1.4.2 DESCRIPTION OF COURSES

Full–time B.Eng Programme

YEAR 2

EE2001 Circuit Analysis
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Circuit Theorems. Network Topology. Laplace Transforms in Circuit Analysis. Network Functions. Two-port Networks.

EE2002 Analog Electronics
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Diode circuit analysis. Bipolar junction transistors. MOSFET devices. Small-signal amplifiers. Differential and multistage amplifiers. Frequency response. Operational amplifiers.

EE2003 Semiconductor Fundamentals
AUs: 3, Pre-requisite: FE1002, Semester 1 and 2
Basic semiconductor concepts. Semiconductor in equilibrium. Carrier transport phenomena. Semiconductor in non-equilibrium. PN junction. Metal-Semiconductor contacts. Introduction to Bipolar Junction Transistors.

EE2004 Digital Electronics
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Number Systems and Logic Gates. Boolean algebra and Logic Minimisation. Combinational logic design and MSI digital devices. Sequential Logic Elements. Synchronous sequential logic circuits. Programmable logic devices and memories.

EE2005 AC Circuits and Machines
AUs: 3, Pre-requisite: EE2001, Semester 1 and 2
Three-phase Circuits. Electromagnetism. Transformers. Rotating Machines.

EE2006 Engineering Mathematics I
AUs: 4, Pre-requisite: FE1007, Semester 1 and 2
Fourier Analysis. Laplace Transform. Partial Differential Equations. Numerical Methods. Probability. Mathematical Statistics.

EE2007 Engineering Mathematics II
AUs: 4, Pre-requisite: FE1007, Semester 1 and 2
Linear Algebra. Complex Variables. Vector Differential Calculus. Vector Integral Calculus.

EE2008 Data Structures and Algorithms
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction. Principles of algorithm analysis. Data structures. Searching. Sorting. Algorithm design techniques.

EE2010 Signals and Systems
AUs: 3, Pre-requisite: FE1006 and FE1007, Semester 1 and 2
Signals and Systems. Linear Time-Invariant Systems. Fourier Series and Fourier Transform. Discrete-time Fourier Transform. Sampling. Modulation.

EE2071 Laboratory 2A
AUs: 1, Pre-requisite: NIL, Semester 1
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE2072 Laboratory 2B
AUs: 1, Pre-requisite: NIL, Semester 2
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE2079 Design and Innovation Project
AUs: 3, Pre-requisite: NIL, Special Session
A five-week full-time practical training programme designed to exercise creativity, stimulate innovation and cultivate technopreneur capabilities. The programme focuses on an in-depth project covering the design, prototyping, testing and documentation of innovative electrical, electronic or IT products. Each project is carried out by a group of about 20 students. It is supported by lectures on project management and seminars on relevant issues in engineering innovation and design, and culminates in a competition for attractive prizes.

EE2090 Basic Engineering Mathematics
AUs: 3, Pre-requisite: NIL, Semester 1
Differentiation and Integration. Ordinary Differential Equations. Partial Differentiation. Multiple Integrals. Infinite Sequences and Series. Vectors.

EE2091 Engineering Physics
AUs: 4, Pre-requisite: FE0001, Semester 1 and 2
Rotational Dynamics. Oscillations and Wave Motion. Electricity. Magnetism. Optics. Quantum Physics.

HW210 Technical Communication
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
Written technical communication. Oral technical communication.

YEAR 3

EE3001 Engineering Electromagnetics
AUs: 3, Co-requisite: EE2007, Semesters 1 and 2
Static electric and magnetic fields. Maxwell's equations. Wave equation and uniform plane waves. Electromagnetic energy transfer. Reflection of electro-magnetic waves. Transmission lines.

EE3002 Microprocessors
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Microprocessor fundamentals. Assembly language programming. I/O interfacing. Protected mode operation.

EE3003 Integrated Electronics
AUs: 3, Pre-requisite: EE2002, Semester 1 and 2
Feedback amplifier. Voltage reference and current sources. Operational amplifier circuits. Applications of operational amplifiers. Power supplies. CMOS logic circuits. CMOS flip-flops and memories.

EE3011 Modelling and Control
AUs: 3, Pre-requisite: EE2006, Semester 1 and 2
Introduction to Control Systems. System Modelling. Time Domain Analysis. Performance of Feedback Control Systems. Root-locus Technique. Frequency Domain Analysis. Relative Stability and Design Specifications. System Compensation and PID Control.

EE3012 Communication Principles
AUs: 3, Pre-requisite: EE2010, Semester 1 and 2

Review of signal analysis and noise representations. Linear modulation. Frequency and phase modulation. Digital communication principles.

EE3013 Semiconductor Devices and Processing
AUs: 3, Pre-requisite: EE2003, Semester 1 and 2
Fundamentals of Bipolar Devices. MOS Devices. Crystal growth and wafer preparation. Deposition Techniques. Diffusion and thermal oxidation. Ion implantation. Lithography. Etching.

EE3014 Digital Signal Processing
AUs: 3, Pre-requisite: EE2010, Semester 1 and 2
Introduction. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT). Z-Transform. Digital Filter Design.

EE3015 Power Systems and Conversion
AUs: 3, Pre-requisite: EE2005, Semester 1 and 2
Fundamentals of Power Systems. System Operation and Protection. Power Conversion. Electromechanical Power Conversion Systems.

EE3017 Computer Communications
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction to computer communications. Data Communications Fundamentals. Data Link Control. Local Area Networks. Internetworking.

EE3018 Introduction to Photonics
AUs: 3, Prerequisites: NIL, Semester: 1
Geometric optics. Wave optics. Propagation of light in matters. Photon optics. Laser optics. Applications of photonics.

EE3071 Laboratory 3
AUs: 1, Pre-requisite: NIL, Semester 1 and 2
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE3072 Project
AUs: 1, Pre-requisite: NIL, Semester 1 and 2
This course teaches the essential techniques for solving specific implementation problems either in control, communications, electronics, programming, or microprocessor systems for applications/implementation in a mobile robot platform. Each of the project modules is used to extend or enhance one aspect of the mobile robot's capabilities/ functionalities. In addition to tackling the individual projects, various issues and problems pertaining to the integrated engineering project of developing an intelligent mobile robot are also examined.

EE3079 Industrial Attachment
AUs: 10, Pre-requisites: Engineering 1 students: Year 3 standing and have completed at least 4 sem. of study; Poly students: Year 3 standing and have completed at least 2 sem. of study, Semester 1 and 2
Industrial Attachment is a learning process which by exposing the students in real life engineering environment as part of an academic curriculum helps the students to develop and enhance academic, personal and professional competencies. Every participating organisation is required to provide an initial proposal of an attachment programme for each of the students. The attachment programme should have emphasis on applications, management and hands-on experience for the student.

YEAR 4

EE4001 Software Engineering
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction to software engineering. Software project management. Software requirements and specifications. Software design. Software testing and maintenance.

EE4040 Engineer and Society
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
The course comprises four main topics: Evolution of Modern Singapore; Technology and Society; Ethics and Professionalism and The Environment. The students are made aware of "Current Issues" at the time of their study.

EE4041 Human Resource Management
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Using case studies and current events to: understanding individual and group behavior in organisations: the impact of globalisation, continuous learning, work values and corporate culture; visionary and transformational leadership strategies: motivation, teambuilding and talent development, ethical behavior and integrity; Managing work groups: organisational communications and conflict resolution strategies, leveraging on diversity; Quality and excellence concepts: stakeholders awareness, customer-centred mindset, people-centred management approaches, innovative adaptation to continuous change, learning organisation, global talent search; Trade unions, collective bargaining and labour-management relations challenges and prospects.

EE4079 Final Year Project
AUs: 10, Pre-requisite: Year 4 Standing, and have earned at least 86 AU (excluding GERP and UE) for A-level students, and 59 AUs (excluding GERP and UE) for Poly direct-entry students, Semesters 1 and 2.
This project will involve in-depth study, investigations, construction of hardware and/or development of software and testing in any of the areas of specialised courses offered in an option group.

EE4105 Cellular Communication System Design
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
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.

EE4109 Microwave Circuit And System Design
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
Students will be involved in the design of advanced wireless communication systems as well as microwave planar components. It will include the analysis, design and simulation of microwave integrated circuits.

EE4110 Optical Communication System Design
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
Students will be involved in the design of fibre optic communication systems. Issues such as light propagation, fibre characteristics and classification, fibre cables, connectors and splices, optical

transmitters and receivers, optical amplifier and filter, optical coupler and wavelength converter, non-linear effects in WDM systems, and system design methodology are covered

EE4151 RF and Microwave Engineering
AUs: 3, Pre-requisite: EE3001, Semester 1 and 2
RF and Microwave Circuit Analysis. Planar Transmission Lines and Discontinuities. Planar Couplers and Filters.

EE4152 Digital Communications
AUs: 3, Pre-requisite: EE3012, Semester 1 and 2
Digital communication principles. Information theory. Error correcting codes. Optimum signal detection.

EE4153 Telecommunication Systems
AUs: 3, Pre-requisite: EE3012, Semester 1 and 2
Telecommunication networks. Switching and signaling. Line transmission. Microwave communication systems. Optical fibre communication systems and applications.

EE4188 Wireless Communications
AUs: 3, Pre-requisite: EE3012, Semester 1 and 2
Types of wireless systems. Radio frequency spectrum. Performance calculations. Cellular radio systems.

EE4189 Spread Spectrum Communications
AUs: 3, Pre-requisite: EE3012, Semester 1
Advanced signal analysis and noise. Generation of spreading sequences. Fundamentals of spread spectrum. Analysis of spread spectrum systems. Applications of spread spectrum systems.

EE4207 Control Engineering Design
AUs: 2, Pre-requisite: NIL, Semester 1
Discrete-time Control Systems. Z-Transform. Root Locus Method. Frequency Response Method. State Space Design. Pole Placement. State Observers. Servo Systems.

EE4208 Intelligent System Design
AUs: 2, Pre-requisite: NIL, Semester 2
This module covers the design of intelligent systems such as intelligent automation systems, neuro-fuzzy systems and intelligent vision systems. Currently, the focus is on the design of computer vision systems.

EE4265 Process Control Systems
AUs: 3, Pre-requisite: EE3011, Semester 1 and 2
Introduction. Process Models. Feedback Control Systems. Complex Control Structures. Feedback Controller Design for Time Delay Systems. Advanced Control Techniques. Process Control Applications.

EE4266 Computer Vision
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Image Representation. Preprocessing Techniques. Segmentation and Representation. Recognition and Machine Intelligence. Machine Vision Applications.

EE4268 Robotics and Automation
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction to Robotics. Coordinate Transformation and Kinematics. Trajectory Planning. Control Techniques. Sensors and Devices. Robot Applications.

EE4273 Digital Control Systems
AUs: 3, Pre-requisite: EE3011, Semester 1 and 2
Signal Conversion and Reconstruction. Analysis and Design of Digital Control Systems. State Variable Techniques and Implementation Issues.

EE4285 Computational Intelligence
AUs: 3, Pre-requisite: NIL, Semester 1
Introduction. Fundamental Concepts and Models of Artificial Neural Systems. Neural Network Learning Paradigms and Architectures. Applications of Artificial Neural Networks. Fuzzy Sets. Fuzzy Inference Mechanisms, Applications of Fuzzy Logic. Genetic Algorithms and its Applications in Optimisation.

EE4303 Mixed Signal IC Design
AUs: 2, Pre-requisite: EE3003, Semester 1 and 2
Mixed-Signal Design. Design Practice.

EE4304 Radio Frequency Integrated System Design
AUs: 2, Pre-requisite: EE3003, Semester 1 and 2
RF Integrated Systems, Design and Simulation of RF Circuits.

EE4305 Digital Design With HDL
AUs: 2, Pre-requisite: EE2004, Semester 1 and 2
Digital Design using Hardware Description Language. Design Practice.

EE4340 VLSI Systems
AUs: 3, Pre-requisite: EE2004, Semester 1 and 2
VLSI System Architecture and Memory Management. Parallel Processing. High Speed Synchronous and Asynchronous design. System noise consideration. VLSI system verification and testability. System reliability.

EE4341 Advanced Analog Circuits
AUs: 3, Pre-requisite: EE3003, Semester 1 and 2
Wide-bandwidth amplifiers. Low noise circuits. Power amplifiers. Current-mode circuits. Active filters.

EE4343 Radio Frequency Circuits
AUs: 3, Pre-requisite: EE3003, Semester 1 and 2
Radio-frequency input-circuits and impedance matching. Small-signal radio-frequency amplifiers. Mixers. RF Power Amplifiers. Oscillators. Phase-Locked Loop circuits.

EE4344 Analysis And Design of Integrated Circuits
AUs: 3, Pre-requisite: EE3003, Semester 1 and 2
Basic Analog Building Blocks. Data Converters. Low-Voltage Low-Power Digital Circuits. Memories. Sequential and Self-Timed CMOS Circuits. Design Methodologies and Implementation Strategies.

EE4413 DSP System Design
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
This course introduces the basic rules, procedures, techniques and components for designing a DSP system. The course 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.

EE4455 Embedded Systems
AUs: 2, Pre-requisite: EE3002, Semester 2
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.

EE4475 Audio Signal Processing
AUs: 3, Pre-requisite: NIL, Semester 1
Fundamentals of Human Hearing. Room Acoustics. 3-D Sound Synthesis. Sound Compression.

EE4476 Image Processing
AUs: 3, Pre-requisite: NIL, Semester 1
Digital Image Fundamentals. Image Transforms. Image Enhancement. Image Restoration. Image Compression. Nonlinear Image Processing. Applications.

EE4478 Digital Video Processing
AUs: 3, Pre-requisite: NIL, Semester 2
Fundamentals of Digital Video. Block-matching Motion Estimation and Fast Algorithms. Video Coding Basics. Video Coding Standards. Video Streaming and Processing. Applications.

EE4483 Artificial Intelligence and Data Mining
AUs: 3, Pre-requisite: NIL, Semester 1
Introduction of Machine Learning. Problem Solving Techniques. Application to Data Mining.

EE4490 Multimedia Systems
AUs: 3, Pre-requisite: NIL, Semester 1
Fundamentals of Multimedia Systems. Overview of Digital Image and Video Coding Standards. Overview of Digital Audio Coding Standard. Multimedia Communications. Multimedia Applications.

EE4503 Power Engineering Design
AUs: 2, Prerequisites: EE3015, Semester 1
In this design course, students will apply the concepts of various power system analysis techniques and system performance criteria in designing a medium/low voltage transmission system and protection schemes for some typical industrial distribution networks. They are required to carry out the detailed design with hands-on exercise and extensive use of computer simulation software, and verify the results of the final design to meet specifications.

EE4504 Design of Clean Energy Systems
AUs: 2, Prerequisites: EE3015, Semester 2
Clean and renewable energy sources. Wind energy turbines and systems. Solar photovoltaic devices and systems. System-level designs. Analytical design and analysis. Modelling and simulation. Hands-on sessions using commercial software. Comprehensive case studies of wind and solar energy systems.

EE4530 Power System Analysis and Control
AUs: 3, Pre-requisite: EE2005, Semester 1 and 2
Power Flows. Active Power and Frequency Control. Reactive Power and Voltage Control. Power System Stability.

EE4532 Power Electronics and Drives
AUs: 3, Pre-requisite: EE2005, Semester 1 and 2
Introduction to Power Electronic Systems and Devices. Uncontrolled and Controlled Rectifiers. Hard Switching Power Converters. Principles and Control of Motor Drives.

EE4533 Power Apparatus and System Protection
AUs: 3, Pre-requisite: EE2005, Semester 1 and 2
Power Apparatus and Transients. High Voltage Testing and Maintenance. Fault Analysis. Protection of Distribution Systems. Protection of Power Apparatus.

EE4534 Modern Distribution Systems with Renewable Resources
AUs: 3, Prerequisites: EE3015, Semester 2
Operation of distribution systems. Power quality. Solar power systems. Wind power systems.

EE4613 CMOS Process and Device Simulation
AUs: 2, Pre-requisite: EE3013, Semester 1 and 2
Virtual Wafer Fabrication. Virtual Device Characterisation. Virtual Process Integration.

EE4614 Device Parameter Extraction And Layout Implementation
AUs: 2, Semester 1 and 2
Virtual Device Characterisation. Transistor Parameter Extraction. Circuit Simulation and Mask Layout
.Design.

EE4645 Microfabrication Engineering
AUs: 3, Pre-requisite: EE3013, Semester 1 and 2
Crystal Growth and Wafer Preparation. Vacuum Science and Plasma. Rapid Thermal Processing. Advanced Deposition Techniques. Process Integration. Semiconductor Characterisation Techniques. IC Manufacturing.

EE4646 VLSI Technology
AUs: 3, Pre-requisite: EE3013, Semester 1 and 2
Advanced MOS structures and process technology. Advanced bipolar transistors and process technology. MOS scaling rules and small geometry effects. CMOS latchup and isolation.

EE4647 Microelectronic Devices
AUs: 3, Pre-requisite: EE2003, Semester 1 and 2
Bipolar devices. MOS physics. MOSFET device characteristics and modelling. Introduction to Heterojunction devices.

EE4648 Flat Panel Display Technologies
AUs: 3, Pre-requisite: EE2003, Semester 1
Overview of display technologies. Ergonomics of displays. Liquid crystal cell. Liquid crystal display technologies. Electroluminescent devices. Plasma Displays. Field emission displays. Thin film transistors. Recent advances in display technologies.

EE4694 IC Reliability and Failure Analysis
AUs: 3, Pre-requisite: EE3013, Semester 1
Basic reliability engineering concept. Statistical aspect of reliability and data handling. Microelectronic device failure mechanisms. Failure analysis techniques and instrumentation.

EE4695 Semiconductor Physics
AUs: 3, Pre-requisite: EE2003, Semester 2
Elements of quantum mechanics. Crystal structure and diffraction. Thermal properties of semiconductor crystals. Outline of statistical mechanics and quantum theory of electrons in periodic lattices. Optical and transport properties of semiconductors.

EE4705 Object-Oriented Programming
AUs: 3, Prerequisites: NIL, Semester 1
Introduction. C++ fundamental. Object-Oriented programming in C++. Graphical user interface programming.

EE4706 Object-Oriented Software Engineering Design
AUs: 2, Pre-requisite: NIL, Semester 1 and 2
This course consists of four parts: classroom lessons, laboratory sessions, project assignment, and open-book examination. The classroom lessons cover the basic concepts and techniques. The laboratory sessions provide a hands-on opportunity to digest the lessons in the classroom. The exercises and assignment provide an opportunity to put the all lessons learned into practice, it also serves as a part of the final assessment together with the written examination. The content covers an introduction to OOP, OOAD, OO Software Development. Design and development of a mini software project.

EE4717 Web Application Design
AUs: 2, Pre-requisite: NIL, Semester 1
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 connections are inherently unreliable and protocols are inherently stateless.

EE4718 Enterprise Network Design
AUs: 2, Pre-requisite: EE3017, Semester 1 and 2
This course 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.

EE4756 Computer Architecture
AUs: 3, Pre-requisite: NIL, Semester 2
Fundamental of Computer Design. Instruction Set Architecture. Memory-system Architecture. Buses, Storage Devices and I/ O System. RISC Design. Pipelining.

EE4757 Computer System Software
AUs: 3, Prerequisites: NIL, Semester 2
Assemblers, Loaders, Linkers. Introduction to Compilers. Principles of Operating Systems. Implementation Examples of Operating Systems.

EE4758 Computer Security
AUs: 3, Pre-requisite: NIL, Semester 1
Introduction. Secret/public-key cryptosystems. Secure protocols. Electronic election and digital money. Intrusion detection and database security.

EE4761 Computer Networking
AUs: 3, Pre-requisite: EE3017, Semester 1 and 2
Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.

EE4762 Web Services
AUs: 3, Pre-requisite: NIL, Semester 2
Introduction. Web services architecture. Infrastructure support for web services. Web services standards and protocols. Web services development platforms and tools.

EE4791 Database Systems
AUs: 3, Pre-requisite: NIL, Semester 1
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.

EE4815 Optical Design
AUs: 2, Pre-requisite: NIL, Semester 1
This course is concerned with the design of multiplayer dielectric films and lasers, which are the two widely used technologies in modern optics. The course discusses the basic principles of the technologies and some practical techniques involved. Two design exercises will be carried out. In the first design module, students will learn antireflection coating and different types of filters, and do a project on minimization of light reflection on solar cells. In the second design module, students will learn how to design and align a laser, and will be asked to construct an open frame HeNe laser and experiment with the laser to study the laser single transverse mode and multi-transverse mode operations. Techniques for laser mode control and wavelength selection will also be demonstrated.

EE4816 Photonic Devices: Design and Characterization
AUs: 2, Pre-requisite: NIL, Semester 2
Photonic device design and measurement. Photovoltaic device design and performance characterization.

EE4836 Semiconductor Optoelectronics
AUs: 3, Pre-requisite: EE2003, Semester 1
Semiconductor Photonic Materials. Photodetectors. Solar Cells. Light Emitting Diodes. Semiconductor Lasers.

EE4838 Laser Engineering And Applications
AUs: 3, Pre-requisite: NIL, Semester 2
Laser fundamentals. Cavity Design. Laser Techniques. Design of Laser Systems. Applications in various areas.

EE4839 Fibre Optic Communications
AUs: 3, Pre-requisite: NIL, Semester 2
Introduction to Fibre Optic Communications. Optical Fibre Characteristics. Light Sources, Transmitters, Receivers, Regenerators and Amplifiers. Passive and Active Components. System Concepts and System Design. Optical Networks.

EE 4840 – Biophotonics
AUs: 3, Pre-requisite: NIL, Semester 1
Fundamentals of Biophotonics, Bioimaging Principles and Techniques, Optical Biosensors, Laser-Photomedicine, Applications of Biophotonics.

EE4901 Biomedical Control System Design
AUs: 2, Pre-requisite: NIL, Semester 1
This design course is an introduction to biomedical system modelling and control, focusing on the synthesis of control techniques for biomedical systems. The musculoskeletal and cardiovascular systems will be used as illustrative examples.

EE4902 Design Of Medical Information Processing Systems
AUs: 2, Pre-requisite: NIL, Semester 2
This module is on the design of software/hardware systems for biomedical signal and image processing and analysis.

EE4903 Physiological Systems Analysis
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
System Modelling, Control and Analysis. The Respiratory System. The Cardiovascular System. The Neuromuscular System. The Renal System.

EE4904 Biomedical Instrumentation
AUs: 3, Pre-requisite: NIL, Semester 2
Introduction to Biomedical Instrumentation. Biopotential Electrodes. Electrocardiography. Blood Pressure, Heart Sounds and Blood Flow. Respiratory System Measurements. Instrumentation for Medical Imaging. Therapeutic Devices. Electrical Safety in Hospitals.

EE4905 Biomedical Signal Processing
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction to Biomedical Signals. Acquisition and Modelling of Biomedical Signals. Digital Filters with Applications to Biomedical Signals. Power Spectral Density (PSD) Estimation. Non-Stationary Biomedical Signal Processing. Case Study.

EE4906 Medical Imaging Systems
AUs: 3, Pre-requisite: NIL, Semester 1
Fundamentals of Medical Imaging. Medical Image Processing. X-ray Imaging and Computed Tomography (CT). Magnetic Resonance Imaging (MRI). Ultrasound Imaging.

HW310 Professional Communication
AUs: 2, Pre-requisite: HW001, Semester 1 and 2
Business writing. Career strategies: resume, cover letters, interviews. Oral presentation skills. Intercultural communication. Negotiation and conflict management.

INFORMATION ENGINEERING AND MEDIA

YEAR 1

IM1006 MATHEMATICS 1
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: In this course, the basic concepts of limits, differentiation and integration are introduced. Applications of differential and integral calculus are included. In addition, the course also covers topics on complex numbers, vectors and matrices to prepare the students for other courses in this programme. After completing this course, the student will be ready to take the next level of mathematics courses where the basic concepts will be further developed and applied. The topics in this course are Complex numbers, vectors and matrices; Limits and continuity of functions; Derivatives; Applications of derivatives; Integration; Integration methods; Applications of integration.

IM1007 MATHEMATICS 2
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: This course extends the basic concepts of differentiation and integration learned in Mathematics 1 to the operations on functions of multiple variables. Advanced applications of differential and integral calculus are included. In addition, the course covers topics on series and ordinary differential equations. After completing this course, the student will be able to apply the concepts of this course to various engineering disciplines in the following years of study. The topics in this course are Partial differentiation; Multiple integrals; Sequences and series; First order differential equations; Second order differential equations.

IM1091 ENGINEERING PHYSICS
AUs: 4, Pre-requisite: Nil, Semester 1
Course Description: This course provides students with a good understanding of the fundamental principles of physics and equips them with the necessary foundation for more advanced courses in electrical & electronic engineering. After completing this course the student will be ready to take the next level of various engineering courses where these basic concepts will be further developed and applied. The topics in this course include Equilibrium; Kinematics of Particles; Kinetics of Particles; Thermodynamics. Electricity; Magnetism; Optics; Quantum Physics.

IM1008 COMPUTING
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: This course introduces fundamental concepts in computing, with an emphasis on applications in engineering. The students on this course will acquire the software "literacy" that is indispensable to working creatively in Engineering. A brief introduction to basic computer architecture is followed by problem solving and programming techniques including necessary library routines. With this as background, the course focuses on available techniques and solutions in the engineering context. Throughout this course, the student will be equipped with the basics in computer programming. They will be given a fundamental understanding on how problems can be solved using readily available library routines. This will be done through the programming exercises undertaken during laboratory sessions. Initially, more time will be spent on concepts during tutorial classes. A shift towards more laboratory hours will make way for a greater emphasis on practice. The topics in this course are Introduction to computers; C language fundamentals; Flow of control; Functions and libraries; Arrays; Basic file processing; Structured programming and quality of programs; Case studies in engineering Applications.

IM1001 DATA STRUCTURES & ALGORITHMS
AUs: 3, Pre-requisite: Nil, Semester 1 and 2
Course Description: 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. On completion of the course the students are expected to have the essential knowledge and skills to design and implement efficient programs using appropriate data structures and algorithms. The topics in this course are Introduction to data structures & algorithms; Principles of algorithm analysis; Data structures; Searching, Sorting and Algorithm design techniques.

IM1003 OBJECT-ORIENTED PROGRAMMING
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: The objective of this course is to equip students with: (i) The knowledge of Object-Oriented programming concept and languages, and (ii) Skills of solving software problems with the use of Object-Oriented programming. On completion of this course, the students are expected to have the essential knowledge and skills to implement software program through the use of Object-Oriented paradigm as a problem solving model. The topics in this course are Introduction to OOP; OOP concepts and programming; Graphical user interface programming.

IM1002 ANALOG ELECTRONICS
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: The course covers the fundamentals of analog electronics. Topics covered include diode circuit analysis, bipolar junction transistors. MOSFET devices, small-signal amplifiers, differential and multistage amplifiers, frequency response, and operational amplifiers.

IM1004 DIGITAL ELECTRONICS
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: The course covers the fundamentals of digital electronics. The main objective is to gain knowledge of five main topics of digital electronics: (1) Concepts of number systems, digital signals, logic gates, Boolean functions and algebra, and logic minimization techniques. (2) Logic design of combinational circuits such as adders, comparators, decoders/encoders, multiplexers/demultiplexers, and the applications of these devices. (3) Basics of sequential logic circuits such as state table, state diagram and flip-flops. (4) Logic design of synchronous sequential circuits including finite state machines, counters and registers. (5) The applications of programmable logic devices and the operation of ROM and RAM. The topics in this course are Number Systems and Logic Gates; Boolean algebra and Logic Minimization; Combinational logic design and MSI digital devices; Sequential Logic Elements; Synchronous sequential logic circuits; Programmable logic devices and memories.

ART190 DRAWING AS A CONCEPTUAL TOOL
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: Students learn how to represent their ideas through a combination of life drawing and illustration studies. This course provides engineering students with an overview of figure drawing, composition, and sketching as a conceptualization and communication tool.

COM204 BASIC MEDIA WRITING
AUs: 4, Pre-requisite: Nil, Semester 1
Course Description: Introduction to writing formats in journalism, broadcasting, public relations, advertising and various electronic media. Philosophy, objectives and style of various types of media and communication writing.

HW110 EFFECTIVE COMMUNICATION
AUs: 2, Pre-requisite: Nil, Semester 1
Course Description: This is an introductory course on developing effective communication skills. Content components include: Communication model and process - meaning, importance and levels; Written communication - purpose, audience analysis; organization, language use and types of written messages; Oral presentation - delivery skills, persuasion, and group presentation; Interpersonal skills - listening; group interactions, and social skills. This course is designed to introduce students to fundamental concepts of oral and written forms of communication: to provide students with an understanding of the principles, strategies and process of communication, and to prepare them to handle verbal and written tasks in various situations. Students will learn through a variety of activities such as group discussion, role-play and simulation. The topics in this course are Communication process; Written communication; Oral presentation skills; Interpersonal skills.

YEAR 2

IM2006 ENGINEERING MATHEMATICS I
AUs: 4, Pre-requisite: IM1007, Semester 1 and 2
Course Description: The purpose of the course is to serve as a baseline course for all future engineering courses. 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. On completion of this course, students should have the understanding and be able to use the basic mathematical tools for solving engineering problems. The topics in this course are Fourier Analysis; Laplace Transform; Partial Differential Equations; Numerical Methods; Probability; Mathematical Statistics.

IM2007 ENGINEERING MATHEMATICS II
AUs: 4, Pre-requisite: IM1007, Semester 1 and 2
Course Description: The purpose of the course is to serve as a baseline course for all future engineering courses. The objectives include equipping students with: (a) basic understanding of topics related to engineering mathematics like linear algebra, complex variables and vector differential and integral calculus; (b) skills and techniques for solving these problems. On completion of this course students should have the understanding and be able to use the basic mathematical tools for solving engineering problems. The topics in this course are Linear Algebra; Complex Variables; Vector Differential Calculus; Vector Integral Calculus.

IM2001 SOFTWARE ENGINEERING
AUs: 3, Pre-requisite: Nil, Semester 1 and 2
Course Description: The objective of this course is to provide students with an understanding of the essential software engineering body of knowledge. Through this course, students are expected to acquire sufficient knowledge on software engineering. The topics in this course are Introduction to software engineering; Software project management; Software requirements and specifications; Software design; Software testing and maintenance.

IM2002 MICROPROCESSORS
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: The objective of this course is to provide students with working knowledge of the microprocessors. It covers the machine architecture, hardware interface, software programming in assembling language and microprocessor-based applications. Through this course, students are expected to gain a sound understanding on the architecture, organization, and operation of the 80x86 microprocessors. The students should be capable of building a microprocessor-based application, including the overall design, hardware interfacing and software programming in 80x86 assembly language. The topics in this course are Microprocessor fundamentals; Assembly language programming; I/O interfacing; Protected mode operation.

IM2003 COMPUTER COMMUNICATIONS
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: The course aims 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. The topics in this course are Introduction to computer communications; Data Communications Fundamentals; Data Link Control; Local Area Networks; Internetworking.

IM2004 SIGNALS & SYSTEMS
AUs: 3, Pre-requisite: IM1006 and IM1007 or equivalent, Semester 2
Course Description: Signals and Systems provide 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. Through this course, students should be able to understand the representation of continuous-time and discrete-time signals; their frequency characteristics and Fourier spectrum; representation and characteristics of linear time-invariant systems in both time and frequency domains; and the principles of sampling a continuous-time signal to a discrete-time one. The topics in this course are Signals and Systems; Linear Time-Invariant Systems; Fourier Series and Fourier Transform; Discrete-time Fourier Transform; Sampling; Modulation.

IM1090 FOUNDATION PHYSICS (For Direct-Entry students)
AUs: 3, Pre-requisite: 'O' Level Physics, Semester 1
Course Description: This course provides students with a comprehensive introduction to the basic concepts and principles of Physics. By the end of the course, students should have a good understanding of the basic concepts and principles of mechanics, heat, waves, electricity and

magnetism and attain a level of proficiency equivalent to that of the GCE A-Level in Physics. The topics in this course include Kinematics; Dynamics; Oscillations and waves; Physics of fluids; Temperature and heat; Electricity; Magnetism and electromagnetism.

IM1092 BASIC ENGINEERING MATHEMATICS (For Direct-Entry students)
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: The objective of the course is to provide a review of the necessary foundation in basic mathematics so as to enable students to handle courses in Engineering Mathematics in the Second year of the B.Eng. programme more effectively. Upon satisfactory completion of the course, the students should have learnt the basic techniques of differentiation and integration and be able to solve first and higher order linear differential equations. They should also have acquired the basic techniques of partial differentiation and be able to perform multiple integrals such as double integrals and triple integrals. They should also have acquired a basic knowledge of sequences and limits, and vectors. In short, they should have had a sufficient grasp of the basic mathematics required for a further study in engineering mathematics at the Second year B.Eng. Level. The topics in this course include Differentiation and Integration; Ordinary Differential Equations; Partial Differentiation; Multiple Integrals; Infinite Sequences and Series; Vectors.

ART290 VISUAL WORKSHOP I
AUs: 3, Pre-requisite: Nil, Semester 1 and 2
Course Description: This course presents the fundamental of image-making starting from the conceptualization stage, and moving onto basic techniques using a combination of traditional and digital tools. The emphasis is on still imagery, colour, composition, foreground and background, the interplay of word and image, and simple storytelling. (In addition to class time six hours are required to complete the workload presented in this course.)

COM206 VISUAL LITERACY AND COMMUNICATION
AUs: 4, Pre-requisite: Nil, Semester 1
Course Description: Visual literacy and issues of aesthetics and representation in visual media including photography, graphics and typography, film and video. Students explore form, meaning and impact of images through structural, historical and rhetorical analyses, and through the production and presentation of projects under supervision.

HW210 TECHNICAL COMMUNICATION
AUs: 2, Pre-requisite: Nil, Semester 1
Course Description: This course aims to teach students principles of technical communication for their academic and professional needs. The course focuses on basic written and oral skills essential in presenting technical information effectively. A key feature of the course is the use of project-based learning approach in learning technical communication. At the end of the course, students will be able to 1) have a good knowledge of the different kinds of technical communication; 2) communicate technical information effectively in writing; 3) give oral presentations of technical information; 4) research, process, and synthesize research ideas. The topics in this course are Principles of technical communication; conveying technical information in writing and orally; types of technical reports; technical writing style.

IM2079 DESIGN & INNOVATION PROJECT
AUs: 3, Pre-requisite: Nil, Special Session 1
Course Description: A five-week full-time practical training programme designed to exercise creativity, stimulate innovation and cultivate technopreneur capabilities. The programme focuses on an in-depth project covering the design, prototyping, testing and documentation of innovative electrical, electronic or IT products. Each project is carried out by students of group size of about twenty. It is supported by seminars on relevant issues in engineering innovation and design. It culminates in a project competition where the best projects vie for attractive prizes.

YEAR 3

IM3001 DIGITAL SIGNAL PROCESSING
AUs: 3, Pre-requisite: IM2004, Semester 1
Course Description: 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. Through this course, students are expected to achieve a basic understanding of digital signal processing. Ultimately, it is hoped that through learning this course students will be equipped with a clear picture of DSP as well as a necessary foundation for further study of advanced DSP topics in the future. The topics in this course are Introduction to DSP; Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT); Z-Transform; Digital Filter Design.

IM3002 COMMUNICATION PRINCIPLES
AUs: 3, Pre-requisite: IM2004, Semester 1
Course Description: 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. Mathematics is used only at a level that is absolutely necessary. 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. The topics in this course are Review of signal analysis and noise representations; Linear modulation; Frequency and phase modulation; Digital communication principles.

IM3003 INFORMATION SECURITY
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: This course aims to provide students with essential concepts of information security, cryptography, secure protocols, detection and other security techniques. With the background obtained in this course, students are able to incorporate appropriate security techniques in the application development. The topics covered in this course include Introduction to information security; Secret/public-key cryptosystems; Secure protocols; Electronic election and digital money; Intrusion detection and database security.

IM3072 PROJECT
AUs: 1, Pre-requisite: Nil, Semester 1
Course Description: This project module is designed to complement the lecture material of one or more courses offered in the semester.

IM3079 INDUSTRIAL ATTACHMENT
AUs: 10, Pre-requisite: Year 3 Standing, Semester 2
Course Description: Industrial Attachment is a learning process which by exposing the students in real life engineering environment as part of an academic curriculum helps the students to develop and enhance academic, personal and professional competencies. Every participating organisation is required to provide an initial proposal of an attachment programme for each of the students. The attachment programme should have emphasis on applications, management and hands-on experience for the students.

IM3076 INDUSTRIAL ORIENTATION
AUs: 4, Pre-requisite: Year 3 standing, Semester 2
Course Description: Industrial Orientation is a learning process which by exposing the students in real life engineering environment as part of an academic curriculum helps the students to develop and enhance academic, personal and professional competencies. Every participating organisation is required to provide an initial proposal of an attachment programme for each of the students. The attachment programme should have emphasis on applications, management and hands-on experience for the student.

ART292 VISUAL WORKSHOP II
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: This course presents the fundamentals of animation, including basic notions or visual rhythm, the role of sound, notions of acting, and a few finished exercises. (In addition to class time six hours are required to complete the workload presented in this course.)

COM224 WEB DESIGN AND TECHNOLOGIES
AUs: 4, Pre-requisite: Nil, Semester 1
Course Description: Introduction to the processes of creating, designing and managing an effective web site. Course includes the study and practice of electronic media, multimedia, and the managing of online content for both journalism and advertising.

YEAR 4

HW310 PROFESSIONAL COMMUNICATION
AUs: 2, Pre-requisite: A pass in English Proficiency (HW001), Semester 2
Course Description: This course aims to impart to students 1) Widely held theories of the processes involved in business communication; 2) Writing techniques and organizational strategies essential for composing clear business messages; and 3) Oral skills necessary for communicating ideas in presentations and employment interviews. Upon completing the course, students should be able to 1) Apply a systematic knowledge of the theory and processes involved in business communication to the workplace in Singapore and abroad; 2) Compose effective documents for different business purposes; 3) Speak confidently at presentations and employment interviews. The topics in this course are Business writing; Career strategies: résumés, cover letters, interviews; Oral presentation skills; Intercultural communication; Negotiation and conflict management.

IM4001 MULTIMEDIA SYSTEMS
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: 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. Through this course, students are expected to achieve a basic understanding of multimedia systems. With such background equipment, students would be able to evaluate more advanced or future multimedia systems. This course will also arouse students' interest in the course and further motivate them towards developing their career in the area of multimedia and internet applications. The topics in this course are Fundamentals of Multimedia Systems; Overview of Digital Image and Video Coding Standards; Overview of Digital Audio Coding Standard; Multimedia Communications; Multimedia Applications.

IM4079 FINAL YEAR PROJECT
AUs: 10, Pre-requisite: Year 4 Standing, Semester 1 and 2
Course Description: All final year students are required to undertake a project, supervised by one or two academic staff. This project will involve an in-depth study, investigation, construction of

hardware and/or development of software and testing in any of the areas of specialized courses offered in a final year option group, and spread over the whole academic year. Students are required to submit a formal report, carry out a project demonstration and also make an oral presentation on completion of the project.

IM4040 ENGINEERS & SOCIETY
AUs: 3, Pre-requisite: Nil, Semester 2
Course Description: This course aims to provide a general understanding of the society that we live in and engineers' roles and responsibilities towards its well being. The course helps to develop students into better citizens of Singapore and the world. This is achieved by lectures covering a wide range of topics including history on engineering, professional ethics, the various issues involved in building and sustaining Singapore, international politics and globalization and other global developmental issues. 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.

IM4041 HUMAN RESOURCE MANAGEMENT
AUs: 3, Pre-requisite: Nil, Semester 1
Course Description: Using case studies and current events to: understanding individual and group behaviour in organizations: the impact of globalization, continuous learning, work values and corporate culture; visionary and transformational leader-ship strategies: motivation, teambuilding and talent development, ethical behaviour and integrity; Managing work groups: organizational communications and conflict resolution strategies, leveraging on diversity; Quality and excellence concepts: stakeholders awareness, customer-centred mindset, people-centred management approaches, innovative adaptation to continuous change, learning organization, global talent search; Trade unions, collective bargaining and labour-management relations challenges and prospects.

IM4761 COMPUTER NETWORKING
AUs: 3, Pre-requisite: IM2003
(Offered as Technical Elective)
Course Description: The course 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. On completion of the course, the students will have a solid foundation on computer networking and network protocols. The student will be able to analyse the suitability of different protocols for various applications, understand the needs of various protocols for the delivery of messages through the network, and identify the requirements for the design and configuration of a basic network. The topics in this course are Computer network architecture and services; Internetworking protocols and routing; Transport protocols; Application services and multimedia networking.

IM4756 COMPUTER ARCHITECTURE
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: This course provides 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. Through this course, students are expected to become conversant with a large body of concepts and accompanying terminology in computer architecture. The course will be helpful for students to read and understand technical articles or promotional brochures that describe new computer architectures and appreciate the design issues and tradeoffs of that architecture. This course will introduce the current trends in computer architecture so that students have some sense of the future directions of computational machines. Students will also learn how to quantitatively analyze, compare, and evaluate the

performance of computer systems. The topics covered in this course include Fundamental of Computer Design. Instruction Set Architecture. Memory-system Architecture. Buses, Storage Devices and I/O System. RISC Design. Pipelining.

IM4757 COMPUTER SYSTEM SOFTWARE
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: This course serves as an introduction to systems programming. It covers the design and implementation of various types of system software, including assemblers, loaders and linkers, compilers, and operating systems. The topics covered in this course include System software and Machine Architecture; Assemblers; Loaders and Linkers; Compilers; Operating Systems.

IM4791 DATABASE SYSTEMS
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The objective of the course 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 modelling, 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. Upon completion of this course, the students will understand: how a database system is used and managed; how to perform data modelling; how to design the logical and physical structures of a database; and why more complex databases are needed for special applications. The topics in this course are 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.

IM4762 WEB SERVICES
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: This course introduces the concepts behind core and extended web services technologies. It provides students with a primer for web services architectures, infrastructure support and protocols. Through this course, students are expected to acquire essential and in-depth knowledge of web services. The topics in this course are Introduction to web services; Web services architecture; Infrastructure support for web services; Web services standards and protocols; Web services development platforms and tools.

IM4152 DIGITAL COMMUNICATIONS
AUs: 3, Pre-requisite: IM3002
(Offered as Technical Elective)
Course Description: 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. Students equipped with the knowledge and training provided in the course will be able to participate in design and development, installation and operation of a wide spectrum of applications in the area of digital communications. The firm grounding in digital communications fundamentals and digital methods will also prepare students to anticipate, appraise and pursue future trends in digital communications research and technologies. The topics in this course are Digital communication principles; Information theory; Error correcting codes; Optimum signal detection.

IM4188 WIRELESS COMMUNICATIONS
AUs: 3, Pre-requisite: IM3002
(Offered as Technical Elective)
Course Description: 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, 3G, and emerging (UWB, Wi-Fi, WiMax, etc.) systems. The students will be able to understand the design, specifications and the performances of various wireless communication systems. The topics in this course are Types of wireless systems; Radio frequency spectrum; Performance calculations; Cellular radio systems.

IM4153 TELECOMMUNICATION SYSTEMS
AUs: 3, Pre-requisite: IM3002
(Offered as Technical Elective)
Course Description: This course provides students with the basic understanding of the principles involved in the design and implementation of optical fibre communication systems, radio-wave propagation, satellite communication, public switched telephone networks, teletraffic theory, network planning and principle of digital switching systems. Students will be able to participate in the design, installation and management of some typical wired and wireless communication networks. Topics covered in this course include Telecommunication networks; Switching and signalling; Line transmission; Radio communication; Optical fibre communication systems and applications.

IM4475 AUDIO SIGNAL PROCESSING
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: 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. The student is expected, at the end of this course, to have basic knowledge related to audio signal processing that includes fundamentals of auditory perception, room acoustics, reproduction of 3-D audio sound, various compression techniques for audio signals. This course will arouse students’ interest in the course and further motivate them towards developing their career in the area of digital audio signal processing. The topics in this course are Fundamentals of Human Hearing; Room Acoustics; 3-D Sound Synthesis; Sound Compression.

IM4476 IMAGE PROCESSING
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: 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. At the end of the course, students should appreciate and understand the principles involved in the processing of images. Stimulating tutorial questions are also provided to enhance students’ understanding as well as to encourage creativity and thinking skill. Students would then be able to apply some of these concepts and techniques learned through worked examples in the lectures and tutorials to real-life applications after graduation. The topics in this course are Digital Image Fundamentals; Image Transforms; Image Enhancement; Image Restoration; Image Compression; Nonlinear Image Processing; Applications.

IM4478 DIGITAL VIDEO PROCESSING
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The objective of this course is to provide students with a basic understanding of digital video processing with more emphasis on video coding and its international standards, since coding is a turnkey technology of today's multimedia applications. After the course, students would be able to have sufficient understanding regarding why and how on video compression and communications technologies and appreciate its exploitation on various multimedia applications. Through this course, students are expected to achieve a basic understanding of digital video compression and its relevant processing tasks, such as transport issues, video streaming, error detection, recovery, and/or concealment issues. With these backgrounds, students would be able to evaluate more advanced or future video compression technologies and multimedia application systems that exploit compressed video. The topics in this course are Fundamentals of Digital Video; Block-matching Motion Estimation and Fast Algorithms; Video Coding Basics; Video Coding Standards; Video Streaming and Processing; Applications.

IM4455 EMBEDDED SYSTEMS
AUs: 3, Pre-requisite: IM2002
(Offered as Technical Elective)
Course Description: The objective of this course is to provide a practical approach for students to understand several important concepts of embedded systems. In addition, several portable embedded media applications such as MP3 player, digital camera and digital video streaming are showcased in this course to tie the basic concepts together into coherent entities. This course is structured to combine lectures, insightful demonstrations and case study tutorials for students to gain an in-depth understanding of fundamental concepts on embedded systems. Upon completion of this course, the students should be able to: (1) understand the hardware and software components, and their development cycles, (2) understand the deployment of embedded processors and supporting devices in real-world applications, and (3) interpret application specifications and make practical recommendations on resource selection for embedded systems. The topics in this course are Hardware components, including processors, memory, buses, and I/O; System software, including device drivers and operating systems. Interfacing and networking; Processor selection for optimal cost and system performance; Concepts on real-time embedded system programming and real-time operating systems (RTOS); Case studies on real-world embedded designs; Applicable standards grouped by system applications.

IM4483 ARTIFICIAL INTELLIGENCE AND DATA MINING
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: 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) Application of machine learning techniques to data mining. Upon completion of this course, students will have sufficient expertise in both the theory of machine learning and its application to data mining, so as to use these powerful techniques in a wide range of industrial contexts, for example, bioinformatics, electronic commerce, and finance. The topics in this course are Introduction of Machine Learning; Problem Solving Techniques; Application to Data Mining.

IM4770 COMPUTER GRAPHICS AND ANIMATION
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: This course gives an introduction to the fundamental concepts of computer graphics and animation. The topics cover graphics concepts and basic techniques of manipulating two- and three-dimensional animated objects. Some applications of animation are

also included to help the students to appreciate the course. The topics covered include: Introduction to Computer Graphics and Applications, Geometric Shapes, Affine and Viewing Transformations, Basics of Illumination and Shading, Conventional and Computer Animation, Applications for Computer Animation.

IM4771 COMPUTER VISION
AUs: 4, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The topics covered in this course are Image Representation; Pre-processing Techniques; Segmentation and Representation; Recognition and Machine Intelligence; Machine Vision Applications.

IM4772 VISUALISATION
AUs: 4, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The topics covered in this course include 3D Computer graphics; Visualisation pipeline; Graphical data representation; Visualisation algorithms and applications.

IM4773 GEOMETRIC MODELLING
AUs: 4, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The topics covered in this course include Parametric curves and surfaces: bezier, B-spline, nurbs, surfaces of revolution, Swept surfaces, 2D and 3D "De Casteljau" algorithm; Implicit surfaces: algebraic surfaces, quadrics, superquadrics, blending, blending functions, skeletons, convolution surfaces; Subdivision surfaces; Normal vector calculation; Surfaces representation: polygonization, grids, octrees, points, CSG.

IM4774 COMPUTER GAME PROGRAMMING
AUs: 4, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The topics covered in this course History of computer/video game technology; Game genres and design principles; The social impact of games; Event loops and execution threads; Rendering and animation in 3D; Terrain/background representation; Polygonal models; Texturing; Collision detection; Physically-based modelling; Game AI; Multi-user games and networking.

CS321T AUDIO RADIO PRODUCTION
AUs: 4, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: The main purpose of this course is to give student theory and practice in audio and radio production with dual emphases on using tools of the trade, and on producing a variety of program formats. The first half of the course will prepare student for practical production by introducing tools of the trade involved in audio production. The second half of the course will introduce student a number of radio program formats. Student will gain experience in the integration of human voice, music and sound effects into program which will include news, current affairs and commercials.

COM270T SINGLE CAMERA PRODUCTION
AUs: 3, Pre-requisite: Nil
(Offered as Technical Elective)
Course Description: This course introduces students the practices of single camera field production. Different phases of single camera production – from pre-production, production to post-production – will be covered and discussed. In addition, students will also learn how to execute a continuity shoot and edit, producing a 3-minute video as their final project for the course. The class will also watch and discuss various television and video programs in class.

FULL-TIME B.ENG PROGRAMME

THE GENERAL EDUCATION REQUIREMENT (GER)

EE8061 Innovation and Technology Management
AUs: 3, Prerequisites: NIL, Semester 1
Overview. Patterns of Technology Development. External Environment. Internal Environment and Processes. Financial Fundamentals, Funding and Risk Management.

EE8084 Cyber Security
AUs: 3, Pre-requisite: NIL, Semester 1 and 2
Introduction to Cyber Crimes and Security Issues in a Cyber environment. System Perspectives of Information Security: Issues and Solution Approaches. Concepts for Secrecy, Integrity and Availability. Security Solutions and Models. Security Planning and Management. Security Cases and Technology Trends.

EE8085 Electricity For Modern Society
AUs: 3, Pre-requisite: NIL, Semester 2 and Special Session
Conventional sources of electricity generation, transmission and distribution systems. Clean/green power and renewable sources. Liberalisation of electricity industry and energy procurement. Electricity utilisation and quality. Energy conservation. Safety.

EE8086 Astronomy – Stars, Galaxies and Cosmology
AUs: 3, Pre-requisite: NIL, Semester 2 and Special Session
The origin of modern astronomy – an introduction, Learn to read the stars, Overview of the solar system, The beginning and life of stars, The mysteries ahead, The future of space exploration.

EE8087 Living with Mathematics
AUs: 3, Prerequisites: NIL, Semester 2
Solving algebraic equations and applications. Trigonometry with applications. Conic sections: straight line, circle, hyperbola, parabola, ellipse. Planets of the universe. Functions in daily life. Applications of differentiation and integration. Personal finance.

EE8091 Sound In Our Daily Life
AUs: 3, Pre-requisite: NIL, Semester 1
Preliminary acquaintance of sound; Sound sources and radiation; Wave motion and some useful phenomena; Sound in a room, environment noise, hear, speech, psychoacoustics and measurement of sound; Underwater sound, ultrasound and applications; History and future of sound research.

EE8092 Digital Lifestyle
AUs: 3, Pre-requisite: NIL, Semester 2
Home Entertainment Systems and Game Consoles. Digital Audio Systems. Digital Cameras and Video Camcorders. Personal Computers. Mobile Phones and PDA.

PART-TIME B.ENG PROGRAMME

YEAR 1

FE0001 Foundation Physics
AUs: 3, Prerequisites: NIL, Semester 1
Kinematics. Dynamics Oscillations and waves. Physics of fluids. Temperature and heat. Electricity. Magnetism and electromagnetism**.**

EE2004 Digital Electronics
AUs: 3, Pre-requisite: NIL, Semester 2
Number Systems and Logic Gates. Boolean algebra and Logic Minimisation. Combinational logic design and MSI digital devices. Sequential Logic Elements. Synchronous sequential logic circuits. Programmable logic devices and memories.

EE2006 Engineering Mathematics I
AUs: 4, Pre-requisite: NIL, Semester 2
Fourier Analysis. Laplace Transform. Partial Differential Equations. Numerical Methods. Probability. Mathematical Statistics.

EE2008 Data Structures and Algorithms
AUs: 3, Pre-requisite: NIL, Semester 1
Introduction. Principles of algorithm analysis. Data structures. Searching. Sorting. Algorithm design techniques.

EE2090 Basic Engineering Mathematics
AUs: 3, Pre-requisite: NIL, Semester 1
Differentiation and Integration. Ordinary Differential Equations. Partial Differentiation. Multiple Integrals. Infinite Sequences and Series. Vectors.

HW001 ENGLISH PROFICIENCY
AUs: 0, Prerequisites: For students who fail QET, Semester 1
The course aims to help students improve their English language proficiency for use in academic situations. Tutorials are structured into a 3-wk cycle in which each cycle comprises a blend of workshops, face-to-face and online sessions, and independent study. Activities are designed to scaffold learning and help students integrate all four language skills, with a focus on writing and speaking. Materials from the textbook and other sources, e.g. the Internet, recorded student speeches and writing software, are used.

HW210 Technical Communication
AUs: 2, Pre-requisite: NIL, Semester 2
Principles of technical communication. Conveying technical information in writing and orally. Types of technical reports. Technical writing style.

YEAR 2

EE2001 Circuit Analysis
AUs: 3, Pre-requisite: NIL, Semester 1
Circuit theorems. Energy storage and transient response. Alternating current circuits. Laplace transforms in circuit analysis. Network functions and two-port networks.

EE2002 Analog Electronics
AUs: 3, Pre-requisite: NIL, Semester 1
Diode circuit analysis. Bipolar junction transistors. MOSFET devices. Small-signal amplifiers. Differential and multistage amplifiers. Frequency response. Operational amplifiers.

EE2003 Semiconductor Fundamentals
AUs: 3, Pre-requisite: NIL, Semester 2
Basic semiconductor concepts. Semiconductor in equilibrium. Carrier transport phenomena. Semiconductor in non-equilibrium. PN junction. Metal-Semiconductor contacts. Introduction to Bipolar Junction Transistors.

EE2005 AC Circuits and Machines

AUs: 3, Pre-requisite: EE2001, Semester 2
Three-phase Circuits. Electromagnetism. Transformers. Rotating Machines.

EE2010 Signals and Systems
AUs: 3, Pre-requisite: NIL, Semester 1
Signals and Systems. Linear Time-Invariant Systems. Fourier Series and Fourier Transform. Discrete-time Fourier Transform. Sampling. Modulation.

EE2071 Laboratory 2A
AUs: 1, Pre-requisite: NIL, Semester 1
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE2072 Laboratory 2B
AUs: 1, Pre-requisite: NIL, Semester 2
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE2091 Engineering Physics
AUs: 4, Pre-requisite: FE0001, Semester 2
Rotational dynamics. Oscillations and wave motion. Optics. Quantum physics. Electricity. Magnetism.

YEAR 3

EE2007 Engineering Mathematics II
AUs: 4, Pre-requisite: NIL, Semester 1
Linear Algebra. Complex Variables. Vector Differential Calculus. Vector Integral Calculus.

EE3001 Engineering Electromagnetics
AUs: 3, Co-requisite: EE2007, Semester 2
Static electric and magnetic fields. Maxwell's equations. Wave equation and uniform plane waves. Electromagnetic energy transfer. Reflection of electro-magnetic waves. Transmission lines.

EE3002 Microprocessors
AUs: 3, Pre-requisite: NIL, Semester 1
Microprocessor fundamentals. Assembly language programming. I/O interfacing. Protected mode operation.

EE3003 Integrated Electronics
AUs: 3, Pre-requisite: EE2002, Semester 1
Feedback amplifier. Voltage reference and current sources. Operational amplifier circuits. Applications of operational amplifiers. Power supplies. CMOS logic circuits. CMOS flip¬flops and memories.

EE3011 Modelling and Control
AUs: 3, Pre-requisite: EE2006, Semester 2
Introduction to Control Systems. System Modelling. Time Domain Analysis. Performance of Feedback Control Systems. Root-locus Technique. Frequency Domain Analysis. Relative Stability and Design Specifications. System Compensation and PID Control.

EE3012 Communication Principles
AUs: 3, Pre-requisite: EE2010, Semester 2

Review of signal analysis and noise representations. Linear modulation. Frequency and phase modulation. Digital communication principles.

EE3013 Semiconductor Devices and Processing
AUs: 3, Pre-requisite: EE2003, Semester 2
Fundamentals of Bipolar Devices. MOS Devices. Crystal growth and wafer preparation. Deposition Techniques. Diffusion and thermal oxidation. Ion implantation. Lithography. Etching.

EE3014 Digital Signal Processing
AUs: 3, Pre-requisite: EE2010, Semester 2
Introduction. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT). Z-Transform. Digital Filter Design.

EE3015 Power Systems and Conversion
AUs: 3, Pre-requisite: EE2005, Semester 2
Fundamentals of Power Systems. System Operation and Protection. Power Conversion. Electromechanical Power Conversion Systems.

EE3017 Computer Communications
AUs: 3, Pre-requisite: NIL, Semester 2
Introduction to computer communications. Data Communications Fundamentals. Data Link Control. Local Area Networks. Internetworking.

EE3071 Laboratory 3
AUs: 1, Pre-requisite: NIL, Semester 2
Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.

EE3072 Project
AUs: 1, Pre-requisite: NIL, Semester 1
This course teaches the essential techniques for solving specific implementation problems either in control, communications, electronics, programming, or microprocessor systems for applications/implementation in a mobile robot platform. Each of the project modules is used to extend or enhance one aspect of the mobile robot's capabilities/ functionalities. In addition to tackling the individual projects, various issues and problems pertaining to the integrated engineering project of developing an intelligent mobile robot are also examined.

YEAR 4

EE4001 Software Engineering
AUs: 3, Pre-requisite: NIL, Semester 2
Introduction to software engineering. Software project management. Software requirements and specifications. Software design. Software testing and maintenance.

EE4040 Engineer and Society
AUs: 3, Pre-requisite: NIL, Semester 1
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.

EE4079 Final Year Project
AUs: *****, Pre-requisite: Year 4 standing, Semester 1 and 2

This project will involve in-depth study, investigations, construction of hardware and/or development of software and testing in any of the areas of specialised courses offered in an option group.

EE4105 Cellular Communication System Design
AUs: 2, Pre-requisite: NIL, Semester 1
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.

EE4152 Digital Communications
AUs: 3, Pre-requisite: EE3012, Semester 1
Digital communication principles. Information theory. Error correcting codes. Optimum signal detection.

EE4153 Telecommunication Systems
AUs: 3, Pre-requisite: EE3012, Semester 2
Telecommunication networks. Switching and signaling. Line transmission. Microwave communication systems. Optical fibre communication systems and applications.

EE4303 Mixed Signal IC Design
AUs: 2, Pre-requisite: EE3003, Semester 1
Mixed-Signal Design. Design Practice.

EE4340 - VLSI Systems
AUs: 3, Prerequisite: EE2004, Semester 1
VLSI System Architecture and Memory Management. Parallel Processing. High Speed Synchronous and Asynchronous design. System noise consideration. VLSI system verification and testability. System reliability.

EE4503 - Power Engineering Design
AUs: 2, Prerequisite: EE3015, Semester 1
In this design course, the students will apply the concepts of various power system analysis techniques and system performance criteria in designing a medium/low voltage transmission system and protection schemes for some typical industrial distribution networks. Students are required to carry out the detailed design with hands-on exercise and extensive use of computer simulation software. Students are also required to verify the results of the final design to meet specifications.

EE4532 - Power Electronics and Drives
AUs: 3, Pre-requisite: EE2005, Semester 1
Introduction to Power Electronic Systems and Devices. Uncontrolled and Controlled Rectifiers. Hard Switching Power Converters. Principles and Control of Motor drives.

EE4533 - Power Apparatus and System Protection
AUs: 3, Prerequisite: EE2005, Semester 2
Power Apparatus and Transients. High Voltage Testing and Maintenance. Fault Analysis. Protection of Distribution Systems. Protection of Power Apparatus.

EE4647 Microelectronic Devices
AUs: 3, Pre-requisite: EE2003, Semester 2
Bipolar devices. MOS physics. MOSFET device characteristics and modelling. Introduction to Heterojunction devices.

EE4717 - Web Application Design
Aus: 2, Prerequisites: NIL, Semester 1
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.

EE4761 Computer Networking
AUs: 3, Prerequisite: EE3017, Semester 1
Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.

EE4791 Database Systems
AUs: 3, Prerequisite: NIL, Semester 2
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.

HW310 Professional Communication
AUs: 2, Pre-requisite: HW001, Semester 2
Business writing. Career strategies: rŽsumŽs, cover letters, interviews. Oral presentation skills. Intercultural communication. Meetings and conflict management.

YEAR 5

EE4041 Human Resource Management
AUs: 3, Pre-requisite: NIL, Semester 1
Using case studies and current events to: understanding individual and group behavior in organizations: the impact of globalization, continuous learning, work values and corporate culture; visionary and transformational leadership strategies: motivation, teambuilding and talent development, ethical behavior and integrity; Managing work groups: organizational communications and conflict resolution strategies, leveraging on diversity; Quality and excellence concepts: stakeholders awareness, customer-centred mindset, people-centred management approaches, innovative adaptation to continuous change, learning organization, global talent search; Trade unions, collective bargaining and labour-management relations challenges and prospects.

EE4079 Final Year Project
AUs: 10, Pre-requisite: Year 4 standing, Semester 1 and 2
This project will involve in-depth study, investigations, construction of hardware and/or development of software and testing in any of the areas of specialised courses offered in an option group.

EE4110 Optical Communication System Design
AUs: 2, Pre-requisite: NIL, Semester 2
Students will be involved in the design of fibre optic communication systems. Issues such as light propagation, fibre characteristics and classification, fibre cables, connectors and splices, optical transmitters and receivers, optical amplifier and filter, optical coupler and wavelength converter,

nonlinear effects in WDM systems, and system design methodology are covered.

EE4153 Telecommunication Systems
AUs: 3, Pre-requisite: EE3012, Semester 2
Telecommunication networks. Switching and signaling. Line transmission. Microwave communication systems. Optical fibre communication systems and applications.

EE4208 - Intelligent System Design
AUs: 2, Prerequisite: Nil, Semester 2
This course covers the design of intelligent systems such as intelligent automation systems, neuro-fuzzy systems and intelligent vision systems. Currently, the focus is on the design of computer vision systems.

EE4268 - Robotics and Automation
Aus: 3.0, Prerequisite: Nil, Semester 1
Introduction to Robotics. Coordinate Transformation and Kinematics. Trajectory Planning. Control Techniques. Sensors and Devices. Robot Applications.

EE4305 Digital Design with HDL
AUs: 2, Pre-requisite: EE2004, Semester 2
Digital Design using Hardware Description Language. Design Practice.

EE4532 - Power Electronics and Drives
AUs: 3, Prerequisite: EE2005, Semester 1
Introduction to Power Electronic Systems and Devices. Uncontrolled and Controlled Rectifiers. Hard Switching Power Converters. Principles and Control of Motor drives.

EE4533 Power Apparatus and System Protection
AUs: 3, Pre-requisite: EE2005, Semester 2
Power Apparatus and Transients. High Voltage Testing and Maintenance. Fault Analysis. Protection of Distribution Systems. Protection of Power Apparatus.

EE4647 Microelectronic Devices
AUs: 3, Pre-requisite: EE2003, Semester 2
Bipolar devices. MOS physics. MOSFET device characteristics and modelling. Introduction to Heterojunction devices.

EE4694 IC Reliability and Failure Analysis
AUs: 3, Pre-requisite: EE3013, Semester 1
Basic reliability engineering concept. Statistical aspect of reliability and data handling. Microelectronic device failure mechanisms. Failure analysis techniques and instrumentation.

EE4761 Computer Networking
AUs: 3, Pre-requisite: EE3017, Semester 1
Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.