The Hong Kong University of Science and Technology

UG Course Syllabus (Spring 2025-26)

[Course Title] Computer and Communication Networks

[Course Code] COMP4621

[No. of Credits] 3

[Any pre-/co-requisites] COMP 2611 OR [ELEC 2350 AND (COMP 2011 OR COMP 2012H)]

[Exclusions] COMP 5621, ELEC 3120, ISOM 3180

[Cross-Campus Equivalent Course] FTEC 4260

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Office Hours: [Specify Office Hours and Location] By appointment

Course Description

This course delves into the fundamental principles of computer network architectures and communication protocols. It examines the Internet and the OSI reference model, providing a comprehensive overview of networks and communications systems. The course covers various topics, including switching and multiplexing techniques, data link protocols (LAN, medium access protocols, and error detection), network routing and forwarding models, transport reliability and congestion control, and network applications, including hands-on application design using socket programming, as well as network traffic inspection and investigation via Wireshark.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Define the basic principles of computer networks, architecture and protocols.

2. Identify the design principles of networked applications, including client-server based applications (such as HTTP, FTP, SMTP and DNS) and P2P based applications (such as BT).

3. Discuss the major transport layer protocols, such as TCP and UDP, and identify the basic principles involved in designing reliable communication protocols

4. Understand congestion, its impact on network performance, where it takes place in the switches and routers and how to overcome it to improve network performance.

5. Illustrate the principles of routing algorithms and their applications on the Internet.

6. Identify basic link layer protocols and the basic medium access mechanism.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

The homeworks will assess knowledge distilled during the semester. Homework 1 will cover the applications layer, Homework 2, will partly cover topics in the Transport layer, the mid-term will cover topics not covered by Homework 1 and 2, homework 3 covers topics in the network layer and possibly the link layer. The project covers the practical aspect of socket programming, the lab worksheets serve as a means to ensure the students complete their lab work and cover the Wireshark experiments. The final exam covers topics from Congestion control onwards that were not covered in homework 3 and tests the students on knowledge acquired during the programming assignment and the wireshark labs.

Typically after the first two weeks of the add-drop period thestudents will have a test every couple of weeks with a weekly lab worksheet to complete.

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework assignments (3)	20% (all)	Spread over the semester (end February, end March and late April)
Mid-Term	25%	On week 8 with a cutoff on week 6.5
Lab attendance and Lab worksheet uploads (10)	10%	weekly
Individual programming Project	20%	3 weeks before the end of classes
Final examination	25%	TBA

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Homework 1	ILO1, ILO2	Be able to identify application protocols, be able to go beyond materials learned in class and inspect more aspects of the HTTP protocol and DNS protocol
Homework 2	ILO1, ILO2, ILO3	Be able to identify the principles behind reliable data transfer such as error detection retransmission, sequence numbering etc. Be able to identify transport layer services offered to the applications.

Mid-term exam	ILO1, ILO2, ILO3	Complements Homework 1 and Homework 2 by assessing aspects not covered in the Homework assignmnents.
Homework 3	ILO1, ILO3, ILO4	Be able to understand congestion and congestion control. Be able to identify different congestion control protocols and the need for evolving them with the evolution of network characteristics (TCP, new Reno, Cubic, BBR, application-based Congestion control such as QUIC)
Final examination	ILO1, ILO5, ILO6	Be able to indentify and understand and run routing algorithms including intra-AS and iter-AS routing. BE able to apply coding principles for error detection. Be able to understand medium access control protocols such as Aloha and CSMA and their combination into more complex scenarios such as DOCSIS.
Programming assignment	ILO1, ILO2, ILO3	Be able to program parts of a functional network application such as peer to peer file sharing or a chatroom with public and private messaging and file sharing. A squeleton will be provided and the student would complete it by building parts that pertain to items in ILOs 1, 2, 3.
Lab worksheets	ILO1, ILO2, ILO3	Lab worksheets serve to ensure the student attends the lab and understand the topics covered in the lab, by answering a few simple questions drawn from the day's topic.

Grading Rubrics

Two aspects are important in the grading of student work. Justification of results is of primary importance and counts for more than 50% of the grade. Any result unexplained or unjustified would not get marks. Students need to demonstrate that they actually understand the topics by deriving the result and showing the steps rather than submitting the final result.

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	[Example: Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and

		collaboration, going beyond core requirements to achieve learning goals.]
B	Good Performance	[Example: Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.]
C	Satisfactory Performance	[Example: Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.]
D	Marginal Pass	[Example: Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.]
F	Fail	[Example: Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.]

Course AI Policy

Submitted work must be written by the student. AI use for research an learning further is allowed; however, in submitted homeworks a student needs to present the results in his/her own works highlighting his or her understanding not by copying AI text. All submitted work will go through plagiarism and AI detection software and penalties will be taken after consultation with the student.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Only justified absence would be entertained. Late homework submission would face a penalty.

Required Texts and Materials

N.A.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The

University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Additional Resources

Textbook for reference: James F. Kurose and Keith W. Ross Computer Networks: A Top Down Approach Featuring Internet, 7th Edition (and Newer), Pearson