DIPLOMA IN ENGINEERING INFORMATICS (EI)
(3-YEAR COURSE)

SCHOOL OF ENGINEERING

The **Diploma in Engineering Informatics (EI)** prepares students for a career in designing, developing, maintaining and integrating IT-based applications and information systems. The School leverages on its expertise and curriculum strengths to produce IT professionals who meet the demands of the large IT-driven engineering and manufacturing industries. Students undertake broad-based and hands-on training in IT, engineering systems and applications. They learn about e-enterprise processes, various manufacturing processes and technical skills to harness the power of information and Internet technologies. The course also equips students with software skills in, for example, computer programming, software design, web services, web design, multimedia and business processes.

In their final year, students can choose to go on an industrial attachment, locally or overseas, or take on an in-house project. The industrial attachment allows students to apply the knowledge acquired to real-time working environments, while project work offers opportunities to develop innovations and collaborate on industry-linked programmes at our Technology Centres.

The course also caters for students who aspire to pursue further studies or work in non-engineering fields through the Diploma Plus Programme (DPP). This is an optional programme that aims to provide students with the opportunity to broaden their knowledge and deepen their skills in specific areas. Students can graduate with a Diploma Plus Certificates or Enhancement Certificates.

ENTRY REQUIREMENTS

To be eligible for consideration, candidates must have the following GCE 'O' Level examinations (or equivalent) results:

Subject	'O' Level Grade
English	1-7**
Mathematics (Elementary/Additional)	1-6
Science (with Physics or Chemistry or Biology component) or Design & Technology	1-6

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science or Design & Technology and two other subjects.

**Candidates with English as a second language (EL2) must have attained a minimum grade of 6.

DIPLOMA IN ENGINEERING INFORMATICS (EI) (3-YEAR COURSE)
SCHOOL OF ENGINEERING

CAREER PROSPECTS

With the knowledge and skills in both IT and engineering, EI graduates can look forward to good career prospects in IT-driven companies in, for example, the chemical, pharmaceutical, healthcare, electronics and manufacturing-related sectors.

Companies employ EI graduates as IT professionals to help the former to realise their IT goals, or as Internet Applications Specialists, Network Support Specialists, System Integrators, Computer-Aided Design/Manufacturing System Administrators, Engineering Applications Programmers, IT Engineers, Project Leaders, Computer Programmers and Management Information System (MIS) Specialists.

ACCREDITATION FOR FURTHER STUDIES

The Nanyang Technological University, National University of Singapore, Singapore Management University, and a number of universities in Australia and the United Kingdom have offered EI graduates advanced standings for entry into their IT-related and engineering degree courses.

COURSE STRUCTURE

FIRST-YEAR MODULES

Level 1.1
- Engineering Mechanics
- Programming Fundamentals
- Engineering Mathematics 1
- Manufacturing Technology & Materials
- Creativity & Applied Thinking Skills^
- Sports & Wellness^

Level 1.2
- Operating Systems & Networking
- Object-Oriented Programming
- Engineering Mathematics 2
- Web Publishing
- Individual & the Community^
- Communication Toolkit^

SECOND-YEAR MODULES

Level 2.1
- Database Systems
- Software Engineering
- Circuit Analysis
- Engineering Mathematics 3B
- Product Modelling & Realisations
- Any 2 Interdisciplinary Studies (IS) modules^

Level 2.2
- Automation Technology
- Project Management
- Web Applications Development
- Business Information Systems
- Digital Electronics & Computer
- Innovation & Enterprise in Action^

FINAL-YEAR MODULES

Level 3.1
- Process Control Systems
- Embedded Mobile Systems
- E-Applications & Security
- Wireless Networking & Applications
- World Issues: A Singapore Perspective^
- Any 1 Interdisciplinary Studies (IS) module^

Level 3.2 (Pathway 1)
- Industrial Attachment Programme (IAP)/Final-Year Project or
- In-House Project (IHP)/ Final-Year Project

ACROSS-LEVEL MODULES (LEVEL 1.2 ONWARDS)

- Any 2 School of Engineering (SoE) elective modules°

^ Denotes Interdisciplinary Studies (IS) module. For more details on IS modules, please log on to http://www.np.edu.sg/is/

° Students take two elective modules to complete their diploma. Electives are chosen and customised from a wide range of clusters under the Engineering and Non-Engineering categories.

COURSE MODULES

LEVEL 1.1

Engineering Mechanics
Students learn to analyse problems in engineering mechanics based on basic principles and concepts such as equilibrium, friction, and Newton's laws of motion. This module covers both statics and dynamics with emphasis on free-body diagrams, and application of basic principles to solve engineering problems.

Programming Fundamentals
This module teaches students to use programming tools in problem solving. Topics covered include roles of programming language, development environment of C# and Java, language statements and compound statements, control structures and loops, simple input and output array, programming concepts, methodology and program testing. Students learn through hands-on exercises and mini-projects.

Engineering Mathematics 1
This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include algebra, trigonometry, logarithms, matrices and complex numbers.

Manufacturing Technology & Materials
This module examines the manufacturing technology employed in discrete and process industries, and introduces engineering materials used in the industries. Topics include classification, properties, testing and applications of common engineering materials and polymers, concepts of machining, and various processes. Quantitative analysis of manufacturing systems, functions and activities, types of manufacturing systems, plant layout, and production planning and control are also taught.

LEVEL 1.2

Operating Systems & Networking
This module surveys various types of operating systems, their roles and functions, including commonly used operating system commands and simple scriptwriting, and introduces students to inter-networking with the use of routers. Topics covered in computer networking include various types of transmission media, data communication protocol, layered protocol concepts, network topologies, introduction to Transmission Control Protocol/Internet Protocol and Wireless Application Protocol, and network connection devices. Students will be involved in lab activities such as setting up a basic LAN configuration.

Object-Oriented Programming
This module introduces students to the concepts and skills of object-oriented programming using Java programming language. Concepts of object-oriented programming include abstraction, encapsulation, inheritance and polymorphism. Students learn how to implement these concepts in Java through hands-on practices and mini-projects.

Engineering Mathematics 2
This module is designed to provide students with the fundamental skills in Mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include trigonometry, coordinate geometry, differentiation and integration with applications.

Web Publishing
This module is designed to equip students with the skills to develop static Web pages using Web development tools. Topics covered include an introduction to the Internet, Internet architecture, Hyper Text Markup Language and client-side scripting language.

LEVEL 2.1
Database Systems
This module aims to equip students with a knowledge of the fundamental concepts, design, management and applications of database systems. Topics covered include database concepts, storage structures, Entity-Relationship data modelling, relationships model of data, normalisation, structure query language, database administration and database applications development.

Software Engineering
This module provides an introduction to the fundamentals of developing and delivering useful software through an object-oriented approach in analysis, design, testing and implementation. Also covered are the concepts of software life cycle and process, and the tools and techniques used in software development. The unified modelling language (UML) will be used in modelling and developing the software system that involves UML diagrams such as the use case diagram, class diagram, interaction diagram, sequence diagram and activity diagram.

Circuit Analysis
This module provides students with a basic knowledge in DC and AC circuit analysis as well as an introduction to analogue electronics devices and circuits to prepare them for modules dealing with computer interfacing and controls in the later part of the course. Topics include Ohm's Law, Kirchhoff's Voltage and Current Laws, DC series and parallel circuits, AC concepts and circuits, capacitors and inductors. Students are also introduced to commonly used analogue devices and circuits, such as diodes, semiconductors, transistors, operational amplifiers and their practical applications.

Engineering Mathematics 3B
This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include integration with applications, differential equations, Laplace transform, probability and statistics.

Product Modelling & Realisations
This module equips students with a fundamental knowledge of graphics, using 3D parametric modelling software to create 3D model and engineering drawing for manufacturing. Computer-Aided Engineering and Computer-Aided Manufacturing technologies will be used to simulate, analyse and generate manufacturing data to create products. It also covers the concept of a product life cycle and an overview of rapid prototyping.

LEVEL 2.2
Automation Technology
Students gain a broad-based understanding of logic and sequential controls, and their applications in the manufacturing and process industries. Topics include the hardware components used in automated systems, and developing programmable solutions for applications. Widely accepted industrial control programming standards will be covered, in conjunction with lessons on programming controllers and computer interfaces. Essential concepts, technologies and applications of industrial networking for equipment and device linking in manufacturing will also be addressed.

Project Management
This module introduces project management from both the engineering and software perspectives. Topics include project evaluation, selection, estimation, activity planning, resource allocation, monitoring and control, managing people and teams, software quality and standards. Project management tools are taught during the practical lessons.

Web Applications Development
This module aims to introduce server-side Web development with a focus on ASP.NET and C# as the platform and language for Web development. Topics include Web development architecture, Web-form, ASP.NET programming, state management, database accessing, validation and error handling, XML programming and Web service programming.

Business Information Systems
This module introduces students to the role information systems plays in business organisations, particularly in the manufacturing industry. In this module, the students will discover the common functions in business organisations, business models, organisational and enterprise-wide information systems, information system ethics, and the use of an Enterprise Resource Planning System Software.

Digital Electronics & Computer
This module equips students with knowledge of binary systems and logic, and their applications in electronic devices such as the basic Boolean gates, flip-flop, encoders/decoders, and adders. Digital circuitry, storage, input/output interfacing and computer architecture will be covered. Students are also introduced to assembly language programming.

LEVEL 3.1
Process Control Systems
This module equips students with core knowledge of how automated control systems and computer controls are implemented in process plants. It covers fundamental concepts and components of feedback control, system dynamics, Proportional, Integral, Derivative (PID) control modes, Fuzzy logic control, advanced control strategies, introduction to digital control techniques, computer interfaces and computer control of processes and field bus technology. Certain industrial standards such as Standard for the Exchange of Product Model Data (STEP) are also taught.

Embedded Mobile System
This module helps students to develop embedded applications for mobile system hardware platforms such as the Wavecom's WISMO using the Open AT® development tool kits. Topics include infrastructure of mobile networks such as the GSM and GPRS, architecture of embedded mobile hardware platforms, Open AT® commands structures and applications, and development of software and applications using the Open AT® Development Tool kit.

E-Applications & Security
This module provides a fundamental knowledge of the role, operations and issues of e-commerce and e-manufacturing in the modern Internet economy, and the technology and tools to ensure secure transactions over the Internet. Topics include the e-Commence business model, functions and components of a typical e-commerce application, e-manufacturing concepts, e-manufacturing implementations, social and legal issues relating to e-applications, cryptographic technology, digital certificates, Secure Socket Layer (SSL) and Secure Electronic Transaction (SET).

Wireless Networking & Applications
This module teaches the fundamentals of wireless communication and networking. The key aspects covered include technology, architecture, types of wireless networks and applications, as well as mobile devices such as mobile phones and Personal Digital Assistants (PDA). Students learn to develop mobile-based applications and services using various software development tools.

LEVEL 3.2
Industrial Attachment Programme (IAP)/Final-Year Project or In-House Project (IHP)/Final-Year Project
The six-month, full-time placement-cum-project module or the six-month, full-time in-house development project module provides students with opportunities to apply the skills and knowledge gained from the various modules in the development of a software or IT-integrated system to solve practical problems. Students are expected to analyse the problem as well as design, document, implement and test the system. They also have to review the project process and product.

ACROSS-LEVEL MODULES (LEVEL 1.2 ONWARDS)
School of Engineering Elective Modules and the Diploma Plus Programme
Students take two modules from a wide range of clusters under the engineering and non-engineering categories to complete their diploma. Furthermore, students can qualify for a Diploma Plus by simply topping up with two additional modules from the same cluster as one of the electives. The Diploma Plus Certificate helps students if they wish to pursue a university degree or increase their employability in discipline-specific areas. Students can choose electives from the range listed below.

Engineering Category
- Advanced Engineering Mathematics Cluster*
- Aerospace Design Cluster
- Applied Physics Cluster*
- Applied Technology Cluster
- Biomedical Engineering Cluster
- Industrial Control Cluster
- Industrial Electronics Cluster
- Information Technology Cluster
- Mechanical Technology Cluster
- Telecommunication Distribution Technology Cluster
- Workplace Safety & Health Cluster

Non-Engineering Category
- Economics & Financial Applications Cluster
- Green Development Cluster
- Leisure & Retail Management Cluster

Other Available Diploma Plus Certificates
- Business
- Innovation Management
- Languages (Japanese)

*Designed in collaboration with the Department of Electrical and Computer Engineering, National University of Singapore (NUS). The syllabus is based on the first-year engineering mathematics and science curricula of NUS.

For detailed module descriptions under each cluster, please refer to page 182.

COURSE CURRICULUM

Module No.	Module Name	Credit Units
	YEAR 1	
	Level 1.1 (24 hours per week)	
1.	Engineering Mechanics	5
2.	Programming Fundamentals	6
3.	Engineering Mathematics 1	5
4.	Manufacturing Technology & Materials	4
5.	Creativity & Applied Thinking Skills^	2
6.	Sports & Wellness^	2
	Level 1.2 (24 hours per week)	
7.	Operating Systems & Networking	5
8.	Object-Oriented Programming	5
9.	Engineering Mathematics 2	5
10.	Web Publishing	5
11.	Individual & the Community^	2
12.	Communication Toolkit^	2
	YEAR 2	
	Level 2.1 (25 hours per week)	
13.	Database Systems	5
14.	Software Engineering	4
15.	Circuit Analysis	5
16.	Engineering Mathematics 3B	4
17.	Product Modelling & Realisations	3
18.	Interdisciplinary Studies (IS) module^	2
19.	Interdisciplinary Studies (IS) module^	2
	Level 2.2 (25 hours per week)	
20.	Automation Technology	4
21.	Project Management	4
22.	Web Applications Development	5
23.	Business Information Systems	3
24.	Digital Electronics & Computer	5
25.	Innovation & Enterprise in Action^	4
	YEAR 3	
	Level 3.1(21 hours per week)	
26.	Process Control Systems	5
27.	Embedded Mobile System	4
28.	E-Applications & Security	4
29.	Wireless Networking & Applications	4
30.	World Issues: A Singapore Perspective^	2
31.	Interdisciplinary Studies (IS) module^	2
	Level 3.2 (25 hours per week)	
32.	Six-month Industrial Attachment Programme (IAP)/ Final-Year Project	25
	Across-Level Modules (Level 1.2 onwards) (6 hours per week)	
33.	School of Engineering (SoE) elective module°	3
34.	School of Engineering (SoE) elective module°	3

Notes:

^ For more details on Interdisciplinary Studies (IS) modules, please log on to www.np.edu.sg/is/

° For more details on School of Engineering elective modules, please refer to page 182.

IS Modules

The School of Interdisciplinary Studies (IS) delivers the interdisciplinary curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge-based economy. IS modules challenge boundaries and offer insights into Communication, Entrepreneurship, Life Skills, Media & the Arts, and Science & Technology.

School of Engineering (SoE) Elective Modules

The SoE elective modules fall under a wide range of clusters under both Engineering and Non-Engineering categories. The aim is to provide students with the opportunity to broaden their knowledge and deepen their discipline-specific areas. Each cluster comprises a minimum of three 3-hour modules. Students are required to take two modules in order to satisfy the minimum graduating requirement.