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) demonstrate critical thinking and in-depth understanding of specialized technical and research articles in a professional computer networking magazines, journals and transactions, such as IEEE/ACM Transactions on Networking, IEEE Transactions on Wireless Communications, and IEEE Transactions on Mobile Computing; b) utilize various specialized network diagnosis tools (e.g., such as wireshark, traceroute programs, and various ping and ping-like network analysis and diagnosis software) and apply coherent and advanced body of networking knowledge to conduct in-depth research on network protocols, perform effective and efficient diagnosis and troubleshooting, develop creative solutions, and devise experiments to critically evaluate their performance in practical settings; and c) critically review and summarize latest advances in specialized networking topics that require foundational in-depth understanding of network protocols such as 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.
	• 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

Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
Assignments, Tests & Projects	55	✓	✓	✓
Final Examination	45	✓	✓	✓
Total	100			

Student study effort expected

Class Contact:	
Class activities (lecture, tutorial, lab)	39 hours
Other student study effort:	
Assignments, Quizzes, Projects, Exams	66 hours
Total student study effort	**105 hours**

Reading list and references

(1) J. Kurose and K. Ross, Computer Networking: A Top-Down Approach, 8th Edition, Pearson, 2020.
(2) L. Peterson and B. S. Davie, Computer Networks: A Systems Approach, https://book.systemsapproach.org/, 2019.
(3) Academic Journals and Conference Papers such as publications in IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, ACM SIGCOMM, ACM MobiCom, and IEEE INFOCOM.