Subject Description Form

Subject Code	COMP 5311
Subject Title	Internet Infrastructure and Protocols
Credit Value	3
Level	5
Pre-requisite/ Exclusion	Nil
Objectives	The overall objective of this course is to build up a solid understanding on the networking technologies underpinning the current Internet infrastructure. This course would serve as an important pre-requisite for other more advanced topics, such as network security, network measurement and diagnosis, wireless and mobile networks, and multimedia networking. The teaching approach will be based on in-depth problem-solving and hands-on class projects. Specifically, 1. Understand the TCP/IP technology underpinning Internet; 2. Understand the original design philosophy of Internet, and the strength and weaknesses of the then designed Internet in today's computing environment; 3. Explore some most up-to-date development in the Internet technology; and 4. Acquire knowledge in one specific Internet topic through a group project.
Intended Learning Outcomes	After completing the subject, students should be able to: a) understand the articles in a professional computer networking magazines, such as the NetworkWorld and IEEE Netwok, and ACM netWorker; b) use various network diagnosis tools, such as wireshark, traceroute programs, and various ping and ping-like tools to study network protocols and perform simple diagnosis and troubleshooting; and c) take on a self-study on more advanced networking topics that require foundational understanding of the TCP/IP suite.
Subject Synopsis/ Indicative Syllabus	• Data-link networks and IP: shared medium and point-to-point networks; the internetworking problem, the hour-glass model, address resolution, IP fragmentation, packet reordering, IP addressing. • IP forwarding: longest prefix match algorithms, routing vs switching, IP address lookup, packet classification, IP tunnelling, ICMP. • End-to-end issues and protocols: end-to-end argument, end-to-end reliability, TCP and UDP, sliding window protocol, acknowledgment strategies. • Control congestion in Internet: TCP slow-start and congestion avoidance, TCP fast retransmit and recovery, fairness, buffer management, packet scheduling, and queue management.

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Applications protocols, e.g., DNS and HTTP, and their interactions with the lower layers.
Internet routing: Internet topology, distance vector, link state, and path vector routing protocols, convergence and routing loops, Routing Information Protocol, Open Shortest Path Protocol, Border Gateway Protocol, Inter-AS relationship.
Design philosophy of IP and TCP, and future challenges.

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<tr><td>Teaching/Learning Methodology</td><td>Class activities including - lecture, tutorial, lab, workshop seminar where applicable</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific Assessment Methods/Tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>Assignments, Tests & Projects</td><td>55</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Final Examination</td><td>45</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="3"></td></tr>
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<tr><td rowspan="5">Student study effort expected</td><td colspan="2">Class Contact:</td></tr>
<tr><td>Class activities (lecture, tutorial, lab)</td><td>39 hours</td></tr>
<tr><td colspan="2">Other student study effort:</td></tr>
<tr><td>Assignments, Quizzes, Projects, Exams</td><td>65 hours</td></tr>
<tr><td>Total student study effort</td><td>104 hours</td></tr>
<tr><td>Reading list and references</td><td>
(1) J. Kurose and K. Ross, Computer Networking: A Top-Down Approach Featuring the Internet, 6th Edition, Addison Wesley, 2012.
(2) L. Peterson and B. S. Davie, Computer Networks: A Systems Approach, 5th Edition, Morgan Kaufmann, 2011.
(3) R. Perlman, Interconnection , Second Edition, Addison Wesley, 2000.
(4) S. Keshav, An Engineering Approach to Computer Networking, Addison Wesley, 1997.
(5) W. R. Stevens, TCP/IP Illustrated Volume I, The Protocols, Addison Wesley, 1994.
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