

Module Synopsis

Diploma in Engineering (Electrical – Rapid Transit Technology)

This Diploma is offered through **two** distinct pathways:

1. Employee Path (for SBST/SMRT staff only):

Students must complete MC 1 to MC 5 to obtain the *Diploma in Engineering (Electrical – Rapid Transit Technology)*, with MC 4 and MC 5 designated exclusively for SBST/SMRT staff.

2. Public Path:

Open to eligible public applicants. Students must complete MC 1 to MC 3, MC 6 and MC 7 to obtain the *Diploma in Engineering (Electrical – Rapid Transit Technology)*.

MC 1: Modular Certificate in Electrical & Electronic Engineering		(180 hours)
1. ET0805 Electrical Principles		(105 hours)
Covers the basic laws and theorems that govern the operation of electrical circuits. Topics covered include scientific notation, engineering notation, metric prefixes, definitions of energy and power, power sources, measuring instruments, DC and AC concepts, simple series and parallel networks, electromagnetism, inductor, inductance, transformers, Kirchhoff's Voltage and Current Laws, Current and Voltage Divider Rules.		
2. ET0803 Digital Principles		(75 hours)
Covers the principles and design techniques to enable students to design simple combinational circuits using commercial SSI and MSI integrated circuits. Simple sequential logic circuits such as flip-flops and mono-stables are also introduced.		

MC 2: Modular Certificate in Technologies for Rail Engineering		(180 hours)
1. ET0855 Engineering Data Analytics & Industrial Internet of Things		(90 hours)
This module provides students with the concepts of The Internet of Things (IoT), starting with an introduction to various IoT technologies, data sensing and collection, wireless communication, network connectivity, cloud computing and data analysis.		
It provides students with an understanding of the concept of various condition-based asset monitoring techniques at workplace. Students also learn how to determine conditions and identify variances in systems, equipment and components.		
The module also covers the basic of cybersecurity and how it relates to the security and integrity of information and network. The module also introduces to students the characteristics of cybercrime, security principles, technologies and technologies to defend networks.		
The module provides students with the concepts of data analytics in rail engineering, starting with an introduction to the tools for preparation and pre-processing of data, followed by various		

Module Synopsis

Diploma in Engineering (Electrical – Rapid Transit Technology)

analysis tools in the domains of supervised and unsupervised learning. Students will learn how to identify data sets for the application of statistical techniques to analyse and interpret large complex data to uncover trends or patterns in order to locate and define new process improvement opportunities.

2. ET0857 Engineering Asset Management & Operation Technology	(90 hours)
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The module covers the maintenance fundamentals and various maintenance electrical & electronic systems. This module also provides students with the concepts and knowledge on the planning and management of maintenance schedules in accordance to the organisational standards and Original Equipment Manufacturer recommendations at workplace. Topics include work management process, job estimation and prioritisation, backlog management, job plan development, work scheduling and coordination, tracking progress and root cause analysis input.

This module provides students the basic definitions, terminology and principles of Asset Management. Students will learn to identify and manage the expectations of different stakeholders with respect to asset management. The module covers on the knowledge on the structured approach on the formulation and implementation of the organisation's asset management policies to optimise asset life-cycle and performance. Topics include Rail Asset Management, management of electrical & electronic systems and equipment, operations and maintenance and their associated performance, and risks and expenditures over the asset's lifecycle.

MC 3: Modular Certificate in Rapid Transit Technology	(180 hours)
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1. ET0846 Rapid Transit Signalling System	(90 hours)
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Provides students with knowledge of the principles of train control and supervision in an urban transit signalling system. The module covers roles and importance of the Signalling system in Railway Operation, Signalling System configuration, architecture and interfaces with other systems, Signal Interlocking System, Train Supervision System and Train Control System, fundamentals of digital communications and transmission line. Students will have a chance to demonstrate their knowledge of the module by designing and implementing a railway model as their graded assignment.

2. ET0852 Rapid Transit Technology (Application)	(90 hours)
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This module provides students with an understanding of the principles of operation of various technologies within the rapid transit system (RTS). An overview of key features of various sub-systems within the RTS (i.e. Power network, Signalling & Communication, Integrated Supervisory Control System, Permanent Way, Environmental Control System, E&M for Building services, Electrical-Rolling Stock and Automatic Fare Collection) are introduced. With the emerging trend of digital transformation technologies (e.g. IoT, Data Analytics) impacting across all sectors of industry, student will learn the integration of technologies into

Module Synopsis

Diploma in Engineering (Electrical – Rapid Transit Technology)

operations of the RTS to enhance the efficiency, reliability and quality of their operation and services.

MC 4: Modular Certificate in Fundamental Technical Training		(180 hours)
1. ET0821 Rail Systems Maintenance I		(90 hours)
This module provides students with the knowledge, skills and competencies to perform preventive and corrective maintenance activities as well as modification and/or overhaul works on passenger trains and its components. Students will be able to carry out troubleshooting to perform fault analyses, repairing of electronics, electrical and mechanical equipment of passenger trains as well as performing routine vehicle inspections in accordance to maintenance procedures and instructions.		
2. ET0822 Workplace Safety & Health I		(45 hours)
This module provides students the abilities to identify and manage risks associated with fatigue within the work environment to ensure all personnel are fit to perform assigned duties, maintain Workplace Safety and Health (WSH) standards and practices when working at heights by establishing safety protocols and complying with regulatory and other Work at Height (WAH) and WSH requirements. Implement safety procedures and risk control measures in a public transport workplace environment and public access areas to ensure safety of staff and commuters. Assess casualties and apply first aid, Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillator (AED) skills and abilities in the workplace.		
3. ET0823 Rail Operation		(15 hours)
This module equip students the skills as Communication Controller to keep track of daily rail operations activities and supports the Operations Control Centre (OCC) in executing its tasks and requirements. Student will be able to monitor passenger activities and train operations to monitor passenger activities and train operations via close-circuit television (CCTV), and communication and alert systems, to provide train service information and updates to commuters and the public Student will possess excellent communication skills, and is able to succinctly disseminate train service information in real-time and under pressure. He is savvy in operating a range of surveillance and broadcast communication equipment.		
4. ET0834 Maintenance Management		(30 hours)
This module provides the students how to prepare organisational budgets to support short- and long term business plans through forecasting, allocation and financial policy setting. Learn to develop and implement business continuity plans for organisational preparedness of disruptive events. Manage organisational change management systems to drive organisation success and outcomes by preparing, equipping and supporting adoption of change. Students have the		

Module Synopsis

Diploma in Engineering (Electrical – Rapid Transit Technology)

capability to identify data sets for the application of statistical techniques to analyse and interpret large complex data to uncover trends or patterns in order to locate and define new process improvement opportunities. Write reports using terminology appropriate to the reader as well as identify requirements for written reports

MC 5: Modular Certificate in Advanced Rapid Transit Technology		(180 hours)
1. ET0835 Rail Systems Maintenance II		(90 hours)
This module provides students with the knowledge, skills and competencies to perform preventive and corrective maintenance activities as well as modification and/or overhaul works on passenger trains and its components. Students will be able to carry out troubleshooting to perform fault analyses, repairing of electronics, electrical and mechanical equipment of passenger trains as well as performing routine vehicle inspections in accordance to maintenance procedures and instructions. Students will be confident to manage the operations of train stations to achieve rail service continuity, safety and reliability.		
2. ET0836 Workplace Safety & Health II		(30 hours)
This module provides the knowledge to create and maintain a Workplace Safety and Health culture based on a common set of attitudes, behaviours, and competencies. Student will be able to perform duties with proper supervision and safety precautions, when working in confined spaces and manage safety to minimise risks and hazards when performing electrical-related maintenance activities. Students will learn to formulate and execute fire safety protocols and processes to minimise risk posed to customers during emergency situations involving fire and Investigate Workplace Safety and Health incidents and accidents based on root cause analysis and identification of corrective actions to prevent recurrences.		
3. ET0837 Process Improvement & Business Management		(30 hours)
This module prepares our student to develop resource allocation plans and implementation of strategies and policies. Formulate the strategies policies that are forward looking and focuses on bottom line results. Student will be able to build actionable organisation strategy plan and policies that are forward looking, anticipate strategic risks and focus on bottom line results. Student will possess excellent communication skills, and is able to succinctly disseminate train service information in real-time and under pressure. He is savvy in operating a range of surveillance and broadcast communication equipment.		
4. ET0838 Critical Core Skills (Leadership)		(30 hours)

Module Synopsis

Diploma in Engineering (Electrical – Rapid Transit Technology)

Student will learn how to formulate and implement inventory management strategies targeted at ensuring availability of equipment, tools and materials for maintenance work. Equip with the skills to manage vendor by ensuring adherence to contract terms and organisation safety and operating requirements.

MC 6: Modular Certificate in Automation & Electrical Installation		(180 hours)
1. ET0818 PLC Applications		(90 hours)
Topics covered include PLC architecture, input and output connection, device selection, programming, testing and troubleshooting. PLC programming language will cover standard languages including ladder logic, function blocks and structured texts.		
2. ET0850 Electrical Installation Design		(90 hours)
This module will cover the basic knowledge and practical skills in the application and safe use of electrical energy and services in domestic, commercial and industrial buildings. The main topics to be covered include an overview of the power generation, transmission and distribution system, electrical safety and protection principles, analyze and design electrical systems based on the relevant codes of practices, and the principles on the testing and troubleshooting of electrical installation circuits. Novel technology in electrical installation, such as the KNX system, will also be covered.		

MC 7: Modular Certificate in Networks & Smart Sensors & Actuators		(180 hours)
1. ET0858 Networks & Protocols		(90 hours)
This module covers the introduction of networks protocols using TCP/IP, and the concepts and techniques used in the various networks. It aims to provide the students with the fundamental knowledge for Broadband Communications module.		
2. ET0828 Smart Sensors & Actuators		(90 hours)
This module aims to provide students with a broad knowledge of various types of smart sensors and an in-depth understanding of the principle & application of smart sensors & actuators in automation and process industries. Application of smart sensors in providing increased automation, improved communication and monitoring, along with self-diagnosis and new levels of analysis to provide a truly productive future will be covered in the module.		
The coverage of this module includes overview and fundamentals of sensors and actuator system, principle and concept of smart sensors, operating principles of actuators, industrial process instruments, data sensing and analysis, signal conditioning techniques and finally smart sensors application in advanced manufacturing.		