

COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (27.5 hours per week)	
Career & Professional Preparation I	1.5
Computer Programming	4
Engineering Mathematics 1	5
IT Service Management	3
Linux Servers	4
Network Fundamentals [@]	6
Innovation Toolkit 1 [^]	2
Sports & Wellness [^]	2
Level 1.2 (28 hours per week)	
Applications Programming	4
Basic Routing & Switching [@]	6
Digital Logic	3
Engineering Mathematics 2	5
Windows Servers	4
Communication & Contemporary Issues [^]	4
Innovation Toolkit 2 [^]	2

Notes:

@ Network Fundamentals, Routing, Local Area Networks & Wide Area Networks will help students prepare for CCNA Routing & Switching certification and Network Security for CCNA Security Certification (provided by external test centres).

Advanced Routing and Advanced Switching will help students prepare for CCNP Routing & Switching certification (provided by external test centres).

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

IS Modules

The School of Interdisciplinary Studies (IS) delivers a broad-based curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge economy. IS offers both prescribed modules and electives to challenge boundaries. Prescribed modules develop students' competencies in core areas such as Communication, Innovation and Enterprise, Culture and Communication, and Personal Mastery and Development, while elective modules provide insights into Arts and Humanities, Business, Design, and Science and Technology.

COURSE MODULES

LEVEL 1.1

Career & Professional Preparation I

This module helps to give students a foundational introduction to their three-year diploma course curriculum and how it prepares them for industry. It will help them to embark on their three-year course with the end in mind,

through guided reflection of their personal characteristics, and producing an overall game plan for their future education and career goals. The module aims to deepen students' commitment to the sector that the course prepares them for.

Computer Programming

This practice-oriented module equips students with basic knowledge and skills in computer programming using C language. The main topics include basic computing concepts, fundamentals of C, branching, loops, and C functions. On completion of the module, students will be able to explain and write C programmes for simple engineering applications.

Engineering Mathematics 1

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast with the application requirements in engineering modules. The emphasis in each topic is on applications and problem solving. Topics include algebra, trigonometry, logarithms, plane analytic geometry, matrices and complex numbers.

IT Service Management

This module covers organisation of IT resources to deliver business value, documenting the processes, functions and roles of IT Service Management (ITSM) in the context of project management. Concepts include detailed descriptions of important IT practices with comprehensive checklists, tasks and procedures IT organisations can use to meet their business needs.

Network Fundamentals

This module covers theoretical concepts and practical applications needed to design networks in small-to-medium businesses. Key concepts include the data networks, protocols in communications, OSI model, TCP/IP model, addressing & naming schemes in network communication.

Linux Servers

This module covers the basics of Linux operating system and server. Concepts include the use of Linux commands to access and manage directories, files, setting of file security and access rights and basic servers' implementation, such as DNS and DHCP in a network.

LEVEL 1.2

Applications Programming

This practice-oriented module equips students with the knowledge and skills required to develop Windows applications. Students will acquire the conceptual understanding to design and develop applications to solve business and engineering problems. Main topics include branch and loop, array, data files accessing and methods.

Basic Routing & Switching

This module covers the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this module, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPng, single-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks, access control lists, DHCP and NAT.

Digital Logic

This module provides students with fundamental knowledge and skills in logic design. Students will learn about the combinational and sequential logics and how to design and use them to control digital systems. A project will be used to reinforce students' learning and help them to relate their learning to real-life examples.

Engineering Mathematics 2

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application

requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Topics include further trigonometry, differentiation with applications, and basic integration with applications.

Windows Servers

This module covers server manager roles, features of server, implementation of Windows Server in a network. Concepts include DNS, server core, network policies & access protection, deployment services, server virtualisation, high availability features performance monitoring and optimisation.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 2	
Level 2.1 (23 hours per week)	
Engineering Mathematics 3A	4
Information Security	4
Intermediate Routing & Switching [@]	5
Object-Oriented Programming	5
Project Management	3
Network Fundamentals [@]	6
Interdisciplinary Studies (IS) elective [^]	2
Level 2.2 (24 hours per week)	
Career & Professional Preparation II	2
Cloud Computing & Data Centres	5
Network Security [@]	5
Wide Area Networks [@]	5
Windows Servers	4
Interdisciplinary Studies (IS) elective [^]	2
NETWORK & CLOUD ARCHITECTURE SPECIALISATION	
Internet of Everything	5
DATA SECURITY & FORENSICS SPECIALISATION	
Server Administration & Security	5

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COURSE MODULES

LEVEL 2.1

Career & Professional Preparation II

This module helps to equip students with skills necessary to seek and secure work. They will also be equipped to communicate their personal brand in a positive way. As students sharpen their communication skills, they will also learn how to market themselves effectively.

Engineering Mathematics 3A

This module is designed to provide students with further mathematical skills to solve basic engineering related problems. The topics are introduced in an order that is intended to keep abreast of the application requirements in their other engineering modules. Topics included in this module are integration with applications, differential equations, Laplace Transform and Fourier Series.

Information Security

This module covers management and administration of Information Security. Concepts include security threats, security incidents, risk assessment and mitigation, information security policy, procedures, guidelines and standards, security administration, physical security and configurations and administrations of current OS systems. Relevant Singapore IT Law and governance issues will also be covered.

Intermediate Routing & Switching

This module covers the architecture, components and operations of routers and switches in larger and more complex networks. Students learn how to configure routers and switches for advanced functionality. By the end of this module, students will be able to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, STP and HSRP in both IPv4 and IPv6 networks. Students will also gain the knowledge and skills needed to implement a WLAN in a small-to-medium network.

Object-Oriented Programming

This module builds on the foundation of the Applications Programming module and introduces the concepts of Object-Oriented Programming to the students. It covers the areas from the fundamental concepts of Object-Oriented Programming to Web forms, database access, and some graphics and animation.

Project Management

This module uses case studies to teach project management principles, strategies & tools, planning a project, estimating project costs, developing the project schedule, executing the project, justifying project costs, managing project quality, managing project risk, software configuration management, interacting with project stakeholders and outsourcing the project.

LEVEL 2.2

Cloud Computing & Data Centres

This module provides an overview of cloud computing and data centres. Concepts include virtualisation as a foundation for cloud computing, issues related to implementation of cloud computing and data centres, cloud

services like Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). It also covers simple architecture, design, implementation, management and security of public and private clouds.

Network Security

This module covers network security, intrusion detection, securing an organisation's wired and wireless network infrastructure. Concepts include network security threats and attacks, designing resilient networks, configuring network components such as firewall, setting up Virtual Private Network (VPN) and securing wireless connections.

Wide Area Networks

This module covers implementation and configuration of common data link protocols and application of WAN security concepts, principles of traffic, access control, and addressing services. Concepts include PPP, Frame Relay, NAT & PAT, DHCP and IPv6.

NETWORK & CLOUD ARCHITECTURE SPECIALISATION

Internet of Everything

This module covers IP communications used in voice, music, video and data in order to implement solutions that are best suited for their storage and transmission. Concepts include sampling theorem, analog & digital communications, aliasing, codecs, QoS, digital media and IP routing in IoE.

DATA SECURITY & FORENSICS SPECIALISATION

Servers Administration & Security

This module covers provisioning and management of secured server systems, software services and hosting environment. Concepts include secured configuration, system hardening, access and activity authentication, authorisation and monitoring of DNS server, Web server & security, SSL, DHCP, Mail server, Samba server, Proxy server, SSH server and FTP server.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 3	
Level 3.1 (24 hours per week)	
Common Modules	
Cloud Architecture & Security	5
Network & Cloud Design	5
Interdisciplinary Studies (IS) module ^	2
World Issues: A Singapore Perspective ^	2
NETWORK & CLOUD ARCHITECTURE SPECIALISATION	
Advanced Routing #	5
Advanced Switching #	5
DATA SECURITY & FORENSICS SPECIALISATION	
Computer & Network Forensics	5
Ethical Hacking & Countermeasures	5
Level 3.2 (22 hours per week)	
6-Month Internship	22

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COURSE MODULES**LEVEL 3.1****Cloud Architecture & Security**

This module covers the design, implementation, management and security of public and private clouds. Concepts include the architecture of cloud and establishment of data integrity and privacy for Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

Network & Cloud Design

This module equips students with the skill sets needed to design high availability secure enterprise networks with server farms, data centres and remote access to all these servers to deliver cloud services.

NETWORK & CLOUD ARCHITECTURE SPECIALISATION**Advanced Routing**

This module teaches students how to implement, monitor and maintain routing services in an enterprise network. Students will learn how to plan, configure, and verify the implementation of complex enterprise LAN and WAN routing solutions, using a range of routing protocols in IPv4 and IPv6 environments. The module also covers the configuration of secure routing solutions to support branch offices and mobile workers. Comprehensive labs emphasise hands-on learning and practice to reinforce configuration skills.

Advanced Switching

This module covers campus switched network construction, implementation of advanced Spanning Tree concepts, VLANs and Inter-VLAN routing, high availability, wireless client access, access layer voice concepts, minimising service loss and data theft in a campus network.

DATA SECURITY & FORENSICS SPECIALISATION**Computer & Network Forensics**

This module covers the techniques and tools for computer and network forensics investigations. Skill sets include the use of the most popular forensic tools for hands-on activities in practical lessons.

Ethical Hacking & Countermeasures

This module covers the offensive and defensive knowledge of network security. Concepts include understanding and appreciation of the need for network security, securing the network effectively from anomalous traffic, mitigating risk from worm and virus infections, detection of SYN and spoofing attacks using various network tools.

LEVEL 3.2

6-Month Internship

In this module, students will be attached to sponsoring companies for a period of approximately six months. During their internships, they will undertake projects assigned by the company or be involved in operations or maintenance-related work. Student internships may be undertaken locally or overseas.

DIPLOMA PLUS PROGRAMME

The Diploma Plus Programme (DPP) is designed to provide students with proficiency in a selected domain area, either to broaden or deepen their knowledge/skills in their main discipline of study, or to equip them with additional professional knowledge that would better prepare them for further study or increase their employability. Students can select elective modules from a wide range of clusters to obtain their Diploma Plus Certificate. DPP is optional and it will not affect the graduating requirement for the award of a diploma.

Students can choose the DPP clusters from the list below. The offer of a DPP cluster is subject to the condition that the minimum class size is met and based on available vacancies.

Engineering Clusters

- Applied Physics[#]
- Computer & Communication Systems

Other available Diploma Plus Certificates

- Advanced Engineering Mathematics^{*}
- Business
- Foreign Languages

[#] The Applied Physics syllabus is aligned with the NTU's FE1012: Physics A module. NP students who obtain good grades in the Applied Physics modules will be granted exemption from the FE1012: Physics A module.

^{*} The CAEM syllabus is aligned with the 'A' Level H2 Pure Mathematics syllabus. NP graduates who have successfully completed the revised CAEM will be granted exemption from the NUS' MA1301 Proficiency Test.