IEM Courses Offered in Academic Year 2017-2018

Course Code & Title	IM1001 – DATA STRUCTURES AND ALGORITHMS
Study Year	1 ; 2
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Huang Guangbin (Semester 1) ; Assoc Prof Low Chor Ping (Semester 2)
Learning Objective	This course aims to give a systematic introduction to data structures and algorithms for constructing efficient computer programs. Emphasis is on data abstraction issues in program development process, and on the design of efficient algorithms. Simple algorithmic paradigms such as greedy algorithms, divide-and-conquer algorithms and dynamic programming will be introduced. Elementary analyses of algorithmic complexities will also be taught.
Course Contents	Introduction. Principles of algorithm analysis. Data structures. Searching. Search Trees, Sorting. Algorithm design techniques.
Prerequisite	Nil
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (6)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quiz; Homework Assignments; Practical Works Written Examination (60%)
Textbook(s)	• Huang Guangbin and Ng Jim Mee, Data Structures and Algorithms, Pearson Education, 2007. (QA76.9.D35D232DS)
Reference(s)	• Johnsonbaugh Richard and Schaefer Marcus, Algorithms, Pearson Education, 2004. (QA76.9.A43J65) • Levitin Anany, Introduction to the Design & Analysis of Algorithms, 3rd Edition, 2012. (QA76.9.A43L666 2012) • Michael Goodrich and Robert Tamassia, Algorithm Design: Foundations, Analysis, & Internet Examples, 2002. (QA76.9.A43G655)

Course Code & Title	IM1002 – ANALOG ELECTRONICS
Study Year	1 ; 2
Availability	Semester 2
Coordinator(s)	Assoc Prof Khong W H, Andy
Learning Objective	This course focuses on the fundamentals of circuit theorems, analysis of resistive networks, transient and steady-state responses, Laplace transforms. The second part of this course focuses on electronic devices including Op-Amps, Bi-polar transistors and MOSFETS.
Course Contents	Introduction. Circuit Analysis. Application of Laplace Transforms of Circuit Analysis. Op-Amps and Diodes. BJTs and MOSFETs. Small Signal Amplifiers.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12); Laboratories (6)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quiz; Homework Assignments; Practical Work Written Examination (60%)
Textbook(s)	• Hayt William Hart, Kemmerly Jack E and Durbin Steven M, Engineering Circuit Analysis, McGraw Hill, 8th Edition, 2012. (TK454.H426 2012) • Jaeger Richard C and Blalock Travis N, Microelectronic Circuit Design, 4th Edition, McGraw Hill, 2011. (TK7874.J22M 2011
Reference(s)	• Nilsson James William and Riedel Susan A, Electric Circuits, Pearson/Prentice Hall, 10th Edition, 2011 • Razavi Behzad, Fundamentals of Microelectronics, 2nd Edition, John Wiley, 2014. (TK7874.R278F 2014)

Course Code & Title	IM1003 – OBJECT-ORIENTED PROGRAMMING
Study Year	1 ; 2
Availability	Semester 2
Coordinator(s)	Assoc Prof Chua Hock Chuan
Learning Objective	The objectives of this course are to equip students with: 1) the knowledge of object-oriented programming concepts; 2) skills of solving software problems with the use of object-oriented programming language.
Course Contents	Programming Fundamentals. Object-Oriented Concepts and Programming. Graphical user interface programming. Applications.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)

Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quiz; Homework Assignments Written Examination (60%)
Textbook(s)	• Liang Y Daniel, Introduction to Java Programming: Comprehensive Version, 11th Edition Pearson/Prentice Hall, 2017.
Reference(s)	• Deitel Paul J and Deitel Harvey M, Java how to program late objects, Version 11th Edition, Prentice Hall, 2017.

Course Code & Title	IM1004 – DIGITAL ELECTRONICS
Study Year	1
Availability	Semester 1
Coordinator(s)	Assoc Prof Lim Meng Hiot (Semester 1)
Learning Objective	This course serves as a foundation course on digital electronics. It covers a broad range of fundamental digital circuits. The concepts of digital signals, number systems, logic gates, switching algebra and logic minimization techniques, basic combinatorial and digital circuits and their application in more complex digital systems are to be imparted to the students.
Course Contents	Digital Fundamentals. Digital Circuits; Combinational Logic Principles. Combinational Logic Circuits. Sequential Logic Principles. Sequential Logic Circuits. Memory, CPLDs, and FPGAs.
Prerequisite	Nil
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (9)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignments/Tests; Practical Work Written Examination (60%)
Textbook(s)	• Wakerly John F, Digital Design: Principles and Practices, 4th Edition, Pearson Prentice-Hall, 2006. (TK7874.W149 2006)
Reference(s)	• Roth Charles H and Kinney Larry L, Fundamentals of Logic Design, 7th Edition, Cengage Learning, 2014. (TK7868.L6R845 2014) • Marcovitz Alan B, Introduction to logic design, 3rd Edition, McGraw-Hill, 2010. (TK7868.L6M321 2010) • Mano M Morris and Ciletti Michael D, Digital Design: With a Introduction to the Verilog HDL, 5th Edition, Pearson Prentice Hall, 2013. (TK7888.3.M285 2013)

Course Code & Title	IM2001 – SOFTWARE ENGINEERING
Study Year	2
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Chen Lihui
Learning Objective	The objective of this course is to provide students with an understanding of the essential software engineering body of knowledge.
Course Contents	Introduction to software engineering. Software project management. Software requirements and specifications. Software design. Software testing and maintenance.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignments Written Examination (60%)
Reference(s)	• Sommerville Ian, Software Engineering, 9th Edition, Addison-Wesley, 2011. (QA76.758.S697 2011) • Pressman Roger S, Software Engineering: A Practitioner's Approach, 8th Edition, McGraw-Hill, 2014. • Pezze Mauro, and Young Michal, Software Testing and Analysis: Process, Principles and Techniques, Wiley, 2008. (QA76.76.T48P522) • Bob Hughes and Mike Cotterell, Software Project Management, 5th Edition, McGraw-Hill, 2009. • Pressman Roger S and Lowe David, Web Engineering: A Practitioner's Approach, McGraw-Hill, 2009. (TK5105.88813.P935)

Course Code & Title	IM2002 - MICROPROCESSORS
Study Year	2
Availability	Semester 1
Coordinator(s)	Dr Chan Chee Keong

Learning Objective	This is an introductory course about the fundamentals of ARM microprocessors. It covers the ARM architecture, hardware interface, software programming in assembly language as well as C language. It will also introduce students to the system-on-chip concept and the use of ARM as a microcontroller.
Course Contents	Introduction to ARM core and programmer's model. Assembler Directives. Loads, Stores and Addressing. Logic and Arithmetic. Flow control instructions. Subroutines, Stacks and Exception Handling. Thumb Instructions and C language. Peripherals Interfacing.
Prerequisite	Nil
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (6)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quizzes; Practical Works Written Examination (60%)
Textbook(s)	• Hohl William, Christopher Hinds, ARM Assembly Language: Fundamentals and Techniques, 2nd edition, CRC Press, 2014.
Reference(s)	• Lewis Daniel Wesley, Fundamentals of Embedded Software: with the ARM Cortex-M3, 2nd Edition, Prentice Hall, 2013. (TK7895.E42L673 2013) • Sloss Andrew N, Symes Dominic and Wright Chris, ARM System Developer's Guide: Designing and Optimizing System Software, Elsevier / Morgan Kaufmann. 2004. (QA76.76.D47S634) • Patterson David A and Hennessy John L, Computer Organization and Design: The Hardware/Software Interface, (ARM edition), 5th Edition, Morgan Kaufmann, 2014. (QA76.9.C643P317 2014)

Course Code & Title	IM2003 – COMPUTER COMMUNICATIONS
Study Year	3
Availability	Semester 1 ; Semester 2
Coordinator(s)	Dr Shao Xuguang, Michelle
Learning Objective	The course is intended to provide students with the fundamental concepts in computer communications, proceeding from data communications over a data link to transfer of information across local-area networks and wide-area networks.
Course Contents	Introduction to computer communications. Data Communications Fundamentals. Data Link Control. Local Area Networks. Internetworking.
Prerequisite	Nil
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (3)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Individual Assignment; Participation Written Examination (60%)
Reference(s)	• Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004) • Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2013. (TK5105.875.I57K96 2013) • Stallings William, Data and Computer Communications, 10th Edition, Pearson/Prentice-Hall, 2014. (TK5105.S782 2014

Course Code & Title	IM2004 – SIGNALS AND SYSTEMS
Study Year	2
Availability	Semester 2
Coordinator(s)	Assoc Prof Teh Kah Chan (Semester 2)
Learning Objective	Signals and Systems provides basic concepts of signals, Fourier analysis, and linear time invariant systems in a generic engineering context with applications in control engineering, communications and signal processing. This course brings continuous-time and discrete-time concepts together in a unified way and relates them through sampling theory.
Course Contents	Signals and Systems. Linear Time-Invariant Systems. Fourier Representation of Signals and LTI Systems. Sampling. Modulation.
Prerequisites	(MH1810 Mathematics I & MH1811 Mathematics II) or MH2810 Mathematics A
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (6)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quizzes; Homework Assignments; Practical Works Written Examination (60%)
Textbook(s)	• M. J. Roberts, Fundamentals of Signals and Systems, McGraw-Hill, International Edition, 2008. (TK5102.9.R646F)

Reference(s)	• Oppenheim Alan V, Willsky Alan S and Nawab Syed Hamid, Signals and Systems, 2nd Edition, Prentice-Hall, 1997. (QA402.P62 1997) • Haykin Simon S and Van Veen Barry, Signals and Systems, Wiley, 2nd Edition, 2003. (TK5102.5.H419) • Mandal Mrinal Kr and Asif Amir, Continuous and Discrete Time Signals and Systems, 1st Edition, Cambridge University Pres, 2007. (QA402.M271) • Hwei Hsu, Schaums Outlines Signals and Systems, 3rd Edition, McGraw Hill, 2013.

Course Code & Title	IM2006 – ENGINEERING MATHEMATICS I
Study Year	2
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Wong Jia Yiing, Patricia (Semester 1) ; Assoc Prof Teoh Eam Khwang (Semester 2)
Learning Objective	Mathematics plays a fundamental role in understanding the working of engineering systems. The purpose of the course is to serve as a baseline course for all future engineering subjects. The objectives include equipping students with: (a) basic understanding of topics related to engineering mathematics like Fourier series, Fourier and Laplace transforms, partial differential equations, numerical methods, probability and mathematical statistics; (b) skills and techniques for solving these problems.
Course Contents	Fourier Analysis. Laplace Transform. Partial Differential Equations. Numerical Methods. Probability. Mathematical Statistics.
Prerequisite	MH1811 Mathematics 2 or MH2810 Mathematics A
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quizzes; Homework Assignments Written Examination (60%)
Textbook(s)	• Kreyszig Erwin, Herbert Kreyszig and Nominton E J, Advanced Engineering Mathematics, 10th Edition, John Wiley, 2011. (QA401.K92 2011) • Johnson Richard Arnold and Bhattacharyya Gouri K, Statistics: Principles and Methods, 6th Edition, John Wiley, 2010. (QA276.12.J68 2010) • Patricia J. Y. Wong and Sundararajan N., Engineering Mathematics, McGraw-Hill, 2010.
Reference(s)	• O'Neil Peter V, Advanced Engineering Mathematics, 7th Edition, Cengage Learning, c2012. (TA330.N58 2012) • James Glyn, Advanced Modern Engineering Mathematics, 4th Edition, Pearson, 2011. (TA330.A244 2011) • Milton J Susan and Arnold Jesse C, Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences, 4th Edition, McGraw-Hill, 2003. (TA330.M662 2003) • Singh Ravish R and Bhatt Mukul, Engineering Mathematics, McGraw Hill, 2010. (TA333.S617)

Course Code & Title	IM2007 – ENGINEERING MATHEMATICS II
Study Year	2
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Ling Keck Voon (Semester 1) ; Assoc Prof Chua Chin Seng (Semester 2)
Learning Objective	Mathematics plays a fundamental role in understanding the working of engineering systems. The purpose of the course is to serve as a baseline course for all future engineering subjects. The objectives include equipping students with: 1) Basic understanding of topics related to engineering mathematics like linear algebra, complex variables and vector differential and integral calculus; 2) Skills and techniques for solving these problems.
Course Contents	Linear Algebra. Complex Variables. Vector Differential Calculus. Vector Integral Calculus.
Prerequisite	MH1811 Mathematics 2 or MH2810 Mathematics A
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24)
Academic Units	4
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignment; Class Participation Written Examination (60%)
Textbook(s)	• Kreyszig Erwin, Herbert Kreyszig and Nominton E J, Advanced Engineering Mathematics, 10th Edition, John Wiley, 2011. (QA401.K92 2011)
Reference(s)	• DeGranza and Gagliardi, Introduction to Linear Algebra with Applications, McGraw-Hill, 2009. (QA184.2.D316) • David C. Lay, Steven R. Lay and Judi J. McDonald, Linear Algebra and its Applications, 5th Ed. Person, 2015.

Course Code & Title	IM2073 – INTRODUCTION TO DESIGN & PROJECT
Study Year	2
Availability	Semester 2

Coordinator(s)	Assoc Prof Chua Hock Chuan
Learning Objective	To inspire students' interest in learning through active participations in the practice - oriented course on the solutions of typical engineering and IT system design and implementation problems.
Course Contents	The practice - oriented course consists of project modules that require students to design and implement state - of - the - art systems in the areas of Information Engineering and Media.
Prerequisite	Nil
Contact Hours	Lectures (6); Laboratories (33)
Academic Units	2
Assessment Modes	Continuous Assessment (100%) – Practical Works

Course Code & Title	IM3001 – DIGITAL SIGNAL PROCESSING
Study Year	3
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Makur, Anamitra (Semester 1) ; Assoc Prof Marziliano, Pina (Semester 2)
Learning Objective	Digital signal processing (DSP) is concerned with the numerical manipulation of discrete signals/data. It has become an essential tool to many engineering and scientific areas, such as multimedia computing (for speech, audio, image, and video) and digital communications, for example. This course is designed to provide students the fundamentals of discrete-time signals, signal transforms, and digital filter design.
Course Contents	Introduction. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT). Z-Transform. Digital Filter Design.
Prerequisite	IM2004 Signals and Systems
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (3)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignment; Practical work Written Examination (60%)
Textbook(s)	• Oppenheim Alan V, Schafer Ronald W and Buck John R, Discrete-Time Signal Processing, 3rd Edition, Pearson Education, 2009. • Prandoni Paolo and Vetterli Martin, Signal Processing for Communication, 1st Edition, EPFL Press. (TK5102.9.P899) (Download here http://www.sp4comm.org/webversion.html)
Reference(s)	• Mitra Sanjit K, Digital Signal Processing: A Computer Based Approach, 4th Edition, McGraw-Hill, 2011. (TK5102.9.M684 2011)

Course Code & Title	IM3002 – COMMUNICATION PRINCIPLES
Study Year	3
Availability	Semester 1 ; Semester 2
Coordinator(s)	Assoc Prof Erry Gunawan
Learning Objective	This course is intended to introduce to the students: 1) The essential approaches, the fundamental concepts and the design issues that are involved in communication engineering. The course emphasises the understanding of engineering principles. 2) Basic concepts of modulation techniques including amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) that are widely used in analogue communication systems, and basic techniques for analysing such systems in the time and frequency domains. 3) Basic concepts of a digital communication system including sampling theorem, pulse code modulation (PCM) and principles of digital data transmission, and basic techniques for analysing such systems in the time and frequency domains.
Course Contents	Review of signal analysis and noise representations. Linear modulation. Frequency and phase modulation. Digital communication principles.
Prerequisite	IM2004 Signals and Systems
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24); Laboratories (3)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Participation; Practical Work Written Examination (60%)
Textbook(s)	• Couch Leon W, Digital and Analog Communication Systems, 8th Edition, Pearson, 2013. (TK5101.C853 2013)
Reference(s)	• Proakis John G and Salehi Masoud, Communication Systems Engineering, 2nd Edition, Prentice-Hall, 2002. (TK5101.P962 2002) • Lathi Bhagwandas Pannalal, Modern Digital and Analog Communication Systems, 4th Edition, Oxford University Press, 2009. (TK5101.L352 2009) • Haykin Simon S and Moher Michael, Communication Systems, 5th Edition, John Wiley, 2010. (TK5101.H419 2010)

Course Code & Title	IM3003 – INFORMATION SECURITY
Study Year	3
Availability	Semester 1
Coordinator(s)	Assoc Prof Mohammed Yakoob Siyal
Learning Objective	This subject intends to provide students with essential concepts of information security, cryptography, secure protocols, detection and other security techniques.
Course Contents	Introduction. Secret / public-key cryptosystems. Secure protocols. Electronic election and digital money. Intrusion detection, social networks and cyber security.
Prerequisite	Nil
Contact Hours	Lectures (Online); Interactive Tutorial Sessions (24)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignments Written Examination (60%)
Textbook(s)	• Stallings William, Cryptography and Network Security: Principles and Practice, 7th Edition, Pearson/Prentice-Hall, 2017.
Reference(s)	• Michael Goodrichand Roberto Tamassia, Introduction to Computer Security, Pearson Education, 2014. • William (Chuck) Easttom II, Computer Security Fundamentals, Pearson Education, 2016.

Course Code & Title	IM3080 – DESIGN AND INNOVATIVE PROJECT
Study Year	3
Availability	Semester 1
Coordinator(s)	Assoc Prof Chua Hock Chuan
Learning Objective	The main objectives of the Design and Innovative Project are to introduce students to electrical and electronic engineering projects, provide with students an opportunity to exercise their creative and innovative qualities in a group project environment and excite the imagination of aspiring engineers, innovators and technopreneurs.
Course Contents	Project Proposal, Lectures on Project Management, Project Implementation, Project Report, Oral Presentation, Design and Innovation Competition.
Prerequisite	Nil
Contact Hours	Lectures (6); Project Work (78)
Academic Units	2
Assessment Modes	Continuous Assessment (100%) – Assessments by Supervisor and Moderator

Course Code & Title	IM0040 – ENGINEERS AND SOCIETY
Study Year	4
Availability	Semester 1 ; Semester 2
Coordinator(s)	Dr Ng, Jessica
Learning Objective	To teach the social, economic, historical and political environment that the engineering profession operates in and the current issues relevant to them. The students also present and discuss these issues during tutorials and participate in community projects.
Course Contents	The course comprises 4 main topics: Evolution of Modern Singapore; Technology & Society; Ethics and Professionalism and The Environment. The students are made aware of "Current Issues" at the time of their study.
Prerequisite	Students must be in their final year of studies.
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (50%) Written Examination (50%)
Reference(s)	• Kwa Chong Guan, Derek Heng & Tan Tai Yong, Singapore: A Seven-Hundred Year History, (Singapore: National Heritage Board, National Archives of Singapore, 2009). • Singapore: Journey Into Nationhood, National Heritage Board: Landmark Books, 1998. (DS610.4.S617j) • Lee Kuan Yew, From Third World to First. The Singapore Story: 1965:2000, Memoirs of Lee Kuan Yew, Times Editions, 2000. (DS598.S7L478f) • Plagiarism 2.0 [videorecording]: Information Ethics in the Digital Age, Fabian and Rhonda. (PN167.P698 – BUSL) (H587897 – BUSLAVRES) • Jessica Lim, Editor, Engineering Ethics, Pearson South Asia Pte Ltd, 2016. • Fleddermann, Charles: Engineering Ethics, Pearson, 4th Edition, 2012. (TA157.F525)

Course Code & Title	IM4080 – FINAL YEAR PROJECT
Study Year	4
Availability	One-Year Course (Students can start their project either in Semester 1 or 2.)
Coordinator(s)	Assoc Prof Shen Zhongxiang
Learning Objective	The main objective of the Final Year Project is to provide a platform for students to demonstrate their ability to apply their knowledge and skills gained from coursework studies and practicum work. This course helps the students to gain confidence and experience in tackling project work independently which should contribute to their effective transition to the job market upon graduation.
Course Contents	Projects may include, but are not limited to, one or more of the following areas: Design, Product development, Software development, Laboratory investigation, Computing and analysis, Field testing and instrumentation and Feasibility studies. Besides project proposals generated by its own academic staff, the School also works with outside partners including the A*STAR Research Institutes and industrial companies to propose relevant projects. The requirements are specified under the scope and objective of each project. Students are allocated 9 hours per week for the project, spread over two semesters. Their time table includes 3 sessions per week, each session being 3 hours long. In practice, the students spend more time than this and may be allowed to use any free time slots.
Prerequisite	Refer to Final Year Project website
Contact Hours	Project Work (78)
Academic Units	8
Assessment Modes	Continuous Assessment (100%) - Project Assessments

Course Code & Title	IM4105 – CELLULAR COMMUNICATION SYSTEM DESIGN
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Soong Boon Hee
Learning Objective	This course aims to provide students with basic understanding of: 1) Principles involved in the design and implementation of mobile cellular systems; 2) Concepts and principles of digital signal processing techniques with emphasis on communication systems; and 3) DSP concepts through lab demonstrations and design examples by using a general purpose mathematical package such as MATLAB to design and simulate communication signal processing systems.
Course Contents	The students will be involved in the planning and design of cellular and wireless personal communication systems at the system level. Issues such as the choice of modulation and channel coding schemes as well as multiple access methods will be dealt with. Fundamentals of digital signal processing will be briefly introduced. DSP techniques used in the design of baseband digital signal transmission and reception will be covered. Carrier-modulated signals, such as AM, QAM and PSK signals, used for transmission through band-pass channels will be discussed. Channel equaliser design for compensation of channel distortions and inter-symbol interference (ISI) will be dealt with.
Prerequisite	Nil
Contact Hours	Lectures (13); Practical Sessions (26)
Academic Units	2
Assessment Modes	Continuous Assessment (50%) – Assignments Written Examination (50%)
Reference(s)	• Karim M R and Saraf Moshen, W-CDMA and CDMA2000 for 3G Mobile Networks, McGraw Hill, 2002. (TK5103.452.K18) • Rappaport Theodore S, Wireless Communications: Principles and Practice, 2nd Edition, Prentice-Hall, 2002. (TK5103.2.R221 2002) • Proakis John G, Salehi Masoud and Bauch Gerhard, Modern Communication Systems Using MATLAB, 3rd Edition, Cengage Learning, 2013. (TK5105.P962m) • Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Pearson Prentice-Hall, 2007. (TK5102.9.P932) • D. Agrawal and Q. A. Zeng, An Introduction to Wireless and Mobile Systems, 4th Edition, Cengage Learning, 2016. (TK5103.2.A277 2016) • Harri Holma and Antti Toskala, LTE for UMTS: Evolution to LTE-Advanced, 2nd Edition, Wiley, 2011. (TK5103.4883.L925u)

Course Code & Title	IM4152 – DIGITAL COMMUNICATIONS
Study Year	4
Availability	Semester 1

Coordinator(s)	Assoc Prof Li Kwok Hung
Learning Objective	The aim is to provide students with a good understanding of digital communications principles and digital techniques required in the rapidly expanding field of digital signal transmission and modulation in communication systems.
Course Contents	Digital communication principles. Information theory. Error correcting codes. Optimum signal detection.
Prerequisite	IM3002 Communication Principles
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Homework Assignment; Project Report Written Examination (60%)
Textbook(s)	• B P Lathi and Z. Ding, Modern Digital and Analog Communication Systems, 4th Edition, Oxford University Press, 2009. (TK5101.L352 2009)
Reference(s)	• S. Haykin and K. Moher, Communication Systems, 5th Edition, John Wiley, 2010. (TK5101.H419 2010) • J. G. Proakis and M. Salehi, Communication Systems Engineering, 2nd Edition, Prentice-Hall, 2002. (TK5101.P962 2002)

Course Code & Title	IM4153 – TELELCOMMUNICATION SYSTEMS
Study Year	4
Availability	Semester 2
Coordinator(s)	Prof Zhong Wende
Learning Objective	To provide the students with the basic understanding of the principles involved in the design and implementation of optical fibre communication systems, transmission principles, LOS and satellite communication systems, public switched telephone networks, teletraffic theory, digital transmission system standards (PDH and SDH), network planning and principle of digital switching systems.
Course Contents	Telecommunication Networks. Switching and Signalling. Line Transmission. Microwave Communication Systems. Optical Fibre Communication Systems and Applications.
Prerequisite	IM3002 Communication Principles
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Homework Assignments Written Examination (60%)
Textbook(s)	• Flood John Edward, Telecommunications Switching, Traffic and Networks, Prentice-Hall, 1995. (reprinted 1999). (TK5103.F631) • Tomasi Wayne, Electronic Communications System: Fundamentals Through Advanced, 5th Edition, Pearson Prentice-Hall, 2004. (TK5101.T655E 2004)
Reference(s)	• Keiser Gerd, Optical Fiber Communications, 4th Edition, McGraw Hill, 2011. (TK5103.59.K27 2011) • Beasley Jeffrey S and Miller Gray M, Modern Electronic Communication, 9th Edition, Pearson/Prentice-Hall, 2008. (TK5101.M648 2008) • Roger L. Freeman, Telecommunication System Engineering, 4th Edition, Wiley-Interscience, 2004, TK5103.F855 2004. (also e-book)

Course Code & Title	IM4188 – WIRELESS COMMUNICATIONS
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Soong Boon Hee
Learning Objective	This course is intended to introduce to students: 1) The basics of wireless systems – concepts, theory, limitation and costs of systems mainly for VHF and above. 2) Various multiple access techniques and the cellular concept as well as some 2G and 3G systems.
Course Contents	Types of wireless systems. Radio frequency spectrum. Performance calculations. Cellular radio systems.
Prerequisite	IM3002 Communication Principles
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Homework Assignment; Class Participation Written Examination (60%)
Textbook(s)	• Agrawal Dharma Prakash and Zeng Qing-An, Introduction to Wireless and Mobile Systems, 4th Edition, Cengage Learning, 2016. (TK5103.2.A277 2016) • Beard Cory and William Stallings, Wireless Communications Networks and Systems, Prentice Hall, 2015.

Reference(s)	• Freeman Roger L, Radio System Design for Telecommunications, 3rd Edition, IEEE/Wiley-Interscience, 2007. (TK6553.F855 2007) • Simon R. Saunders, and Alejandro Aragon-Zavala, Antennas and Propagation for Wireless Communication Systems, 2nd Edition, John Wiley, 2007. (TK7871.6.S257 2007) • Rappaport Theodore S, Wireless Communications: Principles and Practice, 2nd Edition, Prentice-Hall, 2002. (TK5103.2.R221 2002) • Andreas F. Molisch, Wireless Communications, 2nd Edition, John Wiley & Sons, 2011. (TK5103.2.M724 2011)

Course Code & Title	IM4413 – DSP SYSTEM DESIGN
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Ng Boon Poh
Learning Objective	1. To understand the key theoretical principles underpinning DSP in a design procedure through design examples and case studies. 2. To learn how to use a powerful general-purpose mathematical package such as MATLAB to design and simulate a DSP systems. 3. To understand the architecture of a digital signal processor and some programming issues in fixed-point digital signal processor in real-time implementation. 4. To learn to design a real-time signal processing algorithms using the latest fixed-point processor.
Course Contents	This subject introduces the basic rules, procedures, techniques and components for designing a DSP system. The subject also includes an assignment for the students to apply the knowledge and techniques learnt. DSP Architectures, Addressing Mode, DSP fixed-point programming style, real-time implementation issues, DSP integrated development environment.
Prerequisite	Nil
Contact Hours	Lectures (13); Design Sessions (26)
Academic Units	2
Assessment Modes	Continuous Assessment (50%) – Designs; Assignments Written Examination (50%)
Reference(s)	• Mitra, Sanjit K, Digital Signal Processing: A Computer Based Approach, 4th Edition, McGraw-Hill, 2011. (TK5102.9.M684 2011) • Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Prentice-Hall, 2006. • Kuo Sen M, Lee Bob H and Tian Wenshun, Real-Time Digital Signal Processing: Fundamentals, implementations and applications, 3rd edition, John Wiley, 2013. (TK5102.9.K96R 2013) • Oppenheim Alan V, Schafer Ronald W, and Buck John R, Discrete-Time Signal Processing, 3rd Edition, Prentice-Hall, 2009. • T.B. Welsh, H.G. Cameron and M.G. Morrow, Real-Time Digital Signal Processing from MATLAB to C with the TMS320C6x DSPs, Second Edition, Taylor and Francis, 2011.

Course Code & Title	IM4455 – EMBEDDED SYSTEMS
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Gan Woon Seng
Learning Objective	This course is structured to combine lectures, insightful demonstrations, case studies and tutorials for the students to gain an in-depth understanding of fundamental concepts on embedded systems. Several portable embedded media applications such as MP3 player, digital camera and digital video streaming will be showcased to tie the basic concepts together into coherent entities.
Course Contents	Introduction to Embedded System and Embedded Processors. Hardware of embedded systems. Software of embedded systems. Real-Time Embedded System. Embedded Media Processing Components Design. Standards.
Prerequisite	IM2002 Microprocessors
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quiz; Assignment; Class Participation Written Examination (60%)
Textbook(s)	• Marilyn Wolf, Computers as Components: Principles of Embedded Computing System Design, 3rd Edition, Morgan Kaufmann, 2012. (QA76.9.S88W855 2012) • Gan Woon-Seng and Kuo Sen M, Embedded Signal Processing with the Micro Signal Architecture, Wiley-Interscience, 2007. (TK5102.9.G195)
Reference(s)	• Katz David J and Gentile Rick, Embedded Media Processing, Elsevier/Newnes, 2006. (TK5102.9.K19)

- Noergaard Tammy, Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, 2nd Edition, Elsevier/Newnes, 2013. (TK7895.E42N769 2013)
- Wolf Wayne Hendrix, Computers as Components: Principles of Embedded Computing System Design, 3rd Edition, Morgan Kaufmann, 2012. (QA76.9.S88W855 2012)
- Kuo Sen M and Gan Woon-Seng, Digital Signal Processors: Architectures, Implementations and Applications, Pearson Prentice Hall, 2005. (TK5102.9.K96)
- High Performance EMbedded Computing: 2nd Ed by Marilyn Wolf, Publisher: Morgan Kaufman, 2014.

Course Code & Title	IM4475 – AUDIO SIGNAL PROCESSING
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Bi Guoan
Learning Objective	The objective of this "Audio Signal Processing" course is to provide students with fundamental knowledge about various signal processing techniques applied to digital audio signals. All of these are essential to the understanding of the function of present day digital audio processing systems and form a strong foundation of the learning of newly developed digital devices/systems with applications to audio signals. Thus this course serves as an introductory course to other more advanced digital audio signal processing.
Course Contents	Fundamentals of Human Hearing. Room Acoustics. 3-D Sound Synthesis. Sound Compression.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignments; Class Participation Written Examination (60%)
Textbook(s)	1. Bosi Marina and Goldberg Richard E, Introduction to Digital Audio Coding and Standards, Kluwer Academic, 2003. (TK7881.4.B743) 2. Kuo Sen M and Gan Woon-Seng, Digital Signal Processors: Architectures, Implementations and Applications, Pearson Prentice-Hall, 2005. (TK5102.9.K96)
Reference(s)	• Gardner William G, 3-D Audio Using Loudspeakers, Kluwer Academic, 1998. (TK7881.83.G228) 1. Pohlmann Ken C, Principles of Digital Audio, 6th Edition, McGraw-Hill, 2011. (TK7881.4.P748 2011) • Watkinson John, The Art of Digital Audio, 3rd Edition, Focal Press, 2001. (TK7881.4.W336 2001)

Course Code & Title	IM4476 – IMAGE PROCESSING
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Tan Yap Peng
Learning Objective	This course is an introduction to the fundamental concepts and techniques in basic digital image processing and their applications to solve real life problems. The topics covered include Digital Image Fundamentals, Image Transforms, Image Enhancement, Restoration and Compression, and Nonlinear Image Processing. Application examples are also included.
Course Contents	Digital Image Fundamentals. Image Transforms. Image Enhancement. Image Restoration. Image Compression. Nonlinear Image Processing. Applications.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quiz; Assignment; Project Written Examination (60%)
Textbook(s)	• Gonzalez Rafael C and Woods Richard E, Digital Image Processing, 3rd Edition, Prentice Hall, 2008. (TA1632.G643 2008)
Reference(s)	• Pratt William K, Digital Image Processing: PIKS Scientific Inside, 4th Edition, John Wiley, 2007. (TA1632.P917 2007) • Pitas Ioannis, Digital Image Processing Algorithms and Applications, John Wiley, 2000. (TA1637.P681) • Jain Anil K, Fundamentals of Digital Image Processing, Prentice-Hall, 1989. (TA1632.J25)

Course Code & Title	IM4478 – DIGITAL VIDEO PROCESSING
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Chau Lap Pui

Learning Objective	This course aims to introduce digital video processing with an emphasis on video coding and its international standards, since coding is a turnkey technology of today's multimedia applications. Students will learn how video processing technologies are exploited in various multimedia applications.
Course Contents	Fundamentals of Digital Video. Block - matching motion estimation and fast algorithms. Video coding basics. Video coding standards. Video streaming and processing. Digital video applications.
Prerequisite	Nil
Contact Hours	Video lectures (26), Interactive Tutorial Sessions (14); Practical (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quiz; Assignment; Practical Written Examination (60%)
Textbook(s)	• Shi Yun Q and Sun Huifang, Image and Video Compression for Multimedia Engineering: Fundamentals, Algorithms, and Standards, 2nd Edition, CRC Press, 2008. (QA76.575.S555 2008) • Wang Yao, Ostermann Jeorn and Zhang Ya-Qin, Video Processing and Communications. Prentice Hall, 2002. (TK5105.2.W246)
Reference(s)	• Symes Peter, Digital Video Compression, McGraw-Hill, 2004. (TK6680.5.S986D) • Schaar Mihaela van der, Turaga Deepak S and Stockhammer Thomas, MPEG-4 Beyond Conventional Video Coding: Object Coding, Resilience, and Scalability, 1st Edition, Morgan & Claypool, 2006. (TK6680.5.S291) • Richardson Iain E G, The H.264 Advanced Compression: Standard, 2nd Edition, Wiley, 2010. (TK6680.5.R522 2010) • Tekalp A Murat, Digital Video Processing, Prentice-Hall, 1995. (TK6680.5.T266) • ISO/IEC 11172-2, Information Technology - Coding of Moving Pictures and Associated Audio for Digital Storage Media at up to about 1.5 Mbit/s, Part 2: Video, BSI, 1995. (QC100.B862 BS EN ISO/IEC 11172-2 1995) • ISO/IEC IS 13818-2, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Video, 1995. (TK277.I85 ISO/IEC13818-2 1996(E)) • ISO/IEC IS 14496, Information Technology - Coding of Audio-Visual Objects - Part 2: Visual, Geneva, 1999. (TK277.I85 ISO/IEC14496-2(E))

Course Code & Title	IM4483 – ARTIFICIAL INTELLIGENCE & DATA MINING
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Chen Lihui
Learning Objective	The course is designed to introduce both (1) The traditional approach to machine learning using symbolic representations and manipulations, i.e., knowledge representations and problem solving techniques, and (2) Techniques and application of machine learning techniques to data mining.
Course Contents	Problem solving techniques. Machine learning and applications to data mining.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quiz; Assignment; Projects Written Examination (60%)
Textbook(s)	• Luger George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6th Edition, Addison-Wesley, 2009. (Q335.L951) • Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining: Pearson New International Edition, 2013.
Reference(s)	• Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann, 2011, ISBN: 978-0-12-381479-1. • S. Russell and P. Norvig, Artificial Intelligence A Modern Approach, 3rd Edition, Prentice Hall, 2010. (Q335.R967A 2010)

Course Code & Title	IM4490 – MULTIMEDIA SYSTEMS
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Ma Kai-Kuang
Learning Objective	The objective of this course is to provide students with a basic understanding of multimedia systems. This course focuses on topics in multimedia information representation and relevant signal processing aspects, multimedia networking and communications, and multimedia standards especially on the audio, image and video compression. All of these topics are important in multimedia industries.

Course Contents	Fundamentals of Multimedia Systems. Overview of Digital Image and Video Coding Standards. Overview of Digital Audio Coding Standard. Multimedia Communications. Multimedia Applications.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignment; Project Written Examination (60%)
Textbook(s)	• Li Ze-Nian and Drew Mark S, Fundamentals of Multimedia, 2nd Edition, Pearson Prentice-Hall, 2014.
Reference(s)	• Steinmetz Ralf and Nahrstedt Klara, Multimedia: Computing, Communications and Applications, Prentice-Hall, 1997. (QA76.575.S823 1997)

Course Code & Title	IM4717 – WEB APPLICATION DESIGN
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Chong Yong Kim
Learning Objective	The objective of this subject is to provide students with a clear understanding of the architecture of web applications, as well as skills and knowledge to design and construct such applications.
Course Contents	This design course will equip students with principles, knowledge and skills for the design and construction of web-enabled Internet applications. It deals with challenges raised in wide-area distributed computing, including persistence, concurrency and transaction, as well as technologies for creating, managing, and tracking web-interaction state in the environments where the connections are inherently unreliable and protocols are inherently stateless. Specifically, the content covers the architecture of web applications, data presentation, server side programming, data access, state management, data exchange and XML, web services, and personalization. Lab facilities and guidance are provided for the students to practice on the technologies and the skills, go through the steps of web applications, i.e. design, implementation and deployment, with an in house project.
Prerequisite	Nil
Contact Hours	Lectures (13); Practical Sessions (26)
Academic Units	2
Assessment Modes	Continuous Assessment (50%) Written Examination (50%)
Reference(s)	• Douglas K. Van Duyne; James A. Landay; Jason I. Hong, The Design of Sites, 2nd Edition, Prentice Hall PTR, 2006. (TK5105.888.V36) • Terry Felke-Morris, Basics of Web Design: HTML5 & CSS3, 2nd Edition, Addison-Wesley Longman, 2013. ISBN: 978-0-13-312891-8 • Welling Luke, Thomson Laura, PHP and MySQL Web Development, 4th Edition, Addison Wesley, 2009. (QA76.73.P224W452 2009) • Larry Ullman, Modern JavaScript: Develop and Design, Peachpit Press, 2012, ISBN: 978-0321812520.

Course Code & Title	IM4718 – ENTERPRISE NETWORK DESIGN
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Xiao Gaoxi
Learning Objective	The subject aims to provide students the knowledge for designing, setting up and managing an IP based enterprise network. Students will acquire necessary practical skills in planning and configuring an IP network, using simulation and monitoring tools to analyse the network performance.
Course Contents	This subject covers network technologies and protocols, network planning and design methodologies. Besides acquiring the theoretical background in enterprise networking, students will learn to set up, configure and interconnect an IP network in the lab sessions. Network monitoring and management tools will also be introduced to the students. The students will also acquire the knowledge to use simulation tool to design an enterprise network and evaluate design alternatives. Based on the knowledge and skills, the students are to finish a design of an enterprise network to support applications such as electronic mails, centralised database access, and client-server applications. Various issues such as IP addresses assignment, choice of internetworking equipment and network performance will be considered in the network design.
Prerequisite	IM2003 Computer Communications
Contact Hours	Lectures (13); Practical Sessions (26)
Academic Units	2
Assessment Modes	Continuous Assessment (50%) Written Examination (50%)
Reference(s)	• Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004) • Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2013. (TK5105.875.I57K96 2013) • CCIE Fundamentals: Network Design and Case Studies, 2nd Edition, Cisco Press, 2002. (TK5105.5.C386) • Priscilla Oppenheimer, Top-Down Network Design, 3rd Edition, Cisco Press, 2011. (TK5105.5.P62 2011)

Course Code & Title	IM4756 – COMPUTER ARCHITECTURE

Study Year	4
Availability	Semester 2
Coordinator(s)	Prof Lim Yong Ching
Learning Objective	The objective of this course is to provide students with the basic concepts and principles in computer architecture so that students have in-depth understanding of computer system organizations and computer system designs.
Course Contents	Fundamental of Computer Design. Instruction Set Architecture. Memory-system Architecture. Buses, Storage Devices and I/O System. RISC Design. Pipelining.
Prerequisite	Nil
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignments Written Examination (60%)
Textbook(s)	• Hennessy John L and Patterson David A, Computer Architecture: A Quantitative Approach, 5th Edition, Morgan Kaufmann, 2012. (QA76.9.A73H515 2012)
Reference(s)	• Patterson David A and Hennessy John L, Computer Organization and Design: The Hardware/Software Interface, (ARM edition), 5th Edition, Morgan Kaufmann 2014. (QA76.9.C643P317 2014)

Course Code & Title	IM4761 – COMPUTER NETWORKING
Study Year	4
Availability	Semester 1
Coordinator(s)	Assoc Prof Ma Maode
Learning Objective	The subject is intended to provide students with: 1) A basic understanding of concepts and protocols used in computer networking, 2) An in-depth knowledge of routing algorithms, congestion and flow control mechanisms, and naming and addressing mechanisms used in the network and transport layers, 3) A strong theoretical and practical foundation to become a competent network professional.
Course Contents	Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.
Prerequisite	IM2003 Computer Communications
Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignment; Class Participation Written Examination (60%)
Textbook(s)	• Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Addison-Wesley, c2013. (TK5105.875.I57K96 2013)
Reference(s)	• Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004) • Stallings William, Data and Computer Communications, 10th Edition, Pearson/Prentice-Hall, 2014. (TK5105.S782 2014) • Comer Douglas E, Internetworking with TCP/IP, 6th edition, Pearson Prentice-Hall, 2014. (TK5105.585.C732 2014 V1)

Course Code & Title	IM4791 – DATABASE SYSTEMS
Study Year	4
Availability	Semester 2
Coordinator(s)	Assoc Prof Wang Lipo
Learning Objective	Database has become part of our daily life. Almost all business and engineering systems now rely on some kind of database. At the heart of every modern information system is a database that would affect the quality of the system decisions, output and performance. The proper understanding, design, and management of a database are crucial to the efficiency of application programs and the effectiveness of computer-based user functions. The objective of the subject is to provide a good fundamental understanding of the theories and practices of database systems for various application domains such as business, engineering, and manufacturing. It examines the full spectrum of database management: data modeling, logical and physical database design, query language, database administration, and offers an appreciation for more advanced database technologies such as web databases, and data warehousing.
Course Contents	Introduction to Database and Data Modelling. Logical Database Design and The Relational Model. The Structured Query Language (SQL). Physical Database Design. Database Administration. Client/Server Database. Data Warehousing.
Prerequisite	Nil

Contact Hours	Lectures (26); Tutorial Sessions (12)
Academic Units	3
Assessment Modes	Continuous Assessment (40%) – Quizzes; Assignment; Project Written Examination (60%)
Textbook(s)	• Hoffer Jeffrey A, Ramesh V and Topi Heikki, Modern Database Management, 11th Edition, Pearson/Prentice-Hall, 2013. (QA76.9.D3M143 2013)
Reference(s)	• Elmasri Ramez and Navathe Shamkant B., Database Systems: Models, Languages, Design and Application Programming, 6th Edition, Pearson, 2011. • Coronel Carlos, Morris Steven and Rob Peter, Database Systems: Design, Implementation, and Management, 11th Edition, Course Technology, 2014.