JAE CODE C85

Diploma in

Information Technology

RANGE OF NET ELR2B2: 6 - 14

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Diploma in Information Technology

is for you if you want to build a better world by leveraging technologies such as Artificial Intelligence and cloud computing.

Ever wondered how your ride-hailing app can identify the nearest available car, or how Facebook recognises you in photos? This course links you to the areas of IT that make these possible. Learn to develop innovative software solutions and get a foot in the door to the world of AI or cloud computing.

This diploma lets you...

- Discover how AI and machine-learning play crucial roles in our everyday lives.
- Build a strong foundation in programming and gain practical skills in developing innovative solutions.
- Look forward to an exciting career in building IT solutions across industries.

Career paths

- AI Specialist
- Application Consultant
- Cloud Architect
- Information Security Analyst
- Mobile Application Developer
- Project Manager

Course Learning Outcomes

- Apply knowledge and skills in programming and problem solving to develop IT applications for users.
- Analyse and design IT solutions based on user requirements and established software development practices across diverse industries
- Demonstrate professional project management competencies in the design and implementation of innovative IT enterprise applications for businesses.

Additional Information
(Not available in your course booklet)

Course curriculum

View Synopses

YEAR 1

CORE MODULES

- App Development Project
- Business Statistics
- Computing Mathematics
- Data Analysis & Visualisation
- Digital Business
- Effective Communication Skills
- Fundamentals of Innovation & Enterprise
- General Studies
- Infocomm Security
- Law & Ethics of IT
- Network Technology
- Principles of UX Design
- Programming Essentials
- Web Development

YEAR 2

CORE MODULES

- Advanced Programming
- Application Security
- Communication & Personal Branding
- Data Structures & Algorithms
- Database Management Systems
- Enterprise Development Project
- Full Stack Development Project
- General Studies
- Market Research & Technology Trends
- Mobile Application Development
- Operating Systems & Administration
- Software Engineering
- UX Design Methods & Techniques

YEAR 3

CORE MODULES

- Final Year Project
- General Studies
- Governance, Risk & Compliance
- Internship Programme or Overseas Internship Programme

PRESCRIBED ELECTIVES (Choose one specialisation)

ARTIFICIAL INTELLIGENCE
- Advanced Topics in AI
- AI Applications Project
- Foundation of AI
- Machine Learning Techniques

ENTERPRISE CLOUD COMPUTING
- Cloud Application Development
- Cloud Architecture
- Enterprise Cloud Project
- Enterprise DevOps

GEOSPATIAL & MOBILE INNOVATION
- Cloud Computing
- Geospatial & Mobile Innovation Project
- Geospatial Information System
- Spatial Analysis & Visualization

CYBERSECURITY
- Cyber Forensic Technologies
- Cybersecurity Attack & Defense
- Cybersecurity Project
- Mobile Security

CROSS-DISCIPLINARY ELECTIVE

(Choose one Prescribed Elective module from any SIT diploma course)

- Disaster Recovery & Business Continuity Management
- Entrepreneurship
- Robotic Process Automation
- Social Media Analytics

*Modules may be revised to align learning content with developing trends and technologies.

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course curriculum *synopses*

Additional Information
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YEAR 1

CORE MODULES

- **App Development Project**
  Students will learn the concepts of object-oriented programming, including classes, encapsulation, inheritance and polymorphism and apply them to construct practical software components that are maintainable and extensible. Students will work in teams to develop, test and implement innovative and interactive applications to solve real life problems using design thinking approach and agile process.

- **Business Statistics**
  Students will learn statistical knowledge that are useful and relevant for business applications. Topics include descriptive statistics using numerical measures, regression and correlation analysis, discrete and continuous probability distributions, sampling distribution, statistical estimation and hypothesis testing. Students will be equipped with knowledge and skills to transform data into useful knowledge and information for business decision-making.

- **Computing Mathematics**
  Students will be equipped with the knowledge in mathematics and analytical skills for developing algorithms in programming. The topics they learn include Number System, Set Theory and Logic, Matrices, Relations, Functions, Differentiation and Integration.

- **Data Analysis & Visualisation**
  Students will learn the fundamental concepts of visual representation of data for effective communication of information and data analysis. They will be equipped with knowledge of data visualisation approaches for various data types, data mining methods and emerging data visualisation trends. They will also learn how to use software tools to extract, cleanse and transform data into useful information for analysis and better business decision making.

- **Digital Business**
  Students will learn the goals and essentials of business operations and the various industries that businesses operate in. They will learn how industries, such as the financial services industry, use digital technologies to transform their businesses. Students will be equipped with a strong foundation in the underlying technologies such as digital payments; data analytics and block-chain that are transforming the way businesses and the financial industry deliver products and services to customers. Students will be able to explain how digital marketing can empower businesses to engage with prospects and customers.

- **Effective Communication Skills**
  Communicating well is a vital life skill, benefitting all aspects of our lives from professional life to social gatherings. It is thus important to be proficient in both written and oral communication. This module will enable learners to communicate effectively in different settings and on different collaborative platforms. There will be opportunities to practise and deliver various types of presentations, to learn to competently handle questions, and to effectively incorporate verbal and non-verbal elements when speaking. Learners will also acquire media and info literacy, and be able to produce clearly written and well-structured reports and proposals, following standard citation and referencing guidelines.

- **Fundamentals of Innovation & Enterprise**
  Students will develop attributes that are pervasive and synonymous with being innovative and enterprising for career and life. Through this module students will develop positive practices when working with data, propose ideas using user-centric approaches and design processes, determine and locate resources, and leverage collaborative practices to formulate solutions.

- **General Studies**
  To provide you an all-rounded education, NYP offers General Studies Modules (GSMs). So besides taking modules related directly to your chosen diploma course, you will get exposed to areas beyond your usual field of study. Through a combination of prescribed and elective inter-disciplinary GSMs, you will gain interesting, practical knowledge that can be beneficial to you as you prepare for the world of work and life after graduation.

- **Infocomm Security**
  Students will learn basic concepts and principles of information security from personal and enterprise perspectives. It provides an understanding of information security trends, security threats, security incidents, security policies, procedures and guidelines.

- **Law & Ethics of IT**
  Students will be able to understand the law and ethics surrounding the use of IT. They will be able to describe issues such as intellectual property rights protection and infringement, copyrights and plagiarism, software piracy, computer crimes, Internet fraud, objectionable materials and confidentiality in the information age. They will also be able to articulate Singapore's laws on cybersecurity, data privacy, etc.

- **Network Technology**
  Students will acquire foundation knowledge on how communication networks operate and services they provide. It covers essentials of the Internet including its various services such as email and the web. Students will be able to design and implement network for small and medium enterprises, perform basic configurations for networking devices, and implement IP addressing schemes.

- **Principles of UX Design**
  Students will appreciate the concepts of User Experience (UX) and UX design. They will understand the fundamentals in visual design and apply user-centred design principles and techniques in design prototyping. They will also gain knowledge of best practices and evaluation methods and use them in analysing and evaluating designs of web and mobile applications.

- **Programming Essentials**
  Students will learn the basic concepts and principles behind computer programs, and the building blocks that are used to create them. Students will understand fundamental programming constructs and basic data structures that will help them to apply their knowledge of computational thinking in practical ways. They will also learn to develop strategies for testing, debugging and apply their programming skills to develop algorithms to solve computational problems.

- **Web Development**
  Students will learn the basic concepts of the Internet and hypertext, and how these concepts are integrated to provide World Wide Web applications over the Internet. They will first focus on learning the theory behind current web-based development tools and technologies including HTML, CSS and JavaScript to develop interactive and rich media web pages. Students will then advance to learning how to create optimized responsive web pages for optimal viewing on devices with different screen size and resolution.

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YEAR 2

CORE MODULES

- **Advanced Programming**
  Students will have a panoramic view of various programming language paradigms. It covers the mainstream programming languages paradigms such as imperative, procedural and object-oriented programming. In addition, students will learn about functional, declarative and constraint-logic programming paradigms. The module also facilitates in-depth discussion on how various programming paradigms are affecting the current trends of software technologies such as big data analytics application, reactive user interface in mobile and web applications, software quality and security, as well as artificial Intelligence.

- **Application Security**
  Students will learn the concepts and security by design principles in application security that includes the methods, processes, tools and technologies in developing secured and security-enabled applications. Students will also learn how use tools and methods to perform security-testing techniques to identify and mitigate security vulnerability related to an application.

- **Communication & Personal Branding**
  In today's competitive environment, a strong personal brand sets one apart from others. In this module, learners will develop techniques to impress and persuade others to accept their ideas. They will also learn how to communicate effectively over e-mail. To support their job search, learners will use digital portfolios to showcase their abilities, as well as gain the knowledge and skills to promote their capabilities in their cover letters and resumes. They will also acquire skills to project themselves positively and for performing well at interviews.

- **Data Structures & Algorithms**
  Students will learn how to use concepts of data structures and algorithms for effective problem solving. Topics such as arrays, dynamic data structures, stacks, queues and algorithms for searching and sorting will be covered.

- **Database Management Systems**
  Students will learn to design and implement a relational database. They will learn the components of database systems, the conceptual, logical and physical design of relational databases. It covers skills in accessing and manipulating database systems through the use of SQL (Structured Query Language).

- **Enterprise Development Project**
  This module introduces students to large-scale software development for the enterprise. Students will learn to identify issues related to enterprise application development, involving team collaboration, enterprise component development, security, integration, testing, deployment and maintenance. Students will learn how to apply the best practices to build secure and scalable enterprise application using the latest enterprise development tools.

- **Full Stack Development Project**
  In this module, students will learn to create end to end scalable applications by getting proficient at working with both front and back-end technologies and frameworks. They will learn how to do basic server management, perform database integrations, and troubleshoot front and back-end development issues. Students will be put through the entire process of development from design to actual deployment to create an application from the ground up using the agile iterative development process.

- **General Studies**
  To provide you an all-rounded education, NYP offers General Studies Modules (GSMs). So besides taking modules related directly to your chosen diploma course, you will get exposed to areas beyond your usual field of study. Through a combination of prescribed and elective inter-disciplinary GSMs, you will gain interesting, practical knowledge that can be beneficial to you as you prepare for the world of work and life after graduation.

- **Market Research & Technology Trends**
  This module enables students to understand the latest trends and technologies that are evolving in the IT industry. Students will also learn about the market leaders in emerging technology, and gain deeper insight into the capability and suitability of technology providers' products and services based on specific use cases.

- **Mobile Application Development**
  In this module, students will be equipped with knowledge to perform, manage mobile application development activities and implement mobile applications that address business requirements. Students will learn to develop mobile applications using best practices, recommended tools and design principles. Students will also utilise essential libraries for persistence, notifications, background data synchronization and cloud-based services to build mobile application with seamless user experience.

- **Operating Systems & Administration**
  Students will learn fundamental concepts of operating systems, including the different types of operating systems, the core components of operating systems and their related algorithms and security features. Students will acquire skills in system administration and shell script programming for Windows and Linux.

- **Software Engineering**
  Students will learn to explain the concepts and methodologies to construct high quality software systems and to manage software projects. It covers Unified Process and Agile Software Development Process. A fundamental understanding of good software design principles will be discussed, including the illustration of object oriented analysis and design development. UML is used to facilitate the modelling of analysis and design. Students will explore various software testing techniques to identify the test cases for software validation. They will also understand concepts of DevOps that enable fast delivery of business values in a changing world.

- **UX Design Methods & Techniques**
  The module guides the students through User-Centred Design process to carry out UX research and analysis within the web and mobile development domain, covering topics such as brainstorming, prototyping, measuring UX and problem solving. Students will learn to standard interface designs that are essential for creating applications with great consistency and seamless user experience.

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YEAR 3

CORE MODULES

- **Final Year Project**
  The Final Year Project module gives students the practical experience of carrying out a software development project from project requirements, implementation, testing to delivery and presentation of the software. The students will go through a software process with deliverables at different stages of the process. The projects often require students to learn and apply new technologies and software tools that are beyond the boundary of the course curriculum. This will inculcate independent and life-long learning. The engagement of industry projects provides an added dimension for students to think market place, appreciate windows of opportunity and see things from the eyes of the customers, while concurrently subjected to the real-life requirements of quality, cost-effectiveness and time-to-market. The students will have the opportunity to put project management into good practice. The above areas are not meant to be exhaustive. In general, all projects which are relevant to the course will be given serious consideration.
- **General Studies**
  To provide you an all-rounded education, NYP offers General Studies Modules (GSMs). So besides taking modules related directly to your chosen diploma course, you will get exposed to areas beyond your usual field of study. Through a combination of prescribed and elective inter-disciplinary GSMs, you will gain interesting, practical knowledge that can be beneficial to you as you prepare for the world of work and life after graduation.
- **Governance, Risk & Compliance**
  Students will learn about IT governance and regulatory compliance of today's business environment. They will know how to apply risk management techniques in the formulation, design, implementation and maintenance of IT and security governance, relying on controls such as policies, procedures, infrastructure, technology and people. Students will be able to describe relevant regulations of today and explain how they can be complied with in the modern IT environment.
- **Internship Programme or Overseas Internship Programme**
  The 12/24-week internship programme at a local or an overseas company exposes students to a real-life work environment and facilitates a structured and integrated learning programme for them. They will get to apply the knowledge and skills that they have acquired to work practice. The programme will also enable them to gain a broader perspective and knowledge of the industry, companies and careers in respective professions. The students will get to experience the realities of a work environment and the importance of work values and culture. They will also get to deepen their relevant skills for them to be well-placed to pursue a career in their chosen discipline.

PRESCRIBED ELECTIVES *(Choose one specialisation)*

ARTIFICIAL INTELLIGENCE

- **Advanced Topics in AI**
  This module aims to provide students with the necessary concepts and theories in selected advanced AI application domains such as computer vision and natural language processing. Students will be equipped with the knowledge to apply tools and techniques required for the application domains.
- **AI Applications Project**
  Students will implement application that incorporates machine intelligence to solve real-world problems. Students will have the opportunity to apply the AI concepts and techniques learnt to design and build AI application using the appropriate machine learning tools and platforms.
- **Foundation of AI**
  This module equips students with a broad understanding of AI concepts and different approaches and techniques to building AI systems. Students will learn how to apply AI to solve some challenging problems today. Students will also understand the historical background of AI and understand the current and future development of AI and its societal impact.
- **Machine Learning Techniques**
  This module aims to provide students with a good foundation in practical machine learning concepts and techniques. Students will learn about the process of machine learning, and be able to apply various machine learning techniques, including deep learning, to different machine learning tasks.

GEOSPATIAL & MOBILE INNOVATION

- **Cloud Computing**
  Students will learn the concepts and core principles of cloud computing technologies. Student will also learn the basic architecture and different technology stacks of cloud computing, cloud application architecture, design principles and related security and governance best practices.
- **Geospatial & Mobile Innovation Project**
  Students will learn the concepts and principles of application design and development for smart devices. Using a mobile development platform, the students will learn the fundamentals of mobile programming and publishing of the applications to a mobile app store.
- **Geospatial Information System**
  Students will learn the concepts of a Geospatial Information System (GIS), techniques of incorporating geovisualization techniques and geoprocessing tools to support the processes of acquiring, analysing and visualizing GIS data.
- **Spatial Analysis & Visualization**
  Students will learn the key concepts of applying Geospatial Information System (GIS) in the mobile platform. Students will be able to apply the different types of spatial analysis and geovisualization techniques to design and develop GIS enabled mobile applications.

ENTERPRISE CLOUD COMPUTING

- **Cloud Application Development**
  Students will learn to design, develop and deploy enterprise solutions that seamlessly integrate components from the cloud ecosystem. They will understand the core cloud services and apply architecture best practices in building cloud applications that are scalable, reliable and secure.
- **Cloud Architecture**
  Students will learn the concepts and core principles of cloud technologies. They will learn to identify and gather requirements to define a solution to be built using cloud architecture best practices. Students will be equipped with knowledge to provide guidance on architectural best practices to cloud developers and system administrators throughout the lifecycle of the project.
- **Enterprise Cloud Project**
  Students will apply the concepts and techniques for cloud computing to design a scalable enterprise system. They will apply cloud architecture best practices and devops process in their design and implementation for continuous delivery. Students will also use cloud services in this project to create intelligent enterprise system that helps to solve real world problem.
- **Enterprise DevOps**
  Students will learn to provision systems, services and deployment automation on cloud infrastructure. They will learn to implement and manage continuous delivery systems and methodologies to implement systems that are highly secure, available, scalable and self-healing on the cloud platform. Students will learn to define and deploy monitoring, metrics and logging systems to automate operational processes.

CYBERSECURITY

- **Cyber Forensic Technologies**
  Students will learn how to use technologies and tools involved in digital evidence gathering, analysis and presentations for both investigative and legal purposes. Students will know about information recording, storage and retrieval technologies in magnetic, optical and electronic media, key industry standard volume and file system formats, techniques and technologies in information retrieval from a given media, duplication technologies and procedures, heuristic and procedural data analysis techniques of examining the captured data, including how to safeguard evidence and reporting the findings.
- **Cybersecurity Attack & Defense**
  This module equips students with tools and techniques used in both cyber attacks and defence. This includes techniques and tools used in foot-printing and social engineering, scanning and enumeration, system and network penetration, reverse engineering, planting Trojans, backdoors and hopping and escalating attack from the compromised systems. The students will learn penetration testing process and the ethical and legal aspects of penetration testing.
- **Cybersecurity Project**
  Students will learn how to apply the methods, processes, tools and technologies learnt in the course to identify, design and implement a cyber security solution to a selected problem. They will be able to work as a team to manage the project, including the risk and deliver a working solution. Students will learn to apply their knowledge in the development of a project, using skills acquired from this and other modules in the course.
- **Mobile Security**
  Students will learn about the framework of prevalent mobile platforms, including their respective security models. Students will learn the best practices in implementing secured mobile applications and solutions for enterprises and lifestyle users for selected device platforms. Students will be able to take advantage of the security configurations and user provisioning to mitigate threats against mobile users and their applications.