

DESCRIPTION OF EEE COURSES – Part-Time B.Eng

Year	Course Code	Course Title	Acad Units	Pre-Requisite	Contact Hours	Course Descriptions
1	EE2004	DIGITAL ELECTRONICS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	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.
1	EE2006	ENGINEERING MATHEMATICS I	4.0	Nil	Lec: 39 hrs Tut: 13 hrs	Fourier analysis. Laplace transform. Partial differential equations. Numerical methods. Probability. Mathematical statistics.
1	EE2008	DATA STRUCTURES AND ALGORITHMS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Introduction. Principles of algorithm analysis. Data structures. Searching. Sorting. Algorithm design techniques.
1	EE2090	BASIC ENGINEERING MATHEMATICS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Differentiation and integration. Ordinary differential equations. Partial differentiation. Multiple integrals. Infinite sequences and series. Vectors.
1	FE0001	FOUNDATION PHYSICS	3.0	GCE 'O' Level Physics	Lec: 26 hrs Tut: 13 hrs	Kinematics. Dynamics. Oscillations and waves. Physics of fluids. Temperature and heat. Electricity. Magnetism and electromagnetism.
1	HW001	ENGLISH PROFICIENCY	-	For students who fail QET	Tut: 20 hrs	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.
1	HW210	TECHNICAL COMMUNICATION	2.0	Nil	Tut: 24 hrs	Principles of technical communication. Conveying technical information in writing and orally. Types of technical reports. Technical writing style.
2	EE2001	CIRCUIT ANALYSIS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Circuit theorems. Energy storage and transient response. Alternating current circuits. Laplace transforms in circuit analysis. Network functions and two-port networks.
2	EE2002	ANALOG ELECTRONICS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Diode circuit analysis. Bipolar junction transistors. MOSFET devices. Small-signal amplifiers. Differential and multistage amplifiers. Frequency response. Operational amplifiers.
2	EE2003	SEMICONDUCTOR FUNDAMENTALS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Basic semiconductor concepts. Semiconductor in equilibrium. Carrier transport phenomena. Semiconductor in non-equilibrium. PN junction. Metal-Semiconductor contacts. Introduction to Bipolar Junction Transistors.
2	EE2005	AC CIRCUITS AND MACHINES	3.0	EE2001	Lec: 26 hrs Tut: 13 hrs	Three-phase Circuits. Electromagnetism. Transformers. Rotating machines.
2	EE2010	SIGNALS AND SYSTEMS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Signals and systems. Linear time-invariant systems. Fourier series and fourier transform. Discrete-time fourier transform. Sampling. Modulation.

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2	EE2071	LABORATORY 2A	1.0	Nil	Lab: 39 hrs	Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.
2	EE2072	LABORATORY 2B	1.0	Nil	Lab: 39 hrs	Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.
2	EE2091	ENGINEERING PHYSICS	4.0	FE0001	Lec: 39 hrs Tut: 13 hrs	Rotational dynamics. Oscillations and wave motion. Optics. Quantum physics. Electricity. Magnetism.
3	EE2007	ENGINEERING MATHEMATICS II	4.0	Nil	Lec: 39 hrs Tut: 13 hrs	Linear Algebra. Complex variables. Vector differential calculus. Vector integral calculus.
3	EE3001	ENGINEERING ELECTROMAGNETICS	3.0	EE2007 (Co-Req.)	Lec: 26 hrs Tut: 13 hrs	Static electric and magnetic fields. Maxwell's equations. Wave equation and uniform plane waves. Electromagnetic energy transfer. Reflection of electro-magnetic waves. Transmission lines.
3	EE3002	MICROPROCESSORS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Microprocessor fundamentals. Assembly language programming. I/O interfacing. Protected mode operation.
3	EE3003	INTEGRATED ELECTRONICS	3.0	EE2002	Lec: 26 hrs Tut: 13 hrs	Feedback amplifier. Voltage reference and current sources. Operational amplifier circuits. Applications of operational amplifiers. Power supplies. CMOS logic circuits. CMOS flip-flops and memories.
3	EE3011	MODELLING AND CONTROL	3.0	EE2006	Lec: 26 hrs Tut: 13 hrs	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.
3	EE3012	COMMUNICATION PRINCIPLES	3.0	EE2010	Lec: 26 hrs Tut: 13 hrs	Review of signal analysis and noise representations. Linear modulation. Frequency and phase modulation. Digital communication principles.
3	EE3013	SEMICONDUCTOR DEVICES AND PROCESSING	3.0	EE2003	Lec: 26 hrs Tut: 13 hrs	Fundamentals of bipolar devices. MOS devices. Crystal growth and wafer preparation. Deposition techniques. Diffusion and thermal oxidation. Ion implantation. Lithography. Etching.
3	EE3014	DIGITAL SIGNAL PROCESSING	3.0	EE2010	Lec: 26 hrs Tut: 13 hrs	Introduction. Discrete fourier transform (DFT) and fast fourier transform (FFT). Z-transform. Digital filter design.
3	EE3015	POWER SYSTEMS AND CONVERSION	3.0	EE2005	Lec: 26 hrs Tut: 13 hrs	Fundamentals of power systems. System operation and protection. Power conversion. Electromechanical power conversion systems.
3	EE3017	COMPUTER COMMUNICATIONS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Introduction to computer communications. Data communications fundamentals. Data link control. Local area networks. Internetworking.

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3	EE3071	LABORATORY 3	1.0	Nil	Lab: 39 hrs	Laboratory experiments to provide practical application and understanding of theories relating to electrical engineering fundamentals.
3	EE3072	PROJECT	1.0	Nil	Lab: 39 hrs	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.
4	EE4001	SOFTWARE ENGINEERING	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Introduction to software engineering. Software project management. Software requirements and specifications. Software design. Software testing and maintenance.
4	EE4040	ENGINEER AND SOCIETY	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	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.
4	EE4105	CELLULAR COMMUNICATION SYSTEM DESIGN	2.0	Nil	Lec: 13 hrs Tut: 26 hrs	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.
4	EE4152	DIGITAL COMMUNICATIONS	3.0	EE3012	Lec: 26 hrs Tut: 13 hrs	Digital communication principles. Information theory. Error correcting codes. Optimum signal detection.
4	EE4188	WIRELESS COMMUNICATIONS	3.0	EE3012	Lec: 26 hrs Tut: 13 hrs	Types of wireless systems. Radio frequency spectrum. Performance calculations. Cellular radio systems.
4	EE4207	CONTROL ENGINEERING DESIGN	2.0	Nil	Lec: 13 hrs Tut: 26 hrs	Discrete-time control systems. Z-transform. Root locus method. Frequency response method. State space design. Pole placement. State observers. Servo systems.
4	EE4265	PROCESS CONTROL SYSTEMS	3.0	EE3011	Lec: 26 hrs Tut: 13 hrs	Introduction. Process models. Feedback control systems. Complex control structures. Feedback controller design for time delay systems. Advanced control techniques. Process control applications.
4	EE4266	COMPUTER VISION	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Image representation. Preprocessing techniques. Segmentation and representation. Recognition and machine intelligence. Machine vision applications.
4	EE4303	MIXED-SIGNAL IC DESIGN	2.0	EE3003	Lec: 13 hrs Lab: 26 hrs	Mixed-Signal design. Design practice.

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4	EE4340	VLSI SYSTEMS	3.0	EE2004	Lec: 26 hrs Tut: 13 hrs	VLSI system architecture and memory management. Parallel processing. High speed synchronous and asynchronous design. System noise consideration. VLSI system verification and testability. System reliability.
4	EE4341	ADVANCED ANALOG CIRCUITS	3.0	EE3003	Lec: 26 hrs Tut: 13 hrs	Wide-bandwidth amplifiers. Low noise circuits. Power amplifiers. Current-mode circuits. Active filters.
4	EE4503	POWER ENGINEERING DESIGN	2.0	EE3015	Lec: 13 hrs Lab: 26 hrs	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.
4	EE4532	POWER ELECTRONICS AND DRIVES	3.0	EE2005	Lec: 26 hrs Tut: 13 hrs	Introduction to power electronic systems and devices. Uncontrolled and controlled rectifiers. Hard switching power converters. Principles and control of motor drives.
4	EE4533	POWER APPARATUS AND SYSTEM PROTECTION	3.0	EE2005	Lec: 26 hrs Tut: 13 hrs	Power apparatus and transients. High voltage testing and maintenance. Fault analysis. Protection of distribution systems. Protection of power apparatus.
4	EE4645	MICROFABRICATION ENGINEERING	3.0	EE3013	Lec: 26 hrs Tut: 13 hrs	Crystal growth and wafer preparation. Vacuum science and plasma. Rapid thermal processing. Advanced deposition techniques. Process integration. Semiconductor characterization techniques. IC manufacturing.
4	EE4646	VLSI TECHNOLOGY	3.0	EE3013	Lec: 26 hrs Tut: 13 hrs	Advanced MOS structures and process technology. Advanced bipolar transistors and process technology. MOS scaling rules and small geometry effects. CMOS latchup and isolation.
4	EE4717	WEB APPLICATION DESIGN	2.0	Nil	Lec: 13 hrs Lab: 26 hrs	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.
4	EE4761	COMPUTER NETWORKING	3.0	EE3017	Lec: 26 hrs Tut: 13 hrs	Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.
4	EE4791	DATABASE SYSTEMS	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	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.
4	HW310	PROFESSIONAL COMMUNICATION	2.0	HW001	Lec: 12 hrs Tut: 12 hrs	Business writing. Career strategies: résumés, cover letters, interviews. Oral presentation skills. Intercultural communication. Meetings and conflict management.

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5	EE4041	HUMAN RESOURCE MANAGEMENT	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	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.
5	EE4110	OPTICAL COMMUNICATION SYSTEM DESIGN	2.0	Nil	Lec: 13 hrs Tut: 26 hrs	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.
5	EE4153	TELECOMMUNICATION SYSTEMS	3.0	EE3012	Lec: 26 hrs Tut: 13 hrs	Telecommunication networks. Switching and signaling. Line transmission. Microwave communication systems. Optical fibre communication systems and applications.
5	EE4208	INTELLIGENT SYSTEM DESIGN	2.0	Nil	Lec: 13 hrs Tut: 26 hrs	This module covers the design of intelligent systems such as intelligent automation systems, neurofuzzy systems and intelligent vision systems. Currently, the focus is on the design of computer vision systems.
5	EE4268	ROBOTICS AND AUTOMATION	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Introduction to robotics. Coordinate transformation and kinematics. Trajectory planning. Control techniques. Sensors and devices. Robot applications.
5	EE4305	DIGITAL DESIGN WITH HDL	2.0	EE2004	Lec: 13 hrs Lab: 26 hrs	Digital design using hardware description language. Design practice.
5	EE4344	ANALYSIS AND DESIGN OF INTEGRATED CIRCUITS	3.0	EE3003	Lec: 26 hrs Tut: 13 hrs	CMOS device modelling. Current mirrors: operation and design considerations on impedances, accuracy and matching. Layout considerations. Voltage references: voltage and current mode techniques.
5	EE4504	DESIGN OF CLEAN ENERGY SYSTEMS	2.0	EE3015	Lec: 13 hrs Lab: 26 hrs	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.
5	EE4534	MODERN DISTRIBUTION SYSTEMS WITH RENEWABLE RESOURCES	3.0	EE3015	Lec: 26 hrs Tut: 13 hrs	Operation of distribution systems. Power quality. Solar power systems. Wind power systems.
5	EE4613	CMOS PROCESS & DEVICE SIMULATION	2.0	EE3013	Lec: 13 hrs Lab: 26 hrs	Virtual Wafer Fabrication. Virtual Device Characterization. Virtual Process Integration.
5	EE4647	MICROELECTRONIC DEVICES	3.0	EE2003	Lec: 26 hrs Tut: 13 hrs	Bipolar devices. MOS physics. MOSFET device characteristics and modelling. Introduction to heterojunction devices.

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5	EE4706	OBJECT ORIENTED SOFTWARE ENGINEERING DESIGN	2.0	Nil	Lec: 13 hrs Lab: 26 hrs	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.
5	EE4718	ENTERPRISE NETWORK DESIGN	2.0	EE3017	Lec: 13 hrs Lab: 26 hrs	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.
5	EE4758	COMPUTER SECURITY	3.0	Nil	Lec: 26 hrs Tut: 13 hrs	Introduction. Secret / public-key cryptosystems. Secure protocols. Electronic election and digital money. Intrusion detection and database security.
4 & 5	EE4079	FINAL YEAR PROJECT	10.0	Year 4 Standings.	-	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.