

## INFOCOMM TECHNOLOGY

ICT diplomas are internationally recognised, making it easy for our graduates to secure advanced standing at many good local and overseas universities.

ICT courses are well-known for being relevant, rigorous and of high quality. The School regularly reviews and updates our curriculum to keep pace with current developments in the field. The School's courses undergo stringent review and approval by an Advisory Committee consisting of high-standing industry representatives. Students enjoy a total learning experience in a collegial atmosphere, with the flexibility to specialise in niche areas of IT, while broadening their perspective with a selection of interdisciplinary studies modules.

### COURSES OFFERED

ICT offers the following courses to meet industry demand for specialist IT manpower as well as academic progression:

- Diploma in Enterprise IT Systems (EIT) **NEW**
- Diploma in Information Technology (IT)
- Diploma in Mobile Business Solutions (MBS)
- Diploma in Multimedia & Animation (MMA)
- Specialist Diploma in Data Communications & Networking (SD-DCN)

### MAJOR ACHIEVEMENTS

#### IT Award Winners

ICT students have proven their prowess in both national and international IT competitions and awards. Some of the recent major achievements are outlined below:

- **Sangar Annadorai** (IT, Class of 2006) clinched the National IT Youth Award 2007. This prestigious national award is given to youth below 25 years old, who clearly exemplify personal qualities of leadership and inspiration; who have demonstrated a commitment to IT and its activities, contributed significantly to their organisations and the IT community, and who have used IT in an innovative way.
- Within a span of six years, Ngee Ann has produced four National IT Youth Award winners (2001, 2002, 2005, 2007) and 2 finalists (2004, 2006).
- **Edward Lay Yong Shun** (IT, Class of 2007) was crowned World Champion in the World Microsoft Office Academic Skills Challenge 2006, (Expert Level, Microsoft Word category), after emerging as National Champion in the local competition. Edward was also presented with the Northwest CDC Outstanding All-Rounder Students Awards (OARS).
- **Huang Yipeng** (IT [MBC], Class of 2007), the Diploma in IT (Mobile Business Computing) IDA Gold Medalist 2007 was awarded the prestigious Lee Kuan Yew Award 2007 for his outstanding performance.

Today, Infocomm Technology (IT) has pervaded all aspects of our lives and transformed the world's economies, giving rise to Microsoft, Yahoo!, eBay, Google, YouTube, Wikipedia, Second Life, MySpace, MMOG Games and many others. IT has created a level playing field for technocrats with creative ideas; allowing many of them to become multi-millionaires.

Ngee Ann Polytechnic's **School of InfoComm Technology (ICT)** is a leader in providing quality IT education. Established in 1982, ICT has nurtured more than 8,000 IT professionals. Many of ICT graduates have assumed influential positions in various organisations in different job capacities. Some have even started their own IT ventures.

ICT has the reputation for delivering a broad-based, holistic IT education that is industry-relevant and technology-focused, fun and yet empowered to provide business solutions that are highly innovative and creative.



- **Frankie Wong Fai Kit** and **Kenny Koh Wei Kien** (IT, Class of 2008) won the PC Magazine Inter-Poly SOHO Networking Competition. They scored impressively with their good wireless network security measures of VPN implementation and sound network architecture design.
- ICT was declared the National Champion in the first-ever National Infocomm Competition (NIC) 2006 for the Institute of Technical Education-Polytechnic category. NIC is a series of infocomm-themed competitions focusing on areas such as business IT, digital media, mobile technology, programming and security. The prize included a fully sponsored trip to Microsoft Redmond Campus, USA where the students met Mr Bill Gates.

### Scholarships for Academic Progression

- In 2007: **Lau Wei Lun** (IT [MBC]), Class of 2007, IDA Silver Medalist 2007) was awarded the DSTA Scholarship to study for a computing degree after National Service (NS).
- In 2006: **Tan Shu Ren** (IT, Class of 2006, IDA Gold Medalist 2006) was awarded the IDA overseas scholarship to study IT in an overseas university after his NS.
- In 2006: **Aaron Tan Wei Cheng** (IT, Class of 2004, World Champion WSS 2005, IT Youth Award 2005) was awarded the SMU scholarship on a fast-track four year programme for a degree at SMU's School of Information Systems and a Masters at Carnegie Mellon University (CMU).
- In 2006: **David Chung** (IT, Class of 2004, IDA Gold Medalist 2004) won a DSTA scholarship to study for a Computer Science degree at NUS in 2006 with direct entry to the second year.
- In 2005, seven outstanding students received scholarships from Hewlett-Packard, Sun Microsystems, Microsoft Singapore, and Singapore Infocomm Technology Federation.

### FACILITIES & STAFF

Our staff are dynamic IT professionals and passionate educators with infocomm and digital media qualifications, and industry experience. Several lecturers have authored books, reference texts, journal articles and conference papers in various fields of IT expertise. A number of our staff have experience in starting up IT ventures and managing IT-related businesses.

ICT is well-equipped with extensive, state-of-the-art computing resources, supported by local area networks in an open systems environment. The School uses the latest industry-standard software for teaching and coursework. Some of these software are installed in students' notebooks while other more advanced software are made available in the School's specialised labs.

The School's specialised labs are for development in niche areas. For example, the specialised networking labs are used for hands-on practical training and development purposes. Each lab is individually configured to expose students to the latest networking technologies. ICT was the first tertiary institution to set up the Certiport Centre with NTUC CertCentral to facilitate the Microsoft Office Specialist certification.

ICT's technology hubs - eGarage® and the Multimedia & Animation Centre are collaborations with industry partners. The hubs were set up to nurture the students' spirit of innovation and enterprise by allowing them to experiment and create using emerging technologies in collaboration with staff and industry experts. The industry experts provide the real-world problems and requirements they face in business areas. ICT jointly scopes out applied research and development projects to challenge and further bring out students' potential. For example, ICT students work on real-world projects for the hotel industry with mentorship from the Millennium & Copthorne International as well as real-world projects for the medical field with mentorship from the National University Hospital.

### INDUSTRY COLLABORATIONS

The School enjoys strategic links with industry by engaging in applied research and consultancy projects, and playing a proactive role in mutually beneficial partnerships and collaborations. We also provide market-oriented continuing education and customised training through collaborations with industry.

ICT diplomas are developed with industry inputs, and with the IDA and MDA master plans in mind. The School regularly reviews its courses and updates its curricula to keep pace with changes in the industry. For example, in the latest Diploma in Enterprise IT Systems, the world's market leader in Enterprise Resource Planning (ERP) – SAP is used to demonstrate how basic business processes are represented and integrated in a real-world business setting. In a role-simulation environment, students can see and learn the best practices of how business processes are integrated across the various business functions – including human resource, finance, sales, inventory and delivery, for competitiveness.

Students and teaching staff are placed on industrial attachments to expose them to business practices, and go on overseas trips or attachments to gain global exposure. Students are also given opportunities to be attached with our industry partner organisations both locally and globally to work on their final-year projects. ICT also conducts student exchange programmes with universities such as the Zhejiang University City College in China, thus allowing students to attend classes and undertake projects in a foreign university setting.

As a leading IT educational institute, the School identifies emerging technologies and pioneers their adoption and implementation. For example, Ngee Ann was the first tertiary institute to pilot the use of wireless IP telephony in a large-scale, real-life environment through a partnership with Cisco Systems. Students have the opportunity to develop IP telephony applications.

ICT has also established a campus grid that is linked with the National Grid Pilot Platform, Singapore's cyber-infrastructure that connects technical computing resources around Singapore for academia, research and industry.

The School has set up the RHyMeS (RFID Hospitality Management Systems) Centre, the first RFID R&D centre in Asia-Pacific that focuses on lifestyle, tourism and hospitality management. This collaboration with Motorola Electronics, Sun Microsystems, Millennium & Copthorne International aims to develop innovative applications that enhance service, enrich experience, and improve operational effectiveness and efficiency in hotels using radio-frequency identification (RFID) and complementary technologies.

NEW!

## DIPLOMA IN ENTERPRISE IT SYSTEMS (EIT) (3-YEAR COURSE)

SCHOOL OF INFOCOMM TECHNOLOGY



The **Diploma in Enterprise IT Systems (EIT)** prepares students for business-oriented Information Technology (IT) careers in key industry sectors such as the banking & financial services, and the healthcare sectors. With IT skills and a deep understanding of business analysis, students will be well-positioned to add value to business process improvements and IT projects in the various industry sectors.

The course provides a strong foundation in the fundamentals of IT, including information systems analysis and design, software development, computer architecture, networking, and IT systems management. This foundation serves as a cornerstone on which the business domain knowledge of industry sectors, such as banking & financial services and healthcare, sectors are built. Students are equipped with skills in business process design, and the management and integration of enterprise technology to enhance business competitiveness in various industries. In the final year, students undertake an Industrial Attachment Programme to gain first-hand working experience in the relevant industry sector.

EIT graduates are well-prepared to choose technically-oriented or business-oriented careers in IT. They will be able to:

- Use knowledge of Information Technology and Information Systems, and systems integration/configuration skills to add value to banking & finance, and healthcare sectors;
- Gain a strong understanding of enterprise-level business processes, software methodology and resource planning, which can simplify and accelerate system and software implementation for companies, whether small and medium enterprises or multinational corporations.

Students also take several Interdisciplinary Studies (IS) modules to broaden their minds and nurture a spirit of innovation and enterprise. This is important for EIT professionals working in a complex business environment, where problems are multi-faceted in nature and require knowledge and skills in different disciplines.

### ENTRY REQUIREMENTS

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

Subject	'O' Level Grade
English (EL1)	1-7
Mathematics (Elementary/Additional)	1-6
Any two other subjects	1-6

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science (Grade 1-9) or Design & Technology (Grade 1-9) and two other subjects.

Candidates with severe vision deficiency should not apply for the course.

### CAREER PROSPECTS

Our graduates can apply for jobs as Software Application Developer, User Support Officer, Business Analyst, and IT Support Consultant, among others. They can further their careers after gaining project implementation experience and relevant industry certification to become members of Best Practice project teams, application consultants, solution architects, pre-sales or channel managers.

### ACCREDITATION FOR FURTHER STUDIES

The Diploma in Enterprise IT Systems is internationally recognised. Graduates enjoy advanced standing when they apply to degree programmes at many local and overseas universities.

## COURSE STRUCTURE

### FIRST-YEAR MODULES

#### Level 1.1

- Fundamentals for IT Professionals
- Fundamentals of Programming
- Computers & Operating Systems
- Business Statistics
- Enterprise Information Systems
- Creativity & Applied Thinking Skills<sup>^</sup>
- Sports & Wellness<sup>^</sup>

#### Level 1.2

- Enterprise Systems Analysis & Design
- Networking Fundamentals
- Object-Oriented Programming
- Accounting & Financial Management
- Individual & the Community<sup>^</sup>
- Communication Toolkit<sup>^</sup>

### SECOND-YEAR MODULES

#### Level 2.1

- Developing Web Applications
- Enterprise Project Management
- Enterprise Business Processes
- Databases
- Any 2 Interdisciplinary Studies (IS) modules<sup>^</sup>

#### Level 2.2

- Enterprise Resource Planning
- Customer Relationship Management
- Elective 1#
- Elective 2#
- Elective 3#
- Innovation & Enterprise in Action<sup>^</sup>

### FINAL-YEAR MODULES

#### Level 3.1

- Elective 4#
- Elective 5#
- Elective 6#
- Elective 7#
- World Issues: A Singapore Perspective<sup>^</sup>
- Any 1 Interdisciplinary Studies (IS) module<sup>^</sup>

#### Level 3.2

- Industrial Attachment Programme

In the second year, students may opt to specialise in one of the following options:

#### Banking & Finance

- Economics
- Financial Markets & Services
- Financial Planning
- Secured & Smart Banking
- Banking & Financial Applications
- Business Intelligence
- IT Outsourcing
- Principles of Marketing

#### Healthcare

- Electronic Health Records & Standards
- Healthcare Systems
- Medical Informatics
- Anatomy & Physiology
- Pathophysiology & Pharmacology
- Ethics in Healthcare
- IT Outsourcing

# The specialisation options offered and their associated electives are reviewed regularly and subject to updates to ensure industry relevance.

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

## COURSE MODULES

### LEVEL 1.1

#### Fundamentals for IT Professionals

This module gives a broad introduction to the field of IT by exploring the roles, professional practice, ethical expectations and development paths of IT professionals. Students will appreciate the importance of problem-solving skills in providing effective IT solutions. They will see how interpersonal and teamwork skills can help build relationships with users, facilitate meetings, influence users in requirements definition, and help them participate as effective members of a systems development team.

### Fundamentals of Programming

This module teaches programming fundamentals, including data types and variables, statements and compound statements, expressions, selection and repetition, simple computation and library use. Other key topics include the development of test cases and test plans, and providing suitable programme documentation, with Java programming language used to illustrate programming concepts. Students will also learn how to apply problem-solving skills and get ample practice in expressing solutions using Java.

### Computers & Operating Systems

This module surveys the basic architecture and functions of a computer system, including input/output devices, data representation, file permissions and operating systems. Students get hands-on experience in using system commands and writing simple shell code to tailor the system environment to the needs of software application development.

### Business Statistics

This module explores how business problems can be solved by applying statistical principles. The main emphasis is to provide students with some basic mathematical skills to handle numerical information in a business context, such as presenting and interpreting statistical data by using means, measures of dispersion, and graphs. Topics covered include fundamentals of statistics and probability, discrete and continuous probability distributions, estimation, and correlation.

### Enterprise Information Systems

This module provides students with an understanding of the use of Enterprise Information Systems in organisations, and the information requirements in a typical organisation. Students will learn how Enterprise Information Systems help organisations gain competitive advantage over its competitors, and how the transformation of organisations leads to changes in the organisations' IT systems.

### LEVEL 1.2

#### Enterprise Systems Analysis & Design

This module introduces students to the concepts and methodology of developing an enterprise system, and modelling it to reflect the business needs. Students are taught how to analyse business problems and gather requirements from business users before applying effective design and implementing solutions to meet business requirements.

### Networking Fundamentals

This module provides an overview of networking. Key topics covered include layering, protocol stacks, network topologies, the Open Systems Interconnection (OSI) model, Transmission Control Protocol/Internet Protocol (TCP/IP), complex data networks and commonly used network systems such as Ethernet and Token Ring. An overview of Internetworking and telecommunications will also be presented to give students a global picture of how the connections of homogenous and heterogeneous networks are established in the real world.

### Object-Oriented Programming

This module builds on the knowledge and skills acquired in the Fundamentals of Programming module. It provides opportunities for students to develop medium-scale applications based on the Object-Oriented (OO) approach. Topics include Abstract Data Types (ADTs), the implementation of selected ADTs using the OO approach, and suitable sorting and search algorithms. Software robustness and correctness, and good programming practices will be emphasised.

### **Accounting & Financial Management**

This module introduces the basic theory and concepts of the principles of accounting and financial management. It introduces students to the different accounting documents that are used in typical organisations, and the different types of financial entries. Students learn how to analyse business transactions and financial documents. In the area of financial management, students will acquire a basic understanding of the acquisition and allocation of funds in a business and the different methods of capital investments and capital budgeting.

### **LEVEL 2.1**

#### **Developing Web Applications**

This module arms students with the knowledge and skills needed to develop Web applications. Students learn to use the latest Web technologies such as Microsoft's .NET framework to develop effective Web applications. Students also acquire the technical skills of server-side programming to create Web-based forms, perform state management, access data and validate user input.

#### **Enterprise Project Management**

This module introduces the basic concepts and methodology involved in planning and managing enterprise information systems projects. It will introduce the various stages of the project cycle and its deliverables. Students also learn how to manage project quality and risk in the project implementation life cycle.

#### **Enterprise Business Processes**

This module introduces students to the structure of an organisation and relates it to the job responsibilities of each department. The associated business process, which includes sales, purchasing, inventory management and finance, will be discussed. Students learn about the flow of information within an organisation and the tight linkages between departments in an organisation. Students will get a chance to be involved in business process modelling to reinforce their understanding of the different roles played by employees in organisations.

#### **Databases**

This module examines the fundamental principles and concepts of database systems that store and structure an organisation's information to drive its business functions. Students will learn to analyse data and perform data modelling and normalisation to design an effective database using relevant theories and concepts of relational database systems.

### **LEVEL 2.2**

#### **Enterprise Resource Planning**

This module introduces students to the basic concepts of an Enterprise Resource Planning system and its basic functions. Students will be able to have practical hands-on experiences in business processes such as sales and marketing, procurement, inventory management and finance using the ERP software. The module will demonstrate the integration of business processes within an organisation.

#### **Customer Relationship Management**

This module provides students with a knowledge and understanding of Customer Relationship Management and how it benefits organisations. Students learn about the different usage of CRM in organisation, the various CRM strategies and how to manage customer information to protect privacy of data.

### **LEVEL 3.1**

**(The modules in Levels 3.1 & 3.2 are offered on an interchangeable basis.)**

### **ELECTIVES FOR THE HEALTHCARE SPECIALISATION**

#### **Electronic Health Records & Standards**

This module provides students with an understanding of the use of information technology to transmit health records across healthcare organisations. It introduces students to a set of worldwide healthcare records standard that healthcare organisations can use to achieve greater integration among healthcare systems within and across country boundaries.

#### **Healthcare Systems**

This module provides students with an understanding of the hierarchy of the healthcare industry and the services it provides. Students learn about the roles of different healthcare groups in a country and their target patients.

#### **Medical Informatics**

This module covers how information is handled in healthcare and the use of information technology in the enhancement of patient care, with an emphasis on electronic medical records management. The module also discusses how data records flows within and across different healthcare systems.

#### **Anatomy & Physiology**

This module provides students with a basic knowledge of the anatomy and physiology of the human body at the cellular, tissue and systems level. Body systems covered include the musculo-skeletal, cardiovascular, respiratory, gastro-intestinal, renal, blood, lymphatic and immune systems. Inter-relationships of the body systems and how they maintain homeostasis are also examined.

#### **Pathophysiology & Pharmacology**

The module introduces students to the general concepts of disease and the processes by which diseases evolve. The specific disorders that may occur in various parts of the human body are discussed. The student will become familiar with diagnostic and therapeutics used for common diseases.

#### **Ethics in Healthcare**

This module helps students to understand the laws that govern nursing practice, and explores ethical principles and moral standards of conduct. Students are also encouraged to examine their own personal and professional values and beliefs.

#### **IT Outsourcing**

This module provides students with an understanding of the need for IT outsourcing and discusses ways to manage outsourcing partners and the associated legal requirements to protect intellectual property rights. The module also discusses the role and responsibilities as an outsourcing partner.

### **ELECTIVES FOR THE BANKING & FINANCE SPECIALISATION**

#### **Economics**

This module is an introduction to macroeconomics and microeconomics. Macroeconomics takes a broad perspective and studies the economy as a whole, covering topics such as national income, output, unemployment, inflation and growth rates. Microeconomics focuses on how firms and consumers decide on what to produce or buy, and what price to charge in accordance with the laws of demand and supply. This module teaches students to analyse day-to-day economic problems using macroeconomics and microeconomic concepts.

### Financial Markets & Services

The module examines the role of financial markets and their players, the influence of the major financial institutions on the economy and the status of Singapore as a financial centre.

### Financial Planning

This module provides an understanding of personal financial planning in the financial services industry and the products available from the financial sectors. The module equips students with technical and conceptual knowledge in financial planning.

### Secured & Smart Banking

This module introduces students to new channels in the banking and finance industry, using Information Technology to provide efficient and effective banking and financial services to consumers. The issues of security and administration in the banking & finance sector will be discussed.

### Banking & Financial Applications

The module discusses various financial applications that are used in a typical banking and financial organisation. It describes the basic needs of the banking and financial industry and how these applications serve as analytical tools and can help their day-to-day operation.

### Business Intelligence

This module introduces students to the importance and uses of a data warehouse. Students are taught analytical techniques and concepts that will equip them with the technical know-how to generate useful reports required by businesses for both analytical and operational usages.

### IT Outsourcing

This module provides students with an understanding of the need for IT outsourcing and discusses ways to manage outsourcing partners and the associated legal requirements to protect intellectual property rights. The module also discusses the role and responsibilities as an outsourcing partner.

### Principles of Marketing

This module presents basic concepts and principles in the marketing of goods and services. Students learn how products and services are planned, priced, promoted and distributed. They will also gain an understanding of the interaction of marketing variables and their impact on marketing decisions.

### LEVEL 3.2

(The modules in Levels 3.1 & 3.2 are offered on an interchangeable basis.)

### Industrial Attachment Programme

This module provides students with the opportunity to apply the knowledge and skills gained to develop an IT solution to solve a practical problem. Students may undertake a real-life IT project in an organisation that may include problem definition, requirements analysis, design, developing and testing, delivery and presentation of the solution. Through the project, they will learn to appreciate the finer points of project planning and control issues relating to IT project development.

## COURSE CURRICULUM

Module No.	Module Name	Credit Units
<b>YEAR 1</b>		
<b>Level 1.1 (29 hours per week)</b>		
1.	Fundamentals for IT Professionals	5
2.	Fundamentals of Programming	5
3.	Computers & Operating Systems	5
4.	Business Statistics	5
5.	Enterprise Information Systems	5
6.	Creativity & Applied Thinking Skills <sup>^</sup>	2
7.	Sports & Wellness <sup>^</sup>	2
<b>Level 1.2 (25 hours per week)</b>		
8.	Enterprise Systems Analysis & Design	5
9.	Networking Fundamentals	5
10.	Object-Oriented Programming	6
11.	Accounting & Financial Management	5
12.	Individual & the Community <sup>^</sup>	2
13.	Communication Toolkit <sup>^</sup>	2
<b>YEAR 2</b>		
<b>Level 2.1 (24 hours per week)</b>		
14.	Developing Web Applications	5
15.	Enterprise Project Management	5
16.	Enterprise Business Processes	5
17.	Databases	5
18.	Interdisciplinary Studies module <sup>^</sup>	2
19.	Interdisciplinary Studies module <sup>^</sup>	2
<b>Level 2.2 (25 hours per week)</b>		
20.	Enterprise Resource Planning	5
21.	Customer Relationship Management	4
22.	Elective 1	4
23.	Elective 2	4
24.	Elective 3	4
25.	Innovation & Enterprise in Action <sup>^</sup>	4
<b>YEAR 3</b>		
<b>Level 3.1 (20 hours per week)</b>		
26.	Elective 4	4
27.	Elective 5	4
28.	Elective 6	4
29.	Elective 7	4
30.	World Issues: A Singapore Perspective <sup>^</sup>	2
31.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 3.2 (25 hours per week)</b>		
32.	Industrial Attachment Programme	25

### Notes:

<sup>^</sup> For more details on Interdisciplinary Studies (IS) modules, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/)

### 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.

## DIPLOMA IN INFORMATION TECHNOLOGY (IT) (3-YEAR COURSE)

SCHOOL OF INFOCOMM TECHNOLOGY



Information technology has changed the way people learn, work, play and communicate. It forms the infrastructure of the new economy, and has transformed the way business is done, introducing innovation and enhancing efficiency.

The **Diploma in Information Technology (IT)** empowers students to become IT professionals, equipping them with the knowledge of eBusiness processes and technical skills to harness the power of information and Internet technologies in the digital economy. The course provides a strong foundation for the development of robust application systems for all types of businesses and industries.

Core modules focus on the fundamental knowledge and skills required of IT professionals, including web applications, information systems, software development, computer architecture, data communication and network systems, computing mathematics and communication skills. In the course of study, students have the opportunity to develop their competence in integrating various IT technologies with effective IT solutions and applications.

In the final year, students specialise in niche areas such as software engineering, networking and security, eBusiness or business management. To strengthen their business, management and entrepreneurial spirit, students also have the opportunity to participate in Industrial Attachment Programmes with the relevant industries.

Integrated into the curriculum are electives and Interdisciplinary Studies (IS) modules that enable students to widen and deepen their spectrum knowledge beyond the core modules, thus broadening their perspectives and nurturing their innovative and enterprising spirit. This is important for IT professionals working in a complex business environment where problems are multi-faceted, requiring knowledge and skills in different disciplines.

### ENTRY REQUIREMENTS

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

Subject	'O' Level Grade
English (EL1)	1-7
Mathematics (Elementary/Additional)	1-6
Any three other subjects	1-6

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science (Grade 1-9) or Design & Technology (Grade 1-9) and two other subjects.

Candidates with severe vision deficiency should not apply for the course.

## CAREER PROSPECTS

IT graduates can join Singapore's vibrant IT industry as IT professionals in a wide variety of jobs regardless of their specialisation.

The specialisation options also give graduates a head start in key niche areas such as Business Management, eBusiness, Software Engineering and Networking & Security.

Graduates are well-equipped for roles as programmers, application developers and administrators for networks, systems and the web; eBusiness solutions analysts and designers; software engineers; java specialists; enterprise software developers; and system engineers.

## ACCREDITATION FOR FURTHER STUDIES

The Diploma in Information Technology is internationally recognised. Graduates enjoy advanced standing when they apply to related degree programmes at many local and overseas universities.

## COURSE STRUCTURE

### FIRST-YEAR MODULES

Level 1.1	Level 1.2
<ul style="list-style-type: none"> <li>Fundamentals for IT Professionals</li> <li>Computers &amp; Operating Systems</li> <li>Fundamentals of Programming</li> <li>Computing Mathematics</li> <li>Web Publishing</li> <li>Creativity &amp; Applied Thinking Skills<sup>^</sup></li> <li>Sports &amp; Wellness<sup>^</sup></li> </ul>	<ul style="list-style-type: none"> <li>Networking Fundamentals</li> <li>Object-Oriented Programming</li> <li>User Interface Design</li> <li>Business Information Systems</li> <li>Individual &amp; the Community<sup>^</sup></li> <li>Communication Toolkit<sup>^</sup></li> </ul>

### SECOND-YEAR MODULES

Level 2.1	Level 2.2
<ul style="list-style-type: none"> <li>Databases</li> <li>Object-Oriented Analysis &amp; Design 1</li> <li>Prescribed Module/Elective #</li> <li>Prescribed Module/Elective #</li> <li>Any 2 Interdisciplinary Studies (IS) modules<sup>^</sup></li> </ul>	<ul style="list-style-type: none"> <li>Developing Web Applications</li> <li>Object-Oriented Analysis &amp; Design 2</li> <li>Project Management</li> <li>Prescribed/Elective Module#</li> <li>Innovation &amp; Enterprise in Action<sup>^</sup></li> </ul>

### FINAL-YEAR MODULES

Level 3.1*	Level 3.2*
<ul style="list-style-type: none"> <li>Prescribed Module/Elective #</li> <li>Prescribed Module/Elective #</li> <li>Prescribed Module/Elective #</li> <li>Prescribed Module/Elective #</li> <li>World Issues: A Singapore Perspective<sup>^</sup></li> <li>Any 1 Interdisciplinary Studies (IS) module<sup>^</sup></li> </ul>	<ul style="list-style-type: none"> <li>Industrial Attachment Programme</li> </ul>

\* The modules in Levels 3.1 and 3.2 are offered on an interchangeable basis.

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

In the second year, students may choose either the business or technology option. Each option requires the completion of five prescribed modules. In addition, they participate in an Industrial Attachment Programme in their final year.

### BUSINESS OPTION

- Business Management
- Principles of Accounting
- Principles of Marketing
- Economics
- Business Finance
- Organisational Behavior

### eBusiness

- eBusiness Foundations
- eCommerce Application Development
- Supply Chain Management
- Web Database Development
- Technopreneurship

### TECHNOLOGY OPTION

#### Software Engineering

- C Programming
- Client-Server Programming
- Data Structures & Algorithms
- Enterprise Application Development
- Windows Application Development

#### Network & Security

- Network Administration & Management
- Network Architectures
- Wireless Technology
- Systems Security
- Web Server Administration & Security
- Wide Area Networks

# The prescribed modules/electives and options are reviewed regularly and subject to updates to ensure relevance to industry needs.

## COURSE MODULES

### LEVEL 1.1

#### Fundamentals for IT Professionals

This module gives a broad introduction to the field of IT by exploring the roles, professional practice, ethical expectations and development paths of IT professionals. Students will appreciate the importance of problem solving skills in providing effective IT solutions. They will see how interpersonal and team work skills can help build relationships with users, facilitate meetings, influence users in requirements definition, and help them participate as effective members of a systems development team.

#### Computers & Operating Systems

This module surveys the basic architecture and functions of a computer system, including input/output devices, data representation, file permissions and operating systems. Students get hands-on experience in using system commands and writing simple shell code to tailor the system environment to the needs of software application development.

#### Fundamentals of Programming

This module teaches programming fundamentals, including data types and variables, statements and compound statements, expressions, selection and repetition, simple computation, and the use of libraries. Other key topics include the development of test cases and test plans, and providing suitable programme documentation, with Java programming language used to illustrate programming concepts. Students will also learn how to apply problem solving skills and get ample practice in expressing solutions using Java.

#### Computing Mathematics

This module introduces the basic concepts of relations and functions, matrices, statistical methods and relevant applications. The main emphasis is to develop students' ability in solving quantitative problems in computing mathematics, probability and statistics.

### **Web Publishing**

This module equips students with the knowledge and skills to create interactive and effective Web pages. Students will learn how to design and develop Web pages using HyperText Markup Language (HTML), style sheets and scripting language. Basic principles of Web design will be taught, including topics such as layout, resolution, typography, and colour theory. Students learn how to create and incorporate different multimedia elements into the Web pages. Copyright and legal issues associated with publishing materials on the Web will also be discussed.

### **LEVEL 1.2**

#### **Networking Fundamentals**

This module provides an overview of networking. Key topics covered include layering, protocol stacks, network topologies, the Open Systems Interconnection (OSI) model, Transmission Control Protocol/Internet Protocol (TCP/IP), complex data networks and commonly used network systems such as Ethernet and Token Ring. An overview of Internetworking and telecommunications will also be presented to give students a global picture of how the connections of homogenous and heterogeneous networks are established in the real world.

#### **Object-Oriented Programming**

This module builds on the knowledge and skills acquired in the Fundamentals of Programming module. It aims to provide opportunities for students to develop medium-scale applications based on the Object-Oriented (OO) approach. Topics covered include Abstract Data Types (ADTs), the implementation of selected ADTs using the OO approach, and suitable sorting and search algorithms. Software robustness and correctness, and good programming practices will be emphasised.

#### **User Interface Design**

This module covers the theory and practical aspects of designing effective user interfaces by taking students through the design process, with a special focus on human-computer interaction. Students learn how to apply good design principles and techniques to create desktop graphical interfaces as well as Web interfaces for different devices. The module encourages students to think through the different aspects of human-computer interaction design, including information architecture, content structure, site structure, navigation, interaction and usability.

#### **Business Information Systems**

Organisations depend on information systems and the use of technologies to maintain and gain a competitive edge. In this module, students are taught the concepts of information systems, and how information systems and the underlying technologies are used to gain competitive advantage. Topics covered include information processes, information needs, the system development life cycle, information system ethics, computer crime and security issues.

### **LEVEL 2.1**

#### **Databases**

This module examines the fundamental principles and concepts of database systems that store and structure an organisation's information, and drive its business functions. Students will learn to analyse data and perform data modelling and normalisation to design an effective database, using relevant theories and concepts of relational database systems.

#### **Object-Oriented Analysis & Design 1**

Information systems are developed to meet business requirements, but they should also be robust and extensible. This requires the use of a software engineering design approach and the adoption of a sound and proven development methodology. This module focuses on the design aspect of information system development. Students learn how to model and design an information system using Unified Modelling Language (UML) notations as part of the Object-Oriented (OO) development approach, as well as how to apply developed use cases to prepare sequence diagrams.

### **LEVEL 2.2**

#### **Developing Web Applications**

This module arms students with the knowledge and skills needed to develop Web applications. Students learn to use the latest Web technologies such as Microsoft's .NET framework to develop effective Web applications. Students also acquire the technical skills to develop server-side programming to create Web-based forms, perform state management, access data and validate user input.

#### **Object-Oriented Analysis & Design 2**

This module explores the various investigation techniques necessary for gathering and documenting business requirements. Using Unified Modelling Language (UML) notation for use cases, students will model and develop the system specifications based on business requirements. As part of the systems analyst's toolkit, students are taught problem analysis and evaluation techniques. They will also learn to appreciate the importance of human aspects issues and the need to recognise change management issues.

#### **Project Management**

Managing the development and construction of any information system is a complex task. In this module, students will learn how to plan and control the various phases in the life cycle of an information systems project. In particular, they learn to establish project terms of reference and develop preliminary plans to facilitate the execution, monitoring and control of projects. The professional code of conduct and practice issues will be discussed. This module also prepares students to conduct and manage their final-year project in a professional way.

### LEVEL 3.1

#### PRESCRIBED MODULES BY OPTION

(The modules in Levels 3.1 & 3.2 are offered on an interchangeable basis.)

#### BUSINESS OPTION

##### BUSINESS MANAGEMENT

###### Principles of Accounting

In this module, students will learn the basic concepts and principles of accounting and develop skills to analyse business transactions and interpret financial statements.

###### Principles of Marketing

This module presents basic concepts and principles in the marketing of goods and services. Students learn how products and services are planned, priced, promoted and distributed, and will gain an understanding of the interaction of marketing variables and their impact on marketing decisions.

###### Economics

This module is an introduction to macroeconomics and microeconomics. Macroeconomics takes a broad perspective and studies the economy as a whole, covering topics such as national income, output, unemployment, inflation, and growth rates. Microeconomics focuses on how firms and consumers make decisions on what to produce or buy and what price to charge in accordance with the laws of demand and supply. This module teaches students to analyse day-to-day economic problems using macroeconomics and microeconomic concepts.

###### Business Finance

This module teaches the basic concepts and principles of business finance. Students will discover the economic factors affecting finance, financial statements and analysis, cash flow and financial planning, and investment decisions, and long- and short-term financial decisions. They will be trained to evaluate the viability of a project using capital budgeting techniques.

###### Organisational Behaviour

This module provides insights into the factors that influence individual and group behaviour in an organisation. Students learn how to use these concepts to improve interpersonal and group interaction skills.

#### eBUSINESS

##### eBusiness Foundations

In the virtual world of the New Economy, electronic commerce offers new ways of doing business that no company can afford to ignore. This module highlights the framework in which eBusinesses operate, to help students in their analysis, design and development of eBusiness solutions. Case studies and business examples complement conceptual coverage to provide a real-world context for both successful and unsuccessful implementations of eBusiness.

##### eCommerce Application Development

This module equips students with the technical skills as well as an appreciation of the business perspective in electronic commerce (eCommerce). Topics covered include the building blocks and enabling technologies, the processes of eCommerce transactions and some related business issues.

##### Supply Chain Management

This module introduces the concept of a supply chain and its importance in strategic management. It provides students with an understanding of key processes in managing eBusiness transactions and the use of information technology for effective supply chain management.

##### Web Database Development

This module builds upon the Databases and eCommerce Application Development modules to expand students' knowledge and skills in developing a Web database for eCommerce applications. The module explores database tools and techniques used in the development of Internet-based transaction systems that require concurrent access to multi-user databases for data and information. Students also learn the concept of database concurrency and integrity in the context of a Web database for eCommerce.

##### Technopreneurship

The rapid emergence of new infocomm technologies is throwing up new capabilities as well as opportunities for creativity and entrepreneurship. This module focuses on the processes and mechanisms by which new ideas and inventions can be commercialised in the market. Students examine case studies of real-world examples of technopreneurship. They also learn about the issues and challenges of transforming a technological innovation into a successful product or service in the marketplace.

#### TECHNOLOGY OPTION

##### SOFTWARE ENGINEERING

###### C Programming

This module covers the constructs and idioms of the C programming language. Examples will be drawn from application domains where C's strengths are exploited. The module also exposes students to the "pointer-based" implementation of various data structures.

###### Client-Server Programming

Building upon the knowledge and skills acquired in Java programming modules, this module focuses on the underlying concepts of client-server development using commonly deployed databases. The module aims to introduce the building of distributed systems using Remote Method Invocation (RMI) and Java Database Connectivity (JDBC). Students are expected to develop client-server applications based on the two-tier model.

###### Data Structures & Algorithms

This module aids students in further developing their programming skills. They are expected to analyse, design, implement, test and document programmes involving various data structures. Topics covered include data structures such as arrays, lists, stacks, queues, trees and their associated algorithms within the conceptual framework of abstract data types. The module makes use of the class feature of Java language for the concrete implementation of various abstract data types.

### **Enterprise Application Development**

This module helps students to develop the tools and techniques necessary to undertake the development of enterprise applications based on sound software engineering principles. The module covers the Java Project Life Cycle and introduces the necessary framework to develop enterprise applications. Topics include Java security, electronic commerce, Enterprise JavaBeans (EJB), Extensible Markup Language (XML) and JavaServer Pages (JSP). Students then undertake, with guidance, a sophisticated real-world enterprise application based on the three-tier architecture model.

### **Windows Application Development**

Building upon the Java programming modules, this module introduces additional concepts such as advanced user interface, multi-threading, streams and networking programming. Students will then develop medium- to large-scale applications using Java. Appropriate tools and standards, and additional data structures and algorithms will be introduced.

## **NETWORKING & SECURITY**

### **Network Administration & Management**

This module equips students with the knowledge to install, configure and administer state-of-the-art network operating systems (NOS) such as Windows 2000 and Linux. For each of these NOS, the module discusses the architecture and directory structure such as Active Directory for Windows 2000 and the Linux directory structure. Other topics include system administration issues, domains and domain-related operations, and systems performance monitoring of NOS.

### **Network Architectures**

This module covers the basic concepts of networking architecture, with a focus on the standards, protocols and applications of the most significant and widely used networking architecture, Transaction Control Protocol/Internet Protocol (TCP/IP). The module also briefly discusses other primary networking architectures such as SNA, AppleTalk and DECNet. Students will participate in practice sessions to apply the concepts taught.

### **Wireless Technology**

This module provides students with a fundamental understanding of wireless communication and networking. Topics covered include the architecture and technology underlying the different types of wireless networks and applications. Some of the technology standards such as IEEE802.11, Bluetooth and Wireless Application Protocol (WAP) are also covered. With an appreciation of how wireless technologies work, and their strengths and weaknesses, students will be able to determine which technology is best suited for a particular application to achieve optimal performance.

### **Systems Security**

This module studies the concepts, techniques, issues and pitfalls of systems security. Students learn how these techniques may be incorporated within an organisation's plan and policy on security management, and will be exposed to security technologies in order to gain a better understanding of security controls. Students will also be expected to identify security gaps, and select appropriate techniques to address them.

### **Web Server Administration & Security**

This module equips students with the necessary skills for planning a website and web server(s) installation and maintenance. It discusses issues of Internet organisation and administration, website security, and server performance. Topics covered include Internet naming and addressing, website planning, Web server installation and configuration, and website security.

### **Wide Area Networks**

This module gives a broad overview of the wide area networking industry, as well as details of various telecommunications and data networking topics. As an introduction to telecommunications concepts (point-to-point, multi-point and packet switch services) and components used to build wide area networks (WANs), this module also covers the protocols used to transport voice and data over wide areas, including Integrated Services Digital Network (ISDN), frame relay, Asynchronous Transfer Mode (ATM), and synchronous optical networking (SONET).

## **ELECTIVES**

### **Basic Animation**

This module presents the fundamental concepts of basic 3D animation and modelling. Concepts will be demonstrated with the help of a typical 3D animation package, allowing students to develop their skills in using this software. The emphasis is on understanding the mechanism behind 3D animation systems and the production process involved in creating animation for use in multimedia applications.

### **Advanced Animation**

In this module, students learn the concepts of generating and producing textures, compositing and layering to improve animation. They will appreciate the need for custom extensions, plug-ins and scripting. Advanced features of the tools are also introduced.

### **Audio & Video Fundamentals & Editing**

This module introduces the fundamental concepts of desktop digital audio and video editing applicable to multimedia application development. Students will gain practical experience by using industry-standard capturing cards, digital cameras and editing software. The emphasis is on the understanding of basic capturing, editing, compressing and distributing techniques.

### **Game Programming**

Building upon the earlier modules on Java, this module delves into game interfaces, game design, play balancing, artificial intelligence, the physical aspects of a game, and advanced gaming techniques for building multi-player networked games. Students also learn to use Java 3D to develop games with 3D graphics.

### **Additional Mathematics 1**

This module, together with the succeeding module, Additional Mathematics 2, enhances students' competency in mathematics. The combination of the two modules will provide the pre-requisite mathematical foundation and knowledge required by more advanced elective modules; namely, Calculus & Numerical Methods, Advanced Statistics and Pure Mathematics. The main focus in this module is on solving quantitative problems in algebra and co-ordinate geometry at GCE 'O' Level Additional Mathematics standard.

### **Additional Mathematics 2**

The main emphasis in this module is to develop the students' ability in solving quantitative problems in trigonometry and calculus at GCE 'O' Level Additional Mathematics standard. Topics include circular measurements, trigonometric functions, simple trigonometric identities and equations, solving of trigonometric equations using additional formulae, vectors and scalars, differentiation and its applications, higher derivatives, integration and its applications, and parametric equations.

### **Advanced Statistics & Pure Mathematics**

For students who intend to pursue further studies in computing, this module provides a good foundation in Mathematics. Together with the Calculus and Numerical Methods module, the module enables students to build an adequate mathematical foundation comparable to GCE 'A' Level's mathematics standard. Students will be able to solve more complex mathematical problems in statistics and pure Mathematics. Topics include complex numbers, vectors in two and three dimensions, and statistics.

### **Calculus & Numerical Methods**

Like the Advanced Statistics and Pure Mathematics module, this module is designed to provide an adequate mathematical foundation comparable to GCE 'A' Level's Mathematics. The main emphasis is on enabling students to solve quantitative problems using calculus and numerical methods. Topics include differentiation, integration and solution of equations using the Newton-Raphson method.

### **Discrete Mathematics**

This module aids students in developing the basic skills and understanding of the mathematical principles and techniques required in computing. The notations and concepts taught will enable them to translate actual problems into abstractions, formulate formal descriptions, and reason about their properties in a rigorous way. Topics include set theory, logic, relations, functions, recursion and recursive algorithms, and graph theory.

### **Developing Office Applications**

Having basic skills in the use of office automation tools is important to any worker in a knowledge-based economy. This module teaches students to design and create dynamic Web pages that contain information residing in various office application suites, such as spreadsheets and databases. Students learn to analyse, design and implement integrated solutions based on typical business scenarios in an office environment. As this module is targeted at application developers, students may be expected to write programming code to integrate the various office applications.

### **Internet Computing**

In this module, students develop client/server-based distributed applications using techniques such as Common Gateway Interface (CGI) and applets. They will address the issues of designing and implementing such applications with database accesses using programming languages such as C, Perl and Java. This module requires knowledge of computer networking, Java programming and databases.

### **Inventory Management**

This module introduces techniques used for maintaining minimum stocks of various industries and commercial enterprises at minimum cost. Special emphasis is given to areas within the supply chain where cost of operations could be minimised through efficient management of inventory. An analysis of different inventory policies and the use of basic techniques in forecasting and simulation relevant to inventory management is also included.

### **Mobile & Wireless Security**

This module examines the concepts, techniques, issues and pitfalls related to mobile and wireless security, including how these techniques may be implemented according to an organisation's plan and policy on security management. Students are exposed to wireless security technologies in order to gain a better understanding of security controls, and will eventually be able to apply this knowledge to make their applications more secure.

### **Mobile Application Development**

This module focuses on the design and development of applications for mobile devices like hand phones, personal digital assistants (PDAs) and handheld computers. Due to the nature of these handheld devices, issues such as memory storage, user interface and data input methods require more careful consideration and planning. At the end of this module, students will be able to develop applications that can run on mobile devices and interact wirelessly with server-side programmes.

### **Mobile Business Applications**

This module explores the world of mobile business applications. It gives an understanding of how mobile applications are not just for the consumer, but can also help a business to grow.

### **Mobile Operating Systems**

This module surveys the various mobile operating systems (OS) in the market, with a focus on the fundamentals of mobile OS and how they differ from those of conventional desktop OS. The module also touches on some mobile development platforms. Students learn to explain the characteristics and functions of the operating systems, which will be useful when they start developing mobile applications using the various platforms available.

**Principles of Management**

This module gives students an understanding of basic management principles and practices. Students learn how managers plan, lead, organise and control activities and resources in organisations, as well as how change management, innovation and creativity enhance organisational performance.

**Professional Issues**

This module addresses social, legal and ethical issues faced by IT professionals. Students learn critical thinking skills that will help them deal with ethical dilemmas likely to arise in working life. Through story-telling, case studies and workshops, students discover value systems and how these influence moral decisions.

**Programming Wireless Applications**

This module highlights the development of applications for small devices, from smart cards, personal digital assistants (PDAs), mobile phones and pagers, to the set-top box. The module covers the knowledge and hands-on experience in client- and server-side Java software development of wireless applications. The emphasis is on converting concepts into software practice, with reinforcement by the development of a small client-server wireless application.

**Research Studies**

This module gives students an opportunity to research and present a topic on IT and its applications. Each student will be assigned a supervisor well-versed in the selected topic of research. The student undertakes the research work in consultation with the supervisor. At the end of the research period, the student will submit a report, and present his findings to fellow students.

**Windows Programming using Visual C++**

This module equips students with the knowledge and skills necessary to develop Windows applications and components using Visual C++. Additional language constructs, libraries and tools will also be introduced. Students will adopt an object-oriented approach taught in the earlier modules. Through this module, students will gain an understanding of the new modular software architecture – Component Object Model (COM).

**LEVEL 3.2**

**(The modules in Levels 3.1 & 3.2 are offered on an interchangeable basis.)**

**Industrial Attachment Programme**

This module provides students with the opportunity to apply the knowledge and skills gained to develop an IT solution to solve a practical problem. Students may undertake a real-life IT project in an organisation that may include problem definition, requirements analysis, design, development and testing, delivery and presentation of the solution. Through the project, they will learn to appreciate the finer points of project planning and control issues relating to IT project development.

**COURSE CURRICULUM**

Module No.	Module Name	Credit Units
<b>YEAR 1</b>		
<b>Level 1.1 (29 hours per week)</b>		
1.	Fundamentals for IT Professionals	5
2.	Computers & Operating Systems	5
3.	Fundamentals of Programming	5
4.	Computing Mathematics	5
5.	Web Publishing	5
6.	Creativity & Applied Thinking Skills <sup>^</sup>	2
7.	Sports & Wellness <sup>^</sup>	2
<b>Level 1.2 (25 hours per week)</b>		
8.	Networking Fundamentals	5
9.	Object-Oriented Programming	6
10.	User Interface Design	5
11.	Business Information Systems	5
12.	Individual & the Community <sup>^</sup>	2
13.	Communication Toolkit <sup>^</sup>	2
<b>YEAR 2</b>		
<b>Level 2.1 (25 hours per week)</b>		
14.	Databases	5
15.	Object-Oriented Analysis & Design 1	6
16.	Prescribed Module/Elective	5
17.	Prescribed Module/Elective	5
18.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
19.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 2.2 (25 hours per week)</b>		
20.	Developing Web Applications	5
21.	Object-Oriented Analysis & Design 2	6
22.	Project Management	5
23.	Prescribed Module/Elective	5
24.	Innovation & Enterprise in Action <sup>^</sup>	4
<b>YEAR 3</b>		
<b>Level 3.1 (24 hours per week)</b>		
25.	Prescribed Module/Elective	5
26.	Prescribed Module/Elective	5
27.	Prescribed Module/Elective	5
28.	Prescribed Module/Elective	5
29.	World Issues: A Singapore Perspective <sup>^</sup>	2
30.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 3.2 (25 hours per week)</b>		
31.	Industrial Attachment Programme	25

**Notes:**

<sup>^</sup> For more details on Interdisciplinary Studies (IS) modules, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/)

**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.

## DIPLOMA IN MOBILE BUSINESS SOLUTIONS (MBS) (3-YEAR COURSE)

SCHOOL OF INFOCOMM TECHNOLOGY



In an increasingly interconnected world, businesses are relying more and more on mobile computing for strategic solutions to drive businesses through mobile phones, personal digital assistants and other mobile commuting devices. Mobile banking, mobile marketing, mobile payments – these are just the tip of a growing industry, which has much to offer graduates who are able to integrate IT and mobile technologies to deliver mobile solutions for businesses.

The **Diploma in Mobile Business Solutions (MBS)** combines three key areas of study – information technology, mobile technology and business skills. At the end of the course, students will be well-equipped with the knowledge and skills to design, develop and deploy efficient mobile applications for mobile commerce, edutainment games and wireless system infrastructure.

Students are required to complete a set of common core modules. The focus is on the fundamental knowledge and skills required of IT professionals, with an emphasis on mobile technology and mobile business concepts. In addition, electives will allow students to pursue their interests in a wide range of subjects.

Also integrated into the curriculum are Interdisciplinary Studies (IS) modules that enable students to widen and deepen their spectrum of knowledge beyond the core modules, thus broadening their perspectives and nurturing their innovative and enterprising spirit. This is important for IT professionals working in a complex business environment where problems are multi-faceted, requiring knowledge and skills in different disciplines.

In the final year, students participate in an Industrial Attachment Programme, which gives them the opportunity to gain first-hand working experience at established organisations such as StarHub, SingTel and SMRT.

### ENTRY REQUIREMENTS

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

Subject	'O' Level Grade
English (EL1)	1-7
Mathematics (Elementary/Additional)	1-6
Any three other subjects	1-6

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science (Grade 1-9) or Design & Technology (Grade 1-9) and two other subjects.

Candidates with severe vision deficiency should not apply for the course.

## CAREER PROSPECTS

MBS graduates are trained to be mobile technology professionals capable of developing effective mobile and wireless applications and software to support mobile businesses. They can join the IT industry as IT professionals in a wide variety of jobs. Potential employers include software houses, IT solution providers, and IT divisions in businesses.

As system integrators, graduates would be invaluable to small and medium enterprises (SMEs) by recommending suitable mobile technology infrastructures and sourcing for appropriate mobile business applications. MBS graduates are also well placed to become entrepreneurs.

## ACCREDITATION FOR FURTHER STUDIES

The Diploma in Mobile Business Solutions is internationally recognised. Graduates enjoy advanced standing when they apply to related degree programmes at many local and overseas universities.

## COURSE STRUCTURE

### FIRST-YEAR MODULES

Level 1.1	Level 1.2
<ul style="list-style-type: none"><li>• Fundamentals for IT Professionals</li><li>• Computers &amp; Operating Systems</li><li>• Fundamentals of Programming</li><li>• Business Statistics</li><li>• Introduction to Mobile Applications</li><li>• Creativity &amp; Applied Thinking Skills<sup>^</sup></li><li>• Sports &amp; Wellness<sup>^</sup></li></ul>	<ul style="list-style-type: none"><li>• Networking Fundamentals</li><li>• Object-Oriented Programming</li><li>• Mobile Usability Design</li><li>• Business Information Systems</li><li>• Individual &amp; the Community<sup>^</sup></li><li>• Communication Toolkit<sup>^</sup></li></ul>

### SECOND-YEAR MODULES

Level 2.1	Level 2.2
<ul style="list-style-type: none"><li>• Databases</li><li>• Object-Oriented Analysis &amp; Design 1</li><li>• Wireless Technology</li><li>• eBusiness Foundations</li><li>• Any 2 Interdisciplinary Studies (IS) modules<sup>^</sup></li></ul>	<ul style="list-style-type: none"><li>• Mobile Application Development</li><li>• Object-Oriented Analysis &amp; Design 2</li><li>• Project Management</li><li>• Elective 1#</li><li>• Innovation &amp; Enterprise in Action<sup>^</sup></li></ul>

### FINAL-YEAR MODULES

Level 3.1*	Level 3.2*
<ul style="list-style-type: none"><li>• Professional Issues</li><li>• Supply Chain Management</li><li>• Elective 2#</li><li>• Elective 3#</li><li>• World Issues: A Singapore Perspective<sup>^</sup></li><li>• Any 1 Interdisciplinary Studies (IS) module<sup>^</sup></li></ul>	<ul style="list-style-type: none"><li>• Industrial Attachment Programme</li></ul>

\* The modules in Level 3.1 and Level 3.2 are offered on an interchangeable basis.

# The Elective Modules offered may change from year to year, depending on relevance and demand. They may also include modules available in other diplomas offered by the School.

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

## COURSE MODULES

### LEVEL 1.1

#### Fundamentals for IT Professionals

This module gives a broad introduction to the field of IT by exploring the roles, professional practice, ethical expectations and development paths of IT professionals. Students will appreciate the importance of problem solving skills in providing effective IT solutions. They will see how interpersonal and team work skills can help build relationships with users, facilitate meetings, influence users in requirements definition, and help them participate as effective members of a systems development team.

#### Computers & Operating Systems

This module surveys the basic architecture and functions of a computer system, including input/output devices, data representation, file permissions and operating systems. Students get hands-on experience in using system commands and writing simple shell code to tailor the system environment to the needs of software application development.

#### Fundamentals of Programming

This module teaches programming fundamentals, including data types and variables, statements and compound statements, expressions, selection and repetition, simple computation, and the use of libraries. Other key topics include the development of test cases and test plans, and providing suitable programme documentation, with Java programming language used to illustrate programming concepts. Students also learn how to apply problem solving skills and get ample practice in expressing solutions using Java.

#### Business Statistics

This module explores how business problems can be solved by applying statistical principles. The main emphasis is to provide students with some basic mathematical skills to handle numerical information in a business context, such as presenting and interpreting statistical data by using means, measures of dispersion and graphs. Topics covered include fundamentals of statistics and probability, discrete and continuous probability distributions, estimation and correlation.

#### Introduction to Mobile Applications

This module covers the various applications that pervade the m-commerce scene and the way business may be conducted in the future. Students learn about the various applications already on the market as well as new services to be enjoyed by consumers. With this understanding, they will be able to consider both consumers' and organisational requirements when developing software applications.

### LEVEL 1.2

#### Networking Fundamentals

This module provides an overview of networking. Key topics covered include layering, protocol stacks, network topologies, the Open Systems Interconnection (OSI) model, Transmission Control Protocol/Internet Protocol (TCP/IP), complex data networks and commonly used network systems such as Ethernet and Token Ring. An overview of Internetworking and telecommunications will also be presented to give students a global picture of how the connections of homogenous and heterogeneous networks are established.

### Object-Oriented Programming

This module builds on the knowledge and skills acquired in the Fundamentals of Programming module. It provides opportunities for students to develop medium-scale applications based on the Object-Oriented (OO) approach. Topics covered include Abstract Data Types (ADTs), the implementation of selected ADTs using the OO approach, and suitable sorting and search algorithms. Software robustness and correctness, and good programming practices will be emphasised.

### Mobile Usability Design

This module equips students with the fundamental knowledge and skills in human-computer interaction design and development for mobile devices. It provides an overview of existing usability problems and how these can be overcome. With this, students will be able to apply diverse mobile devices to improve the usability of goal-driven services and entertainment-focused services. Practical work is emphasised and students will be exposed to numerous mobile interface designs.

### Business Information Systems

Organisations depend on information systems and the use of technologies to maintain and gain a competitive edge. In this module, students are taught the concepts of information systems, and how information systems and the underlying technologies are used to gain competitive advantage. Topics covered include information processes, information needs, the system development life cycle, information system ethics, computer crime and security issues.

### LEVEL 2.1

#### Databases

This module examines the fundamental principles and concepts of database systems to store and structure an organisation's information to drive its business functions. Students learn to analyse data and perform data modelling and normalisation to design an effective database, using relevant theories and concepts of relational database systems.

#### Object-Oriented Analysis & Design 1

Information systems are developed to meet business requirements, but they should also be robust and extensible. This requires the use of a software engineering design approach and the adoption of a sound and proven development methodology. This module focuses on the design aspect of information system development. Students learn how to model and design an information system using Unified Modelling Language (UML) notations as part of the Object-Oriented (OO) development approach, as well as how to apply developed use cases to prepare sequence diagrams.

#### Wireless Technology

This module equips students with a fundamental understanding of wireless communication and networking, including the architecture and technology underlying the different types of wireless networks and applications. Some technology standards such as IEEE802.11, Bluetooth and Wireless Application Protocol (WAP) will also be covered. Students learn to determine which technology is best suited for a particular application to achieve optimal performance.

#### eBusiness Foundations

In the New Economy, electronic commerce offers functionality and new ways of doing business that no company can afford to ignore. This module provides an understanding of the framework in which eBusinesses operate to help students in their analysis, design and development of eBusiness solutions. Case studies and business examples complement conceptual coverage to provide a real-world context for both successful and unsuccessful implementations of eBusiness.

### LEVEL 2.2

#### Mobile Application Development

This module focuses on the design and development of applications for mobile devices like hand phones, personal digital assistants (PDAs) and handheld computers. Due to the nature of these handheld devices, issues such as memory storage, user interface and data input methods require more careful consideration and planning. At the end of this module, students are able to develop applications that can run on mobile devices and interact wirelessly with server-side programmes.

#### Object-Oriented Analysis & Design 2

This module explores the various investigation techniques necessary for gathering and documenting business requirements. Using Unified Modelling Language (UML) notation for use cases, students will model and develop the system specifications based on business requirements. As part of the systems analyst's toolkit, students are taught problem analysis and evaluation techniques. They also learn to appreciate the importance of human aspects issues and the need to recognise change management issues.

#### Project Management

Managing the development and construction of any information system is a complex task. In this module, students learn how to plan and control the various phases in the life cycle of an information systems project. In particular, they will learn to establish project terms of reference and develop preliminary plans to facilitate the execution, monitoring and control of projects. The professional code of conduct and practice issues will be discussed. This module also prepares students to conduct and manage their final-year project in a professional way.

### LEVEL 3.1

**(The modules in Level 3.1 and Level 3.2 are offered on an interchangeable basis)**

#### Professional Issues

This module addresses social, legal and ethical issues faced by IT professionals. Students learn critical thinking skills that will help them deal with ethical dilemmas likely to arise in working life. Through storytelling, case studies and workshops, students will discover value systems and how these influence moral decisions.

#### Supply Chain Management

This module introduces the concept of a supply chain and its importance in strategic management. It provides students with an understanding of key processes in managing eBusiness transactions and the use of information technology for effective supply chain management.

### LEVEL 3.2

**(The modules in Level 3.1 and Level 3.2 are offered on an interchangeable basis)**

#### Industrial Attachment Programme

This module provides students with the opportunity to apply the knowledge and skills gained to develop an IT solution to solve a practical problem. Students may undertake a real-life IT project in an organisation that may include problem definition, requirements analysis, design, development and testing, delivery and presentation of the solution. Through the project, they will learn to appreciate the finer points of project planning and control issues relating to IT project development.

**ELECTIVES**

**Marketing for eCommerce**

The Internet has sparked many changes in the business world, influencing everything from product design and development to distribution models and strategies. This module teaches students how eProducts are marketed, and how to conceptualise and develop eBusiness solutions for organisations to improve overall customer experiences and establish an effective presence in the eMarketplace.

**Mobile Business & the Organisation**

In moving towards mobile businesses, companies are facing big challenges – operating 24/7 instead of fixed operating hours, and managing a diversified customer base that requires a more complex logistical infrastructure. Organisational learning and change management will be key success factors in mobile businesses. This module provides students with a better understanding of how mobile businesses transform organisations and how organisations can respond.

**Mobile Business Applications**

This module explores the world of mobile business applications. It gives an understanding of how mobile applications are not just for the consumer, but can also help a business to grow.

**Mobile Operating Systems**

This module surveys the various mobile operating systems (OS) in the market, with a focus on the fundamentals of mobile OS and how they differ from those of conventional desktop OS. The module will also touch on some mobile development platforms. Students learn to explain the characteristics and functions of the operating systems, which will be useful when they start developing mobile applications using the various platforms available.

**Mobile & Wireless Security**

This module examines the concepts, techniques, issues and pitfalls relating to mobile and wireless security, including how these techniques may be implemented within an organisation's plan and policy on security management. Students are exposed to wireless security technologies in order to gain a better understanding of security controls, and will eventually be able to apply this knowledge to make their applications more secure.

**Programming Wireless Applications**

This module highlights the development of applications for small devices from smart cards, personal digital assistants (PDAs), mobile phones and pagers, to the set-top boxes. The module covers the knowledge and hands-on experience in client- and server-side Java software development of wireless applications. The emphasis is on converting concepts into software practice, with reinforcement by the development of a small client-server wireless application.

**COURSE CURRICULUM**

Module No.	Module Name	Credit Units
<b>YEAR 1</b>		
<b>Level 1.1 (29 hours per week)</b>		
1.	Fundamentals for IT Professionals	5
2.	Computers & Operating Systems	5
3.	Fundamentals of Programming	5
4.	Business Statistics	5
5.	Introduction to Mobile Applications	5
6.	Creativity & Applied Thinking Skills <sup>^</sup>	2
7.	Sports & Wellness <sup>^</sup>	2
<b>Level 1.2 (25 hours per week)</b>		
8.	Networking Fundamentals	5
9.	Object-Oriented Programming	6
10.	Mobile Usability Design	5
11.	Business Information Systems	5
12.	Individual & the Community <sup>^</sup>	2
13.	Communication Toolkit <sup>^</sup>	2
<b>YEAR 2</b>		
<b>Level 2.1 (25 hours per week)</b>		
14.	Databases	5
15.	Object-Oriented Analysis & Design 1	6
16.	Wireless Technology	5
17.	eBusiness Foundations	5
18.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
19.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 2.2 (25 hours per week)</b>		
20.	Mobile Application Development	5
21.	Object-Oriented Analysis & Design 2	6
22.	Project Management	5
23.	Elective 1	5
24.	Innovation & Enterprise in Action <sup>^</sup>	4
<b>YEAR 3</b>		
<b>Level 3.1 (24 hours per week)</b>		
25.	Professional Issues	5
26.	Supply Chain Management	5
27.	Elective 2	5
28.	Elective 3	5
29.	World Issues: A Singapore Perspective <sup>^</sup>	2
30.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 3.2 (25 hours per week)</b>		
31.	Industrial Attachment Programme	25

**Notes:**

<sup>^</sup> For more details on Interdisciplinary Studies (IS) modules, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/)

**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.

## DIPLOMA IN MULTIMEDIA & ANIMATION (MMA) (3-YEAR COURSE)

SCHOOL OF INFOCOMM TECHNOLOGY



The **Diploma in Multimedia & Animation (MMA)** provides a strong grounding in the knowledge and skills required to create games and interactive animation.

This practise-oriented course provides a balanced foundation in art, design, digital media and IT, and allows students to specialise in the rapidly emerging fields of interactive entertainment, 3D modelling and animation, edutainment games and rich Internet applications. Students are also given opportunities to develop their creative thinking, problem solving and communications skills, and cultivate a spirit of innovation and enterprise.

Students complete a set of common core modules in arts design, digital media and computing in the first year, which focuses on the competencies required of interactive digital media professionals. In the second year, students may opt to specialise in 3D animation or interactive media.

In the final year, students acquire expertise in a specific field of interest to them by working on a year-long project. In this project management exercise, students go through the full production process, from concept to budgeting and implementation. There will also be the opportunity to work with industry partners

Students also take several Interdisciplinary Studies (IS) modules to broaden their minds and nurture a spirit of innovation and enterprise. This is important for interactive and digital media professionals working in an environment where problems are multi-faceted in nature, thus requiring knowledge and skills in different disciplines.

### ENTRY REQUIREMENTS

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

Subject	'O' Level Grade
English (EL1)	1-7
Mathematics (Elementary/Additional)	1-6
Any three other subjects	1-6

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science (Grade 1-9) or Design & Technology (Grade 1-9) and two other subjects.

Candidates with hearing deficiency or severe vision deficiency including colour appreciation deficiency should not apply for the course.

## CAREER PROSPECTS

MMA graduates are trained to be interactive or digital media professionals, capable of developing media-rich applications such as interactive entertainment, 3D modelling and animation, edutainment games, and rich Internet applications.

## ACCREDITATION FOR FURTHER STUDIES

The Diploma in Multimedia & Animation is internationally recognised. Graduates enjoy advanced standing when they apply to related degree programmes at many local and overseas universities.

## COURSE STRUCTURE

### FIRST-YEAR MODULES

<p>Level 1.1</p> <ul style="list-style-type: none"> <li>Digital Photomedia</li> <li>Drawing Fundamentals</li> <li>Fundamentals for Creative Professionals</li> <li>Graphic Design Fundamentals</li> <li>Programme Design &amp; Authoring</li> <li>Portfolio Project 1</li> <li>Creativity &amp; Applied Thinking Skills<sup>^</sup></li> <li>Sports &amp; Wellness<sup>^</sup></li> </ul>	<p>Level 1.2</p> <ul style="list-style-type: none"> <li>Animation Principles &amp; Techniques</li> <li>Game Design</li> <li>Problem Solving &amp; Programming</li> <li>Scriptwriting, Storyboarding &amp; Storytelling</li> <li>Visual Interface &amp; Information Design</li> <li>Portfolio Project 2</li> <li>Individual &amp; the Community<sup>^</sup></li> <li>Communication Toolkit<sup>^</sup></li> </ul>
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### SECOND-YEAR MODULES

<p>Level 2.1</p> <ul style="list-style-type: none"> <li>Interactive Storytelling</li> <li>User Experience Design</li> <li>Portfolio Project 3</li> <li>3 Prescribed Modules/Electives*</li> <li>Any 2 Interdisciplinary Studies (IS) modules<sup>^</sup></li> </ul>	<p>Level 2.2</p> <ul style="list-style-type: none"> <li>Digital Audio Design</li> <li>Portfolio Project 4</li> <li>4 Prescribed Modules/Electives*</li> <li>Innovation &amp; Enterprise in Action<sup>^</sup></li> </ul>
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### FINAL-YEAR MODULES

<p>Level 3.1</p> <ul style="list-style-type: none"> <li>Multimedia Project Management</li> <li>Concept Development Project</li> <li>World Issues: A Singapore Perspective<sup>^</sup></li> <li>Any 1 Interdisciplinary Studies (IS) module<sup>^</sup></li> </ul>	<p>Level 3.2</p> <ul style="list-style-type: none"> <li>Industrial Attachment Programme</li> </ul>
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In the second year, students may opt to specialise in 3D animation or interactive media.

<p><b>3D Animation</b></p> <ul style="list-style-type: none"> <li>Basic Animation</li> <li>Cinematography</li> <li>3D Modelling</li> <li>3D Character Animation</li> <li>Advanced 3D Modelling</li> <li>Advanced 3D Character Animation</li> <li>Audio &amp; Video Fundamentals &amp; Editing</li> </ul>	<p><b>Interactive Media</b></p> <ul style="list-style-type: none"> <li>Multimedia Database Design</li> <li>Developing Rich Internet Application</li> <li>Systems Analysis &amp; Design</li> <li>Game Authoring</li> <li>3D Game Authoring</li> <li>3D Modelling</li> <li>Audio &amp; Video Fundamentals &amp; Editing</li> </ul>
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\* The electives and the specialisation options offered are reviewed regularly and subject to updates to ensure relevance to industry needs. They may also include modules offered in other diplomas offered by the School.

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

## COURSE MODULES

### LEVEL 1.1

#### Digital Photomedia

This module introduces basic photographic techniques and aesthetic principles in the context of design. It covers the role of photomedia concepts and the production of visually effective images, and the creative use of photography within an interactive multimedia context. The module explores the technical issues of photography, and covers studio lighting techniques and working with situational lighting.

#### Drawing Fundamentals

This module presents the fundamentals of drawing as practised by production artists and animators; in particular, figure drawing, basic elements of gesture drawing, quick sketch, volume and depth techniques to capture action and attitude. There is a focus on drawing for weight, force, thought, emotion and movement. Perceptual skills are emphasised along with the use of line, shade, perspective and composition.

#### Fundamentals for Creative Professionals

This module examines the creative, gaming and IT industries as well as the broad roles and responsibilities of various professionals in the industries and their tools. It provides an overview of the way that the creative and gaming project is funded and marketed, and the relationships among publishers, developers, distributors, marketers and retailers. It surveys the various international legal systems and introduces students to the basic structure of contracts.

#### Graphic Design Fundamentals

This module explores the creative process of displaying, organising and communicating ideas and information through words and images. It introduces the principles of 2D image-making with an emphasis on visual communication. The module covers basic design concepts, including the use of image, symbol and colour in visual communication, various principles of perception in an ethnically diverse and international audience, as well as the principles of typographic composition, structure and message hierarchy.

#### Programme Design & Authoring

This module introduces the software development process and programme design principles. It advocates an object-oriented way of thinking, and systematic problem solving and authoring to develop and manage relatively large and complex programming jobs. Topics covered include problem discovery and specification, structured decomposition design technique, programme module design using the Stepwise Refinement method, software quality management and assurance, and design documentation.

### LEVELS 1.1, 1.2, 2.1, 2.2

#### Portfolio Projects 1, 2, 3 & 4

These modules provide students with the opportunity, time and space to prepare and consolidate some or all of their best works, and, if necessary, recreate or refine the works into printed and digital portfolios. The modules are aimed at encouraging students to reflect on the knowledge and skills they have acquired and relate these to their career interests and goals.

## LEVEL 1.2

### Animation Principles & Techniques

This module introduces students to the history of animation as well as the principles and practices of 2D vector animation through classical animation techniques. Students explore the art of creating convincing movement, emotion and personality through gesture and good timing, spacing and drawing. The goal of this module is to introduce the sequential image methods used by animators to “act” and bring characters to life. There is a special focus on critical thinking and refinement strategies when modifying vector images.

### Game Design

This module presents the principles and methodologies behind the rules and play of games. It studies the systematic game design approach and explores the fundamental ideas behind the design of electronic and non-electronic games with respect to achieving a total game experience. Topics covered include psychological design considerations, play testing, game tuning, player analysis, and the integration of visual, audio, tactile and textual elements.

### Problem Solving & Programming

Building on knowledge learnt in the earlier module on Programme Design & Authoring, this module covers object-oriented design and programming concepts for interactive media applications. It focuses on developing appropriate data structures and algorithms to handle relatively large and complex programming problems. The aim is to develop students’ analytical, problem solving and creative thinking skills in tackling programming problems.

### Scriptwriting, Storyboarding & Storytelling

This module surveys the fundamentals of scriptwriting, linear storytelling and storyboarding techniques and formats for animation and multimedia applications. It gives an overview of the various writing techniques of the different genres of narrative film. It aims to develop students’ ability to create story flow, and develop a character and its mood.

### Visual Interface & Information Design

This module explores both the aesthetic and information components associated with creating effective computer-based interfaces. It introduces the key principles and techniques of creating aesthetically pleasing visual interfaces for digital presentations that make use of various media elements such as video, images, and other special effects. The module also looks at human factors and the underlying cognitive processes that determine the best way to present information to meet users’ needs.

## LEVEL 2.1

### Interactive Storytelling

This module examines the nature of storytelling and exposes students to the historical traditions of storytelling in all forms. It covers the classical elements of story structure, traditional story goals and narrative theory, critical thinking strategies for matching story form to a specific goal, character development, plot, dialogue, backstory and world creation pertaining to games. Students also learn the technical aspects of writing for non-linear medium, algorithmic storytelling and collaborative story construction.

## User Experience Design

This module focuses on how to design the total user experience for human-computer interaction. It focuses on the value chain of interface activities, and looks at design from the information, interaction and sensorial perspectives. Students learn how to design the user experience through forms, functions, usability and aesthetics. The cognitive aspects of engagement and the psychological aspects of play or experience are also discussed.

## LEVEL 2.2

### Digital Audio Design

This module provides a broad introduction to the basic production techniques of audio and sound effects, the equipment used, and the procedures that will make moving images come alive. It also explores how sound is used to advance a story and create mood, place and emphasis. Students learn about post-production processes and techniques of combining computer-generated imagery with audio, voice narration and sound. The techniques of microphone placement and recording, editing and manipulation are also covered.

## LEVEL 3.1

### Multimedia Project Management

This module examines every aspect of managing a project in a technology environment, from assembling the right team to figuring out a schedule, estimating the resources required, and monitoring its progress. The module covers real-life project management problems and students will learn to communicate these issues effectively with electronic media.

### Concept Development Project

This module introduces students to the realities of team-based production environments. Students are required to work in a multidisciplinary project team, identify a real-life problem situation to solve, conduct research and experiments, and create a prototype that demonstrates elements of innovation and enterprise.

## LEVEL 3.2

### Industrial Attachment Programme

This module provides students with the opportunity to apply the knowledge and skills gained to develop IT solutions to solve a practical problem. Students may undertake a real-life IT project in an organisation that may include problem definition, requirements analysis, design, development and testing, delivery and presentation of the solution. Through the project, they will learn to appreciate the finer points of project planning and control issues relating project development.

## PRESCRIBED MODULES BY SPECIALISATION OPTION

### Developing Educational Games & Simulation

This module deals with learning strategies that make some activities interesting or fun without compromising an instructional quality. It focuses on the systematic design of educational games and simulations, as well as the cognitive, affective and motivational side of instruction and learning. It explores various learning models such as the flow model, ARCS model, intrinsic motivation taxonomy in games and simulation design.

### Instructional Design

This module introduces a systematic process to design instructions in which every component – the teacher, learners, materials, learning activities, and learning environment – is integral to successful learning. The module examines assessment instruments, evaluation methods, and the instructional management system as the three critical elements in any good instructional design. Also covered in this module are learning and instructional design theories, the psychological aspect of learners in learning, the process of learning, and learning characteristics.

### 3D ANIMATION SPECIALISATION OPTION

#### Basic Animation

The module further explores the classical two-dimensional animation principles and techniques. It also provides opportunities for students to develop competency in industry-standard 2D and 3D software tools.

#### Cinematography

This module explores cinematography techniques for video production, computer animation and gaming. Students become familiar with the role of key figures in a video production and the theoretical aspects of managing a production. Also covered are appropriate camera composition, camera movements and lighting techniques to enhance the visual impact of the story being told, reveal action, and establish the focus, place and mood of the story.

#### 3D Modelling

This module presents the basic principles and techniques of building 3D objects and environments that are utilised in the production of computer 3D animation. It introduces techniques and critical thinking for organic and inorganic modelling, polygonal modelling, patch modelling and rigging. It also covers anatomical structuring using Nonuniform Rational B-Splines (NURBS) and Sub-Division Surface Modelling. Basic texture mapping, lighting, shading, rendering and camera set-ups are explored.

#### 3D Character Animation

In this module, students continue to explore and apply the concepts and techniques of animation. The module further develops their understanding of character development, cinematic narrative and expressive movement – the expression of personality, mood, thought and attitude – through motion and posing by applying scripted character controls. Topics covered include timing, weight, anticipation, squash and stretch, conveying simple emotions/interactions, and other animation techniques.

#### Advanced 3D Modelling

This module focuses on human figure and facial modelling. Rigging of characters is accomplished with skeletal structures and animation control set-up. Computer models created reflect true human facial expressions, personality and characteristics.

#### Advanced 3D Character Animation

The module highlights how character animation influences character personality. The expression of emotion, timing, and the subtlety of character are explored. Lip-synching and dialogue animation are also presented.

### Audio & Video Fundamentals & Editing

This module introduces the fundamental concepts of desktop digital audio and video editing applicable to multimedia application development. Students gain practical experience by using industry-standard capturing cards, digital cameras and editing software. The emphasis will be on the understanding of basic capturing, editing, compressing and distributing techniques.

### INTERACTIVE MEDIA SPECIALISATION OPTION

#### Multimedia Database Design

This module focuses on the fundamental principles and concepts of multimedia database systems to store and structure information in an organisation. Students learn to analyse data, perform data modelling and normalisation to design an effective multimedia database, using relevant theories and concepts of relational and object-oriented database systems.

#### Developing Rich Internet Applications

This module equips students with the knowledge and skills needed to develop media-rich Internet applications. Various client-server architectural concepts are introduced. Students learn about client- and server-side programming, and basic multi-users database connection and access.

#### Systems Analysis & Design

This module introduces students to a methodical approach with appropriate diagramming techniques to analyse and design an information system that meets business requirements and objectives while being robust and extensible enough to adapt to future changes or enhancement.

#### Game Authoring

This module introduces students to the basic 2D object-oriented games development and its developmental stages. Students learn how to develop a basic reusable game engine and use it to implement a simple role-playing and strategy-based games, or any other appropriate game genre.

#### 3D Game Authoring

This module covers the basic design and development concepts of single-player interactive 3D games. It introduces basic 3D Mathematics and Physics, data structures and algorithms, artificial intelligence (AI) and rule building, along with techniques for working with graphics and sound assets, performance optimisation, and the technical aspects of game testing.

### COURSE CURRICULUM

Module No.	Module Name	Credit Units
<b>YEAR 1</b>		
<b>Level 1.1 (26 hours per week)</b>		
1.	Digital Photomedia	4
2.	Drawing Fundamentals	4
3.	Fundamentals for Creative Professionals	4
4.	Graphic Design Fundamentals	4
5.	Programme Design & Authoring	4
6.	Portfolio Project 1	2
7.	Creativity & Applied Thinking Skills <sup>^</sup>	2
8.	Sports & Wellness <sup>^</sup>	2

Module No.	Module Name	Credit Units
<b>Level 1.2 (26 hours per week)</b>		
9.	Animation Principles & Techniques	4
10.	Game Design	4
11.	Problem Solving & Programming	4
12.	Scriptwriting, Storyboarding & Storytelling	4
13.	Visual Interface & Information Design	4
14.	Portfolio Project 2	2
15.	Individual & the Community <sup>^</sup>	2
16.	Communication Toolkit <sup>^</sup>	2
<b>YEAR 2</b>		
<b>Level 2.1 (26 hours per week)</b>		
17.	Interactive Storytelling	4
18.	User Experience Design	4
19.	Prescribed Module /Elective	4
20.	Prescribed Module /Elective	4
21.	Prescribed Module /Elective	4
22.	Portfolio Project 3	2
23.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
24.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 2.2 (26 hours per week)</b>		
25.	Digital Audio Design	4
26.	Prescribed Module /Elective	4
27.	Prescribed Module /Elective	4
28.	Prescribed Module /Elective	4
29.	Prescribed Module /Elective	4
30.	Portfolio Project 4	2
31.	Innovation & Enterprise in Action <sup>^</sup>	4
<b>YEAR 3</b>		
<b>Level 3.1 (20 hours per week)</b>		
32.	Concept Development Project	12
33.	Multimedia Project Management	4
34.	World Issues: A Singapore Perspective <sup>^</sup>	2
35.	Interdisciplinary Studies (IS) module <sup>^</sup>	2
<b>Level 3.2 (25 hours per week)</b>		
36.	Industrial Attachment Programme	25

#### Notes:

<sup>^</sup> For more details on Interdisciplinary Studies (IS) modules, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/)

#### 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.

## SPECIALIST DIPLOMA IN DATA COMMUNICATIONS & NETWORKING (SD-DCN) (1-YEAR PART-TIME COURSE) SCHOOL OF INFOCOMM TECHNOLOGY

The **Specialist Diploma in Data Communications & Networking (SD-DCN)** provides a comprehensive education in the field of data communications and networking.

This course empowers students to become specialists in a networking environment with knowledge and skills in the design of communication and Internet-based systems, the installation and testing of communications software and services, and the planning and management of network systems.

#### COURSE STRUCTURE

The Specialist Diploma in Data Communications & Networking consists of three modules:

- Network & Systems Security (120 hours – 1st semester)
- Systems Administration (60 hours – 2nd semester)
- Network Management (60 hours – 2nd semester)

The Network & Systems Security module covers the design and implementation of a data network that supports an organisation's communication and security issues.

The Systems Administration module focuses on the installation, configuration, administration and operation of network operating systems, including Microsoft Windows, Linux and UNIX operating systems. Web server administration is also covered.

Besides providing a comprehensive coverage on data network management, network performance evaluation and router management, the Network Management module will also focus on data network management using tools such as HP Openview, and on some network administration topics that include Storage Area Network (SAN), backup, email set-up and other network services.

Students are expected to do some preparatory studies prior to the course. Each semester runs for 15 weeks.

This diploma is administered by the Centre for Professional Development (CPD). For more information about this course, please log on to [www.np.edu.sg/is/cpd](http://www.np.edu.sg/is/cpd) or contact the CPD at 64606353.