

1.	Name of Course/Module	Data Communications and Networking
2.	Course Code	TCE2311
3.	Status of Subject	Core for B. Sc Medical information technology
4.	MQF Level/Stage	Bachelor Degree – MQF Level 6
5.	Version (state the date of the last Senate approval)	August 2011
6.	Requirement for Registration	NONE
7.	Name(s) of academic/teaching staff	Dr. Lau Siong Hoe
8.	Semester and Year offered	Trimester 2 (Beta Level)
9.	Objective of the course/module in the programme :	
	To provide students with concepts of data communications and networking. (ii) To understand the fundamentals of Communication Architecture, Protocols and Local Area Networks. (iii) To expose the various types of network in terms of the technologies, hardware, and usage.	
10.	Learning Outcomes :	
	At the completion of the subject, students should be able to:	
	LO1: Demonstrate understanding about various data communication transmission media, interface and modulation techniques. (Affective, Level 3)	
	LO2: Understand the link layer data transmission techniques and protocols. (Cognitive, Level 2)	
	LO3: Explain the basic building blocks of a Local Area Network. (Cognitive, Level 2)	
	LO4: Describe the network models, standards, protocols, and concepts of frequency spectrum and bandwidth. (Cognitive, Level 1)	
11.	Synopsis:	
	The course will expose the students to the overall understanding and knowledge in basic data communications and networking. The major area of studies include physical interface, transmission medium, data integrity and security, data compression, improving data communication efficiency, data encoding and modulation, architecture and protocol, LAN, internetworking and digital switching system.	
	Kursus ini akan mendedahkan pelajar-pelajar kepada pemahaman keseluruhan dan pengetahuan dalam asas komunikasi data dan rangkaian perhubungan. Topik-topik utama di dalam lingkungan pelajaran termasuk ruang interface fizikal, perantara penghantaran, integriti data dan kawalan, pemampatan data, memperbaiki data kecekapan perhubungan, data encoding dan modulasi, seni bina dan protokol, rangkaian data tempatan, internetworking dan sistem "switch" digital.	
12.	Mapping of Subject to Programme Outcomes :	
	Programme Outcomes	% of Contribution
	PO1: Apply soft skills in work and career related activities	57.14
	PO2: Demonstrate knowledge and understanding of fundamental concepts, principles and best practices	42.86

13.	Assessment Methods and Types :		
	Method and Type	Description/Details	Percentage
	Test		20%
	Tutorials		10%
	Laboratories		10%
	Final Exam		60%
14.	Details of Subject		
	Topics	Mode of Delivery	
		Lecture	Tutorial
	1. Introduction Data Communications. Data Communication Networking. Protocols and Protocol Architecture (TCP/IP and OSI). Compare TCP/IP architecture and OSI model. Standards Organizations.	3	2
	2. Data Transmission Transmission Terminology. Frequency, Spectrum and Bandwidth. Transmission Impairments. Nyquist's and Shannon's Law.	3	2
	3. Transmission Media Guided and Unguided. Twisted pair. Coaxial cable. Fibre optic. Microwave. Cellular. Satellite.	3	2
	4. Data Encoding and Modulation Digital to Digital: NRZ-L, NRZ-I, Bipolar-AMI, Pseudoternary, Manchester, Differential Manchester. Modulation Rate. Digital to Analog: Amplitude Shift keying (ASK), Frequency Shift keying (ASK), Phase Shift keying (PSK). Analog to Digital: PCM. Analog to Analog: Amplitude Modulation, Frequency Modulation, Phase Modulation.	5	2
	5. Data Communication Interface Synchronous and Asynchronous Transmission. Line Configurations: Simplex, Half-duplex, Full duplex. EIA-232 Interface Standard. DTE and DCE. Null Modem.	3	2
	6. Data Link Control Flow Control: Stop-and Wait, Sliding Window. Error Detection: Parity Check, CRC Methods. HDLC: Characteristics, Frame Structure, and Operation. Data Compression: Huffman Coding and Dynamic Huffman Coding	5	2
	7. Multiplexing Frequency Division Multiplexing: Characteristics. Synchronous Time Division Multiplexing: Characteristics, Link Control, Digital Carrier Systems, Statistical Time Division Multiplexing: Characteristics. ADSL and HDSL Line.	5	2
8. Circuit Switching and Packet Switching Introduction: Switching Networks, Circuit Switching Networks, Circuit Switching Concepts. Routing in Circuit Switching Networks. Introduction to Control Signalling: SS7. Packet Switching: Technique, Packet Size, Compare Circuit Switching and Packet Switching. Routing: Characteristics, Routing Strategies: Fixed Routing, Flooding, Random Routing, Adaptive Routing.	5	2	

	9. LAN Technology LAN Applications. LAN Architecture: Protocol Architecture, Topologies, MAC, LLC. Bus LAN: Characteristics, Media, Use of Repeater in extension of BUS. Ring LAN: Characteristics. Star LAN: Characteristics, Use of Hubs and Switches. Wireless LAN: Applications, Requirements, and Technology. Bridge: Function of a Bridge, Protocol Architecture.		5	2
	10. LAN Systems Ethernet (CSMA/CD): IEEE 802.3 MAC, IEEE 802.3 10 Mbps Specifications (10Base5, 10Base2, 10Base-T, 10Base-F). IEEE 802.3 100 Mbps Specifications: Introduction to Fast Ethernet and Gigabit Ethernet. Token ring: IEEE 802.5 MAC, Physical Layer specifications. FDDI: MAC, Physical Layer specifications. Wireless LAN Standard: IEEE 802.11 Physical Layer Specifications and MAC.		5	2
	Total		42	20
15.	Laboratory			
	<ul style="list-style-type: none"> • Building a LAN (simulator) • Basic Windows/UNIX commands to handle Networking Configuration. • Cable type for specific connection • Frame Relay Circuit-switching (simulator) • Packet Analysis using tcpdump/ Wireshark 			
16.	Total Student Learning Time (SLT)	Face to Face (Hour)	Total Guided and Independent Learning	
	Lecture	42	42	
	Tutorials	20	20	
	Laboratory/Practical	8	4	
	Presentation			
	Assignment			
	Mid Term Test	1	3	
	Final Exam	2	20	
	Quizzes			
	Sub Total	73	89	
	Total SLT	$162/40 = 4.05 \Rightarrow 4$		
17.	Credit Value	4		
18.	Reading Materials :			
	Textbook	Reference Materials		
	1. Forouzan, Behrouz A. Data Communications and Networking. 4E edition. McGraw-Hill, 2007	1. Beyda, William J. Data Communications: From Basics to Broadband.2005 4 th edition. Prentice Hall. 2. Stallings, William. Data & Computer Communications. 2004 7th edition. Prentice Hall. 3. Halsal, Fred. Data Communications, Computer Networks and Open Systems. 4th edition. Addison-Wesley. 1995 4. Tanenbaum, Andrew S. Computer Networks. 4th edition. 2006 Prentice Hall. 5. Shay, William A. Understanding Data Communications and Networks. 2nd edition. 1993 Thomson Publishing.		

19.	<p>Appendix (to be compiled when submitting the complete syllabus for the programme) :</p> <ol style="list-style-type: none">1. Mission and Vision of the University and Faculty2. Mapping of Programme Objectives to Vision and Mission of Faculty and University3. Mapping of Programme Outcome to Programme Objectives4. Programme Objective and Outcomes (Measurement and Descriptions)
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