

Subject Description Form

Subject Code	COMP 5311
Subject Title	Internet Infrastructure and Protocols
Credit Value	3
Level	5
Pre-requisite/ Exclusion	Nil
Objectives	<p>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,</p> <ol style="list-style-type: none"> 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	<p>After completing the subject, students should be able to:</p> <ol style="list-style-type: none"> a) understand the articles in a professional computer networking magazines, such as the NetworkWorld and IEEE Network, 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	<ul style="list-style-type: none"> • 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.

	<ul style="list-style-type: none"> • 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. 																							
Teaching/Learning Methodology	Class activities including - lecture, tutorial, lab, workshop seminar where applicable																							
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="591 604 1373 888"> <thead> <tr> <th rowspan="2">Specific Assessment Methods/Tasks</th> <th rowspan="2">% weighting</th> <th colspan="3">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <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></td> <td></td> <td></td> </tr> </tbody> </table>	Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed			a	b	c	Assignments, Tests & Projects	55	✓	✓	✓	Final Examination	45	✓	✓	✓	Total	100			
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Total	100																							
Student study effort expected	<p>Class Contact:</p> <table border="1" data-bbox="591 940 1373 978"> <tr> <td>Class activities (lecture, tutorial, lab)</td> <td>39 hours</td> </tr> </table> <p>Other student study effort:</p> <table border="1" data-bbox="591 1014 1373 1052"> <tr> <td>Assignments, Quizzes, Projects, Exams</td> <td>65 hours</td> </tr> </table> <p>Total student study effort 104 hours</p>	Class activities (lecture, tutorial, lab)	39 hours	Assignments, Quizzes, Projects, Exams	65 hours																			
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Reading list and references	<ol style="list-style-type: none"> (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. 																							