reaching marginal

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.)

Network architecture: layered architecture, service and protocols; Data transport services and protocols: elements of protocols, service specification; Local Area Networks: LAN topologies, medium access methods: CSMA/CD; LAN performance, access delays, throughput; LAN standards; Wide-area networks, network technologies, circuit, packet, cell switching; Routing algorithms, Internetworking, IP, routing in Internet, mobile IP; Transport layer issues: connection management, multiplexing, quality of service. TCP/UDP protocol suite; Congestion and flow control schemes; Socket communication, client-server communications; Domain name system; Application protocols, HTTP, SMTP, POP, SNTP.

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.	Computer Networking - A Top down Approach featuring the Internet, 7 th edition, 2017, by James F Kurose and Keith Ross, Pearson International Edition
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2.2 Additional Readings

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

1.	Computer Networking and the Internet, 5 th edition, 2005, Fred Halsall, Addison Wesley, ISBN 0321263588
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