



SCHOOL OF INFOCOMM TECHNOLOGY

Information Technology (IT) and Interactive Digital Media (IDM) pervade many aspects of our lives today. In most parts of the world, search engines such as Google, and social media tools such as YouTube, Facebook, Twitter, Wikipedia and blogs have now become a part of everyday vocabulary.

This prevalence of IT and IDM has created a level playing field encouraging new businesses and revenue models to sprout with the innovative use of IT and IDM. It has become a critical enabler for big corporations to differentiate themselves from their competitors.

Ngee Ann Polytechnic's School of InfoComm Technology (ICT) is a leader in providing quality IT and IDM education. Established in 1982, it has since nurtured more than 10,000 IT professionals; many of whom have assumed influential positions in various organisations. Some have even founded their own IT ventures.

ICT has established a reputation for delivering a broad-based and holistic IT education that is industry-relevant, solution-focused and university-relevant. Our courses also undergo stringent review and endorsement by an independent Advisory Committee comprising of high-standing industry players and university representatives.

Students enjoy a total learning experience in a collegial atmosphere, with the flexibility to specialise in niche areas of IT or business management, while broadening their perspectives with a selection of Interdisciplinary Studies modules. Students who are technology-savvy can further sharpen their knowledge and skills to become creators and developers. Students who are business-savvy can further hone their expertise in business-related areas and are able to analyse and address business needs through IT and IDM.

Upon graduation, students find that their diplomas are internationally-recognised, making it easy for them to secure advanced standing at many good local and overseas universities.

COURSES OFFERED

ICT offers the following courses to meet the industry demand for specialist IT manpower:

- Diploma in Animation & 3D Arts (A3DA)
- Diploma in Financial Informatics (FI)
- Diploma in Information Technology (IT)
- Diploma in Multimedia & Animation (MMA)

MAJOR ACHIEVEMENTS

IT Award Winners

- ICT students and alumni have proven their prowess in both national and international IT competitions and awards.
- IT Gold Medallist Ang Jin Hui won the prestigious Lee Kuan Yew Award in 2009. He has since clinched the NUS Undergraduate (Merit) Scholarship and LKY-STEP Award given to only five outstanding polytechnic students to encourage lifelong learning.

- Alumnus Rakesh Gupta was awarded the National Young IT Professional 2009 Award and the Singapore Indian Young Entrepreneur Award in 2007.
- IT students Neo Huixian, Li Chen, Chen Chang, Ferry Sanjaya and Chen Feng won the Enterprise Award 2010 for their project, "Online advertising platform for rental of products & services".
- A team of MMA students – Ang Jun Qin, Chua Shun Long Melvin, Lin Jian Long and Nicholas Ang Yee Fan – won bronze (interactive media) at the prestigious Crowbar Awards 2010.
- IT student team Bui Huy Quang Vu, Chen Kun and Lau Han Yang emerged champions in the polytechnic category of the National Algo*Mania Competition.

Scholarships for Academic Progression

- Nine ICT students (up from four in 2010) won the Integrated Infocomm Scholarship (IIS) 2011 awarded by IDA.
- 2011 FI Gold Medallist Chan Si Hui clinched the prestigious Lee Kong Chian Scholarship to pursue double degree (ISM & BBM) at SMU and FI alumna Lim Sin Yee was awarded NUS Undergraduate Scholarship to pursue B.Comp.
- 2011 IT Gold Medallist Foo Kim Li was awarded NUS Kwan Im Thong Hood Cho Temple Computing Scholarship to pursue B.Comp in Computer Science.
- IT graduates Tan Shu Ren, Tan Choon Yan, Sangar s/o Annadorai and Kelvin Chng Soon Yeong were awarded National Infocomm Scholarships to pursue four-and-a-half-year Direct Masters Programmes.

FACILITIES & STAFF

ICT staff are armed with extensive infocomm and digital media qualifications and industry experience. A number had the experience of creating IT ventures and managing IT-related businesses, putting them in a good position to impart entrepreneurship skills to students.

ICT is well equipped with extensive, state-of-the-art computing resources, supported by high-speed wired and wireless networks in an open systems environment. The latest industry-standard software is used for teaching and learning. Specialised labs are available for the development of skills in niche areas.

INDUSTRY COLLABORATIONS

ICT enjoys strong strategic links with the industry by engaging in applied research and consultancy projects, and playing a proactive role in mutually beneficial partnerships and collaborations.

ICT diplomas are developed with industry inputs. For example, the Diploma in Information Technology's specialisation in Infocomm Sales & Marketing, Microsoft Singapore played an advisory role in the design, development and delivery of the curriculum pertaining to the sale and marketing of high-value infocomm products, services and solutions.

Collaborations with industry partners have led to the establishment of ICT's technology hubs, such as the eGarage®, The DOT® and RHyMeS Centre. These hubs nurture the students' spirit of innovation and enterprise by allowing them to work with emerging technologies, in collaboration with industry experts.

The eGarage® houses a state-of-the-art infocomm showcase and development labs that are open to students and industry partners. These niche development labs are equipped with high-end hardware and software for teaching and project developments. The DOT® has a state-of-the-art sound recording studio, a drawing room, a blue room, as well as specialised multimedia labs equipped with advanced workstations capable of running resource intensive multimedia applications. The RHyMeS Centre, an infocomm incubation centre, focuses on IDM and mobile developments.

DIPLOMA PLUS PROGRAMME

The School of InfoComm Technology also offers three Diploma Plus Certificate Programmes.

- **Certificate in Advanced Computing Mathematics (CACM)**
Helps students build a Mathematics foundation needed for pursuing degrees in computing at both local and overseas universities. Students with this certificate will be able to read all modules carrying 'A' Level Mathematics as prerequisite upon admission to National University of Singapore and Nanyang Technological University.
- **Certificate in Business Solutions Development (CBSD)**
Equips students with the expertise needed to develop customised and integrated business office applications.
- **Certificate in Web Design & Development (CWDD)**
Provides students with in-depth understanding of the concepts and techniques needed to develop web-based applications, Content Management Systems (CMS) and social networking websites.





DIPLOMA IN ANIMATION & 3D ARTS (A3DA) 3-YEAR COURSE

The **Diploma in Animation & 3D Arts (A3DA)** is a practice-oriented course that gives students a strong foundation in animation art, design and storytelling.

Students will also specialise in either Character Animation or 3D Arts from their second year.

The Character Animation option develops students' pre-production and production skills in concept art design, storyboarding, 2D and 3D character animation and the production pipeline. This option prepares students for a career in Character Design, Props & Environment Design, Storyboarding, 2D Animation, and 3D Animation.

The 3D Arts option develops students' pre-production and production skills in concept art design, storyboarding, 3D modelling, rigging, texturing and lighting. It prepares students for a career in Character Design, Props & Environment Design, Storyboarding, 3D Modelling, Lighting, Texturing, and Rigging.

In the final year, students undertake a year-long production in the School's Amphibi Studio™ to further develop their expertise and nurture their business skills. Students from both specialisations will graduate with their own industry-standard portfolio.

Students also take several Interdisciplinary Studies (IS) modules that aim to broaden their minds and help them develop the spirit of innovation and enterprise. This is important for A3DA professionals working in a complex business environment, where problems are multi-faceted in nature and require knowledge and skills in different disciplines.

Students are required to own a MacBook, and purchase art materials.

ENTRY REQUIREMENTS

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

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

You must have also sat for a Science or Art / Higher Art or Design & Technology or Food & Nutrition or a relevant OSIE / Applied Subject and fulfil the aggregate computation requirements.

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

Those with colour appreciation deficiency may be considered, subject to passing an in-house test.

CAREER PROSPECTS

A3DA graduates can join the fast-growing digital entertainment industry and be involved in the various stages of animation production; from concept, story development, storyboard art, character design, props & environment design, to 3D modelling and texturing, lighting, 3D character rigging, and character animation!

ACCREDITATION FOR FURTHER STUDIES

The Diploma in Animation & 3D Arts is recognised by both local and overseas universities, which offer advanced standing to our graduates.

Graduates can pursue further studies in the creative field with universities such as:

- Nanyang Technological University
Bachelor of Fine Arts in Art, Design and Media
- Digipen Institute of Technology (Singapore)
Bachelor of Fine Arts in Digital Art and Animation
Bachelor of Arts in Game Design
- Sheridan College (Canada)
Bachelor of Applied Arts in Animation
- Royal Melbourne Institute of Technology (Australia)
Bachelor of Arts in Animation & Interactive Media

INDUSTRY ENDORSEMENT



Toon Boom Animation helped to design, develop and deliver the digital paperless 2D animation production portion of A3DA's curriculum.

Toon Boom, the worldwide leader in animation software solutions, proudly supports ICT's commitment to jump-starting the process of creating a pool of highly-skilled and well sought-after 2D animation professionals."

COURSE CURRICULUM

Module Name	Credit Units
-------------	--------------

YEAR 1

Level 1.1 (26 hours per week)

Fundamentals for Creative Professionals	2
Drawing & Perspective	4
Light, Colour & Design	4
History of Film & Animation	4
Principles of Animation	4
Storytelling & Scriptwriting	4
Idea Jumpstart [^]	2
Sports & Wellness [^]	2

Level 1.2 (24 hours per week)

Figure Drawing	4
Tone, Colour & Composition	4
3D Form & Space	4
Principles of Body Mechanics	4
Storyboarding	4
Communication & Contemporary Issues [^]	4

YEAR 2

Level 2.1 (24 hours per week)

Advanced Figure Drawing	4
Human Anatomy	4
3D Modelling	4
3D Character Animation	4
Elective Module	4
Idea Blueprint [^]	2
Interdisciplinary Studies (IS) module [^]	2

Level 2.2 (24 hours per week)

Animal Anatomy	4
Character Design	4
Props & Environment Design	4
Elective Module	4
Elective Module	4
Idea Launchpad [^]	2
Interdisciplinary Studies (IS) module [^]	2

Module Name	Credit Units
-------------	--------------

YEAR 3

Level 3.1 (24 hours per week)

Concept Development	4
Digital Cinematography	4
3D Animation Production	4
Elective Module	4
Elective Module	4
World Issues: A Singapore Perspective [^]	2
Interdisciplinary Studies (IS) module [^]	2

Level 3.2

Internship	16
------------	----

Notes:

[^] For more details on Interdisciplinary Studies (IS) modules, 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.

In the second year, students may choose to specialise either in Character Animation or 3D Arts.

Character Animation Option**

- Acting for Animation
- Advanced 3D Character Animation
- Perspective, Background & Layout
- 2D Animation Production I
- 2D Animation Production II

3D Arts Option**

- Texture & Shading
- Advanced 3D Modelling
- 3D Character Rigging
- Architectural Space, Design & Lighting
- 3D Environment Modelling

** The elective modules offered are reviewed regularly and subject to updates to ensure relevance to the industry needs and the sequence of module offering may change as deemed fit.

COURSE MODULES

LEVEL 1.1

Fundamentals for Creative Professionals

This module aims to provide students with a broad introduction to the interactive and digital media industry. Students gain a good understanding of the critical success factors, professional roles and career development paths within the industry, professional practices and ethical expectations.

Drawing & Perspective

This module introduces drawing from observation. The emphasis is on developing the student's understanding of the formal elements of drawing, perspective, composition, and other perceptual concepts. It introduces line, value, composition, linear and atmospheric perspectives, expressive mark making, and also explores the basic professional habits in drawing practice.

Light, Colour & Design

This module explores the fundamental elements and processes of organising, displaying, and communicating ideas and information creatively to the minds of the intended audience through two-dimensional form, colour structure, and composition. It introduces the elements and principles of design, visual organisation, visual perception and communication theory. Emphasis is on concept development, problem solving, and creative process relevant to visual communication.

History of Film & Animation

This module surveys the development of film and animation over the past century. Students explore evolution of the medium and how technology, economics, artistic trends, individual artists and national cultures have affected its development.

Principles of Animation

This module introduces the language and principles of classical animation through analysis and decomposition of movement frame-by-frame. Students will explore the importance of effective timing and spacing, and how their manipulation can affect the feel of an action.

Storytelling & Scriptwriting

This module explores the nature of storytelling and exposes students to the historical traditions of storytelling in all forms. It introduces the essential components in a compelling story and the techniques to create story that will hook the audience and keep them emotionally involved, and explores at the more subtle elements of story. This module also introduces practices in screenwriting such as characterisation, narration, dialogue, script forms, and alternatives.

LEVEL 1.2

Figure Drawing

This module introduces the concepts and techniques of figure drawing. It provides students a thorough understanding of the structure and anatomy of the human figure, and how the underlying skeletal structure can affect the surface appearance of the body. It aims to develop students' ability to create drawings that communicate the dynamics of the body structure and movement.

Tone, Colour & Composition

This module explores the nature and use of tone, colour, and composition in drawing. It emphasises methods of creating tone, ways to use luminance as an organisational element, and stresses on the importance of thinking critically. In addition, the module introduces a variety of classical tonal systems and tonal illusions. The module covers systems and traditions of organising hue and saturation, and examines methods of building from tonal preliminary studies. Students will explore the artistic use of colour, and the classical forms of compositional organisation.

3D Form & Space

This module develops students' ability to perceive objects in three-dimensional space and to translate two-dimensional form into three-dimensional volume, mass, space, and structure. It introduces the basic elements, principles, materials and methodologies of three-dimensional design. Working with both physical medium and digital tools, students explore the use of basic materials, elements and principles of design, basic abstract components to build three-dimensional form that accurately depict its measurement and proportion.

Principles of Body Mechanics

This module further develops students' classical animation skills on various biped/human characters. It continues to develop students' understanding of the concepts of motion and body mechanics, and aim to develop students' ability to create convincing movement, expression of mood, thought, attitude, and personality in the characters with a goal to bring the characters to life.

Storyboarding

This module explores the pre-production skills of storyboard art. It introduces the concepts of storyboard drawings, which map out camera angles, continuity, and lighting. Students learn about the basic of film grammar through the analysis of scripts, character, and set design, and translate these through drawings to create story flow, character development, mood, time, and place. Students will create both production and presentation storyboards.

LEVEL 2.1

Advanced Figure Drawing

This module focuses on the human figure and gestures. Students work from life models to create full studies, short poses, and sustained studies. Students explore putting the figure into an environment, figurative

composition, and introductory sequential figurative composition. The module also includes a thorough study of costume and drapery. Students will learn to increase perception, insight, draftsmanship, aesthetic vocabulary, and conceptual attitudes.

Human Anatomy

This module explores the skeletal and muscular structures of the human body. From both live models and anatomical references, students will learn to understand the anatomical structure of the human body and how these anatomical elements function to create movement, attitudes and poses from head to toe. Emphasis of this module will be on the artistic application of this knowledge for artists and animators.

3D Modelling

This module examines the basic principles and techniques of creating 3D digital models. It provides an overview to the process of digital asset creation, and introduces techniques and critical thinking skills for organic and inorganic modelling, polygonal modelling, and patch modelling. Texture mapping, lighting, shading, rendering and camera setups are explored. Emphasis is placed on professional habits and the digital workflow.

3D Character Animation

The module develops students' understanding in character development, cinematic narrative and expressive movement through motion and posing by applying scripted character controls. Timing, weight, anticipation, squash and stretch, conveying simple emotions/interactions, and other fundamental animation principles are covered. Forward and inverse kinematics for skeletal animation, facial animation, including lip-sync and emotion, will be explored. Animation of basic motion such as walk/run cycles, and the control of rigid and soft character models using skeletons will be introduced.

LEVEL 2.2

Animal Anatomy

This module introduces comparative study of the human structure and the structure of a variety of animal types. Focus will be specifically on the impact of anatomical structure on locomotion. The module also considers standard locomotion cycles and the relationship between humans and various animals. Emphasis of this module will be on the artistic application of this knowledge for artists and animators.

Character Design

This module leverages on the drawing skill and anatomy knowledge to create characters that are memorable and unique. It introduces the creative process and traditions of character design, and the basic structural strategies for creating characters. It covers the basic tools such as thumbnails, silhouette design, figure invention, props, costumes, character archetypes, marker sketches and digital painting.

Props & Environment Design

This module covers the basics of designing different types of props and environments for animation, film and games. Students will learn perspective, composition, the tonal differences between interior and exterior environments, research techniques for believable detail, clear tonal reads, and modelling within established values. Additional subjects will include lighting and material indication, the thought process before the sketch, use of thumbnails, rendering with Photoshop, use of pencil and pen, reference material.

LEVEL 3.1

Concept Development

This module introduces various idea generation and concept development techniques. Students learn the pre-production skills of concept illustration and visual development through the application of knowledge skills

in drawing, storytelling and composition to communicate the concept effectively to an audience.

Digital Cinematography

This module introduces the art of cinematography for digital video and computer-generated imagery. It covers the principles and concepts of practical cinematography through physical lighting, choreography of camera movement and lighting of computer-generated environment to enhance the visual impact in storytelling.

3D Animation Production

This module introduces 3D animation production within the context of a small production pipeline. Students work in a dynamic team on a 3D animation project. Students will be responsible for interpreting the initial animatic, storyboards, and workbooks, breaking down sound and music onto exposure sheets, and learn choreography, continuity, and basic scene analysis.

LEVEL 3.2

Internship / Final Year Project

The primary aim of this final year industry-based project is to nurture the spirit of innovation and enterprise in students and broaden their experience beyond classroom learning. It also provides students with the opportunity to apply the knowledge and skills gained in the past semesters. Using the demo program prototyped in the earlier semester under the Concept Development module, students will develop the idea into a full working product. Local or overseas attachments are possible.

CHARACTER ANIMATION OPTION

Acting for Animation

This module further develops students' ability to translate thoughts and feelings into specific gestures and actions. It surveys the history of acting in the theatre, animation and film. In addition, the module

focuses on the analysis of action in the human form, gestures, timing, characterisation, communication of attitude, character relationship, storytelling through motion, emotion and thought process to create a moving and memorable acting performance.

Advanced 3D Character Animation

This module emphasises how character animation influences character personality and how sound is used to advance a story and create the mood, place and emphasis. Students become knowledgeable in multifaceted issues of human movement. The expression of emotion, timing, and the subtlety of character is explored. Lip-synching and dialogue animation are presented. It also gives students an appreciative view of character rigging for animation.

Perspective, Background & Layout

This module explores the animation pre-production skills of background and layout art. This includes the integration of existing storyboard and design elements into finished layouts that communicate the story effectively. In addition, students incorporate the fundamentals of painting applicable to both concept art and finished layout. Additionally, students will explore means of using drawing to create camera lens illusions, architectural space, theatrical sets, level design, matte painting, and surface texture.

2D Animation Production I

This module introduces the traditional animation production within the context of a small production pipeline. Students work, in teams, on a traditional animation project. They will interpret the initial animatic, storyboards, and workbooks, break down sound and music onto exposure sheets, and complete rough and cleaned up animations for a final rough composite. Students learn choreography, continuity, and basic scene analysis while working within the confines of a team.

2D Animation Production II

Building on the working rough reel produced in the 2D Animation Production I module, students use a digital animation tool to convert the drawings to vector-based images. Students will then focus on character and effects clean-up work to complete the final and polished version of the project. The module pays special consideration to the workflow projections, scheduling, time management, administrative documentation, and quality control. Emphasis is on appropriate work habits.

3D ARTS OPTION

Texture & Shading

The module covers the tools and techniques for the creation of custom 2D texture maps. Students learn about different artistic styles, levels of craftsmanship (handmade, manipulated scanned imagery and 3D compositing), repetition structures, and tile-able and seamless motifs, with grounding in traditional painting. Focus will be on the layering technique, where overlapping elements form rich and beautiful work. Texture mapping techniques will also be explored with emphasis on manual UV unwrapping.

Advanced 3D Modelling

This module continues to build on students' 3D modelling skill through creation of hyper-realistic models. Subjects like bipedal characters and creatures will be tackled through the balance application of anatomy and technical efficiencies. Students will learn to fuse the traditional art of sculpting organic form with digital modelling techniques. It covers the use of anatomy as it pertains to modelling and speaks of the technical needs for creating quality in deformable and detailed surfaces.

Architectural Spaces, Design & Lighting

This module introduces students to the aesthetics and principles of 3D environment design for the theatrical sets, landscapes, terrain, objects, and architectural

structures. It covers a survey of world architectural styles together with the concepts on how to blend the emotion, mood, lighting, shadows, aesthetics and flow into the design of the architectural structures. It also covers texturing, spatial design, negative space, dramatic lighting, and other concepts that affect not only the psychology of level design but also gameplay principles.

3D Character Rigging

This module deals with issues relating to character modelling, rigging and setup based-on production requirements. Students will be presented with various character setups and explore appropriate modelling and rigging solutions for their own characters. Topics include skeletons, forward/inverse kinematics and custom control panels. Students will acquire the ability to set up a character for a wide range of complex body movement, with an emphasis on techniques for creating controls, which are realistic, flexible and can be intuitively animated.

3D Environment Modelling

This module provides the opportunity for students to create architectural interior and the natural environments representing houses, buildings, and entire worlds contained under a roof, in which to place the game characters. It explores and integrates design and technology to develop matte paintings, virtual sets and digital backgrounds. Students acquire the knowledge and practical skill sets for digital matte painting production.



DIPLOMA IN FINANCIAL INFORMATICS (FI) 3-YEAR COURSE

The **Diploma in Financial Informatics (FI)**

is a hybrid course that gives students a strong IT foundation with business knowledge in the dynamic Banking and Finance industry. It provides a unique curriculum which combines the strengths of the School of InfoComm Technology and the School of Business & Accountancy.

The course provides students with cross disciplinary skills in both infocomm and finance. Students are equipped with skills in IT and business process management as well as hands-on experience with Enterprise Resource Planning (ERP) and Business Intelligence (BI) systems for the Banking & Finance industry.

Students learn relevant technical skills to analyse and manage financial data as well as business processes of enterprise systems that improve the business competitiveness within the finance sector. In the final year, students will undertake a four-month internship with leading banks such as DBS, OCBC, UOB or other organisations to gain industrial experience.

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

Students are required to own a notebook.

ENTRY REQUIREMENTS

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

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

You must also have sat for a Science or Design & Technology or Food & Nutrition or a relevant OSIE / Applied Subject and fulfil the aggregate computation requirements.

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

CAREER PROSPECTS

FI graduates are trained to be Business Analysts, a critical role that bridges both business needs and technology. It gives them a head-start in their careers with banking and financial institutions, SMEs, MNCs and the public service sector. With a strong understanding of the organisation's business objectives, Business Analysts are able to value-add to the organisation by achieving operational effectiveness and efficiency for business operations.

ACCREDITATION FOR FURTHER STUDIES

The Diploma in Financial Informatics is recognised by local and overseas universities, many of which offer advanced standing to our graduates. These universities include National University of Singapore, Nanyang Technological University, Singapore Management University, University of New South Wales, University of Melbourne, Monash University and most United Kingdom and United States universities.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (29 hours per week)	
Fundamentals for IT Professionals	5
Fundamentals of Programming	5
Digital Devices & Networking Technology	5
Business Statistics	5
Accounting	5
Idea Jumpstart^	2
Sports & Wellness^	2
Level 1.2 (23 hours per week)	
Enterprise Systems Analysis & Design	5
Enterprise Information Systems	5
Object-Oriented Programming	5
Financial Markets & Services#	4
Communication & Contemporary Issues^	4
YEAR 2	
Level 2.1 (23 hours per week)	
Developing Web Applications	5
Enterprise Business Processes	5
Databases	5
Financial Management#	4
Idea Blueprint^	2
Interdisciplinary Studies (IS) module^	2
Level 2.2 (24 hours per week)	
Enterprise Resource Planning	5
Enterprise Project Management	5
Banking & Financial Applications#	5
Economics#	5
Idea Launchpad^	2
Interdisciplinary Studies (IS) module^	2

Module Name Credit Units

YEAR 3

Level 3.1 (23 hours per week)*

Financial Planning#	4
Business Intelligence#	5
Customer Relationship Management#	5
IT Outsourcing#	5
World Issues: A Singapore Perspective^	2
Interdisciplinary Studies (IS) module^	2

Level 3.2

Internship	16
------------	----

Notes:

* The modules in Levels 3.1 and 3.2 are offered on an interchangeable basis. You will undergo an Internship in your final year.

The prescribed/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.

^ For more details on Interdisciplinary Studies (IS) modules, 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

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 working 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 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.

Digital Devices & Networking Technology

This module focuses on the fundamental concepts of digital devices such as computers and mobile phones, as well as networking. It covers the basic architecture, characteristics and functions of a computer system. The module also provides an overview of current day networking system. Major networking components such as switches, hubs and transmission mediums including wireless networks are discussed.

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.

Accounting

This module covers the basic theory and concepts behind the principles of accounting. It introduces students to the accounting process and the different accounting documents used in typical organisations. Students will learn how to analyse business transactions and financial documents. They will also pick up a basic understanding of the control and accounting for cash, inventories and fixed assets, goods and service taxes, and partnership.

LEVEL 1.2

Enterprise Systems Analysis & Design

This module introduces the Software Development Life Cycle (SDLC) from project planning to implementation with an emphasis on analysis and design. It uses an object-oriented approach to document business needs and design a solution system. Students will learn to understand, document and define the business needs and processing requirements of a new system. They will learn how to design solution systems based on the requirements defined and decisions obtained during analysis.

Enterprise Information Systems

This module aims to provide students with an understanding of the use of Enterprise Information Systems to meet the needs of a typical organisation. Students will learn how Enterprise Information Systems can help an organisation gain a competitive advantage over its competitors, and how the transformation of an organisation can lead to changes in its IT systems.

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.

Financial Markets & Services

The module examines the role of the financial markets and its players as well as the influence of the major financial institutions on the economy and status of Singapore as a financial centre. Students will also trace the relationship between the economy and the institutions in the Singapore economy and the international arena, with emphasis given to current events.

LEVEL 2.1

Developing Web Applications

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

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 - from sales, purchasing and inventory management to finance - will be discussed. Students will 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 an organisation's employees.

Databases

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

Financial Management

This module provides students with the basic knowledge of financial management. Students will understand the financial environment and the role of finance in business. They will learn basic concepts like the financial objectives of firms, cash planning and cash budgeting, working capital management, the management of current assets, capital budgeting decisions using discounting techniques, and the sources of short-term and long-term funds.

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 have practical hands on experiences with business processes such as sales and marketing, procurement, inventory management and finance using ERP software. Students will understand the software integration of business processes within an organisation.

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 will also learn how to manage project quality and risk in the project implementation life cycle.

Banking and Financial Applications

The module discusses the various financial applications – such as payment solutions and securities management – 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 can help their day-to-day operation and be used for analysis.

Economics

This module incorporates the study of demand and supply, resource allocation, consumer behaviour, market demand, production and cost theory, price and output of firms under conditions of perfect and imperfect competition. At the end of the module, students will be able to relate the basic concepts and principles of economics to problems and issues.

LEVEL 3.1

Financial Planning

This module provides an understanding of personal financial planning in the midst of fast changes in the financial services industry and the blurring of product lines within the financial sector. The module will equip students with technical and conceptual financial planning knowledge to prepare them for a career in the financial services industry.

Business Intelligence

This module aims to introduce students to the importance and uses of a data warehouse. Students will be taught analytical techniques and concepts which will equip them with the technical know-how to generate useful reports required by businesses for both analytical and operational usage. They will learn how business managers and analysts throughout an organisation make better decisions using complicated analysis, data mining, prediction and forecasting.

Customer Relationship Management

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

IT Outsourcing

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

LEVEL 3.2

Internship

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, and 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.





DIPLOMA IN INFORMATION TECHNOLOGY (IT) 3-YEAR COURSE

Information technology has revolutionised the way people live and the way businesses function. It forms the infrastructure of the new economy, and has transformed how business is done by introducing innovation and enhancing efficiency. The **Diploma in Information Technology (IT)** empowers students to become IT professionals, equipping them with problem-solving skills, knowledge of business functions as well as technical skills to harness the power of information and Internet technologies in the digital economy.

This 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 systems, data communication and network systems, computing mathematics and communication skills.

Students will have the opportunity to develop their competence in integrating various IT technologies with effective IT solutions and applications to solve business problems.

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

In their final year, students will build upon this solid foundation and specialise in niche areas such as information security & forensics, software

development, networking, mobile business application, infocomm sales & marketing and more. To strengthen their work experience, students will have to undertake an Internship in their final year in a relevant industry.

Students are required to own a notebook.

ENTRY REQUIREMENTS

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

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

You must also have sat for a Science or Design & Technology or Food & Nutrition or a relevant OSIE / Applied Subject and fulfil the aggregate computation requirements.

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

CAREER PROSPECTS

Singapore has a vibrant IT industry with many international IT companies based here. IT graduates can join the industry as IT professionals who are able to choose from 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, Infocomm Sales & Marketing, Mobile Business Application, Software Development and Information Security & Forensics.

Graduates will find themselves well-equipped for roles as programmers, application developers and administrators for network systems and the web. They can also become business solutions analysts and designers, software engineers, java specialists, enterprise software developers, mobile business application developers, system engineers, infocomm sales and marketing professionals or information security analysts.

ACCREDITATION FOR FURTHER STUDIES

The Diploma in Information Technology is an internationally recognised qualification. Graduates enjoy advanced standing at many local and overseas universities.

In addition, they gain module exemptions in infocomm-related degree programmes at local universities:

- National University of Singapore
Bachelor of Computing (Honours) in Computer Science or Communications & Media
Bachelor of Computing in Information Systems or Electronic Commerce
Bachelor of Engineering (Computer Engineering)
- Nanyang Technological University
Bachelor of Science (Hons) in Computer Engineering or Computer Science
- Singapore Management University
Bachelor of Science in Information Systems Management

COURSE CURRICULUM

Module Name	Credit Units
-------------	--------------

YEAR 1

Level 1.1 (29 hours per week)

Fundamentals for IT Professionals	5
Computing in Society	5
Computers & Operating Systems	5
Fundamentals of Programming	5
Computing Mathematics	5
Idea Jumpstart^	2
Sports & Wellness^	2

Level 1.2 (25 hours per week)

Networking Fundamentals	5
Object-Oriented Programming	6
User Interface Design	5
Enterprise Information Systems	5
Communication & Contemporary Issues^	4

YEAR 2

Level 2.1 (25 hours per week)

Databases	5
Object-Oriented Analysis & Design	6
Developing Web Applications	5
Prescribed/Elective Module#	5
Idea Blueprint^	2
Interdisciplinary Studies (IS) module^	2

Level 2.2 (24 hours per week)

Project Management	5
Prescribed/Elective Module#	5
Prescribed/Elective Module#	5
Prescribed/Elective Module#	5
Idea Launchpad^	2
Interdisciplinary Studies (IS) module^	2

Module Name

Credit Units

YEAR 3

Level 3.1 (24 hours per week)*

Prescribed/Elective Module#	5
Prescribed/Elective Module#	5
Prescribed/Elective Module#	5
Prescribed/Elective Module#	5
World Issues: A Singapore Perspective^	2
Interdisciplinary Studies (IS) module^	2

Level 3.2

Internship	16
------------	----

Notes:

In the second year, students may choose to major in an option. Each option requires the completion of five prescribed modules. Students will also take three elective modules and undergo an internship in their final year.

BUSINESS OPTIONS

Infocomm Sales & Marketing Option**

- Principles of Marketing
- Enterprise Business Processes
- Infocomm Sales & Marketing Strategies
- Infocomm Sales Life Cycle Management
- Customer Decision Making & Negotiation Skills
- Infocomm Business Case Challenge
- Economics
- Organisational Behaviour

Business Management Option

- Principles of Marketing
- eBusiness Foundations
- Accounting
- Supply Chain Management
- Web Database Development
- eCommerce Applications Development
- Economics
- Organisational Behaviour

TECHNOLOGY OPTIONS

Information Security & Forensics Option

- Information Security
- Software Security
- Malware Analysis & Antivirus Technologies
- Ethical Hacking
- Digital Forensics
- Mobile Device Security & Forensics
- Local Area Networks
- C++ Programming

Mobile Business Application Option***

- Mobile Applications Development
- Advanced Mobile Applications Development
- Mobile Business Applications
- Wireless Technology
- Mobile & Wireless Security
- Mobile Device Security & Forensics
- Digital Forensics
- Advanced Object-Oriented Analysis & Design

Solutions Architect Option

- Data Structures and Algorithms
- Advanced Object-Oriented Analysis & Design
- Enterprise Applications Development
- Windows Applications Development
- Local Area Networks
- Wireless Technology
- Information Security
- C++ Programming

Students can also complete their elective modules with a focus in:

Game Design & Development

- Game Design
- Games Programming
- C++ Programming

The prescribed/elective modules and options 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.

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

**The Infocomm Sales & Marketing option is brought to you in collaboration with Microsoft Singapore. They provided their expertise on the design, development and delivery of curriculum pertaining to the sales and marketing of infocomm products, services and solutions.

Microsoft Singapore proudly supports the School's commitment to jump-start the process of creating a pool of highly skilled and sought-after professionals in infocomm sales and marketing. Microsoft is a trademark of the Microsoft group of companies.



*** ICT is member of the iPhone Developer University Program. Under this program, the School has incorporated iPhone apps development into its curriculum.

^ For more details on Interdisciplinary Studies (IS) modules, 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

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 working 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.

Computing in Society

This module will expose students to the latest in new media and web technologies. Students will practise thinking and problem-solving skills as well as pick up infocomm professionalism and soft skills to ascertain how they can leverage on such technologies to the advantage of an organisation while avoiding the pitfalls that these can bring. They are required to work on case illustrations and will learn and analyse the social, ethical and professional issues of computing.

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 will 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 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.

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, as well as 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 special focus on the human-computer interaction. Students will 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.

Enterprise Information Systems

This module aims to provide students with an understanding of the use of Enterprise Information Systems to meet the needs of a typical organisation. Students will learn how Enterprise Information Systems can help an organisation gain a competitive advantage over its competitors, and how the transformation of an organisation can lead to changes in its IT systems.

LEVEL 2.1

Databases

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

Object-Oriented Analysis & Design

This module leverages off the skills acquired in Object-Oriented Programming to introduce software design and requirements analysis, so that students experience the full cycle of software development. An overview of various Software Development Life Cycles as well as an in-depth look at software development methodologies will be provided. In particular, students will learn about requirements gathering techniques and the primary artefacts of system design. They will be able to specify, design and document simple software systems using appropriate modelling tools.

Developing Web Applications

This module arms students with the knowledge and skills needed to develop Web applications. Students will learn to use the latest Web technologies such as Microsoft's .NET framework to develop effective Web

applications. Students will acquire the technical skills of server-side programming to create Web-based forms, perform state management, access data, and validate user input.

LEVEL 2.2

Project Management

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 will learn to establish the project charter and develop preliminary plans to facilitate the initiation, execution, monitoring and control and closure 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 Levels 3.1 & 3.2 are offered on an interchangeable basis.

PRESCRIBED MODULES

BUSINESS OPTIONS

INFOCOMM SALES & MARKETING

Principles of Marketing

This module presents basic concepts and principles in the marketing of goods and services. Students will 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.

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 - from sales, purchasing and inventory management to finance - will be discussed. Students will 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 an organisation's employees.

Infocomm Sales & Marketing Strategies

This module will introduce students to the concept of market segmentation and the development of sales and marketing strategies for each segment. They will acquire an understanding of industries segmentation and customer segmentation from corporate, small and medium businesses to consumers. They will also delve into the different go-to-market strategies and selling techniques required in the context of ICT (such as consultative selling, major account selling and management, territory selling and management, partner management and consumer marketing).

Infocomm Sales Life Cycle Management

This module introduces students to a customer's ICT purchase decision making process and sales life cycle management. Students will also pick up some fundamental concepts in interpreting customer annual reports, financial ratios, industry analysis and competitive strategies so that they can recognise customer needs and wants. They will follow the sales life cycle from prospecting, qualifying, developing solutions, negotiating and closing the sales to post-sale support and services, up-selling and cross-selling.

Customer Decision Making & Negotiation Skills

Students will be introduced to soft skills in understanding customer biases and concerns, building rapport, handling objections, identifying informal and formal decision makers, selling functions/features/benefits, negotiating and closing sales techniques. They will also learn about reference selling and proof of concept as well as pick up presentation and communication skills. The module offers opportunities to role play and develop value proposition in sales calls within the context of ICT.

Infocomm Business Case Challenge

This module introduces groups of students to a case study competition where they would need to build a

business solution specific to a client's business challenges and ICT requirements. Students will pick up the tools and techniques needed to qualify the opportunity, assign team members to develop technical and business proposals, prepare a solution to the case study, and finally present it to a panel of ICT industry experts.

Economics

This module incorporates the study of demand and supply, resource allocation, consumer behaviour, market demand, production and cost theory, price and output of firms under conditions of perfect and imperfect competition. At the end of the module, students will be able to relate the basic concepts and principles of economics to problems and issues.

Organisational Behaviour

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

BUSINESS MANAGEMENT

Principles of Marketing

This module presents basic concepts and principles in the marketing of goods and services. Students will 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.

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 of both successful and unsuccessful implementations of eBusiness.

Accounting

This module covers the basic theory and concepts behind the principles of accounting. It introduces students to the accounting process and the different accounting documents used in typical organisations. Students will learn how to analyse business transactions and financial documents. They will also pick up a basic understanding of the control and accounting for cash, inventories and fixed assets, goods and service taxes, and partnership.

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 at 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 multiuser databases for data and information. Students will also learn the concept of database concurrency and integrity in the context of a web database for eCommerce.

eCommerce Application Development

This module equips students with 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 business issues in eCommerce.

Economics

This module incorporates the study of demand and supply, resource allocation, consumer behaviour, market demand, production and cost theory, price and output of firms under conditions of perfect and imperfect competition. At the end of the module, students will

be able to relate the basic concepts and principles of economics to problems and issues.

Organisational Behaviour

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

TECHNOLOGY OPTIONS

INFORMATION SECURITY & FORENSICS

Information Security

This module provides an overview of the various domains of Information security. It aims to provide an appreciation of the Information security from an end-to-end perspective. This module covers security across the seven layers of InfoComm – organisation, people, physical access, system, application, network and data. This module takes a comprehensive and practical approach towards studying information security in its entirety.

Software Security

This module provides a practical approach to the various techniques used to exploit software. Students will learn how to use these techniques to exploit both web applications and desktop applications. This module also gives insight into the software security lifecycle of how security can be built into the software development process. Students will also learn best practices in coding in order to test and secure software against exploits.

Malware Analysis & Antivirus Technologies

This module provides a practical approach to various techniques in analysing malwares and understanding the technologies involved in creating anti-virus software. Students will learn behavioural analysis and code analysis techniques for diagnosing malwares. Students will have hands-on practice on using tools such as system monitoring utilities, disassemblers and debuggers. Antivirus technologies such as heuristics

detection engine and virus signature creation will also be taught.

Ethical Hacking

This module provides a practical approach to various techniques in scanning, testing, hacking and securing systems. Students will learn the techniques intruders use to hack a system, and the steps to secure it. Students will have hands-on practice on footprinting a system, vulnerability enumeration and developing attack vectors to exploit loopholes in a system. Students will also be taught the necessary countermeasures to mitigate risks of exploitation through system hardening & intrusion detection & prevention.

Digital Forensics

This module gives an insight into the process of forensics investigation. It covers the various types of computer-related crimes, techniques of gathering electronic evidence, and recovering of deleted, damaged or encrypted data. Students will also make use of advanced forensic tools to perform forensic investigations. Besides the tools & techniques of investigation, students will be taught sound forensic investigation methodology and the proper handling of evidence. The module will also cover aspects of law and policies applicable to digital forensics.

Mobile Device Security & Forensics

This module covers techniques and tools in the context of a forensic methodology to extract and utilise digital evidence on mobile devices. Students will learn how to use current forensic tools to preserve, acquire & examine data stored in a mobile device. The module covers basic SIM Card examination and cell phone forensics on multiple platforms such as iPhone, Android & Windows Mobile. The module takes a practice-oriented approach to performing forensics investigation on mobile phones.

Local Area Networks

The typical computer network of an organisation has to support heterogeneous, client-server computing to facilitate dissemination of information and sharing of resources. This module covers basic LAN structure,

including types of physical cables used, how these cables are used for LAN connections and how hardware platforms (such as servers and workstations) are attached to LANs. The module also introduces students to the major network operating systems and applications that run on LANs.

C++ Programming

This module gives an overview of the syntax of C++ required for object oriented programming. Students will learn how to implement classes, inheritance, polymorphism and multiple inheritances in C++. An overview of the memory management model of C++ is covered as well as basic I/O operations such as standard I/O and file I/O. The module also covers standard templates such as linked lists, trees and other abstract data types to enable the students to develop large scale C++ programs.

MOBILE BUSINESS APPLICATION

Mobile Business Application

This module explores the world of mobile business applications. It gives an understanding of the underlying technologies for mobile commerce and mobile applications and how mobile applications are not just for the consumer, but can also help a business to grow. Students will also be given an appreciation of the issues in mobile commerce such as mobile payment and security. At the end of this module, students will be able to develop mobile applications on a suitable platform.

Advanced Mobile Applications Development

This module builds upon the skills and knowledge that students have acquired from the Mobile Applications Development module. It will focus on the development of advanced applications and emerging mobile operating systems. For example, students could develop applications for industries such as entertainment, games and healthcare. They will learn to develop applications for emerging operating systems such as the iPhone OS and Android.

Mobile Applications 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 programs.

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 will learn to determine which technology is best suited for a particular application to achieve optimal performance.

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 will be 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 Device Security & Forensics

This module covers techniques and tools in the context of a forensic methodology to extract and utilise digital evidence on mobile devices. Students will learn how to use current forensic tools to preserve, acquire & examine data stored in a mobile device. The module covers basic SIM Card examination and cell phone forensics on multiple platforms such as iPhone, Android & Windows Mobile. The module takes a practice oriented approach to performing forensics investigation on mobile phones.

Digital Forensics

This module gives an insight into the process of forensics investigation. It covers the various types of computer-related crimes, techniques of gathering electronic evidence, and recovering of deleted, damaged or encrypted data. Students will also make use of advance forensic tools to perform forensic investigations. Besides the tools & techniques of investigation, students will be taught sound forensic investigation methodology and the proper handling of evidence. The module will also cover aspects of law and policies applicable to digital forensics.

Advanced Object-Oriented Analysis & Design

This module leverages off the core analysis and design skills acquired in the Object-Oriented Analysis & Design module to introduce complex design artefacts, relevant methodologies and the analysis techniques needed to model and document complex software systems. Students will also learn to appreciate the design, deployment and management of complex software systems in relation to the best practices that the industry recommends.

SOLUTIONS ARCHITECT

Data Structures & Algorithms

This module aids students in further developing their programming skills and knowledge in software development. Students will be expected to analyse software requirements/problems, and choose, design, and implement appropriate data structures and algorithms to solve the problems. 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 also introduces students to basic performance measures and algorithm.

Advanced Object-Oriented Analysis & Design

This module leverages off the core analysis and design skills acquired in the Object-Oriented Analysis & Design module to introduce complex design artefacts, relevant methodologies and the analysis techniques needed to model and document complex software systems.

Students will also learn to appreciate the design, deployment and management of complex software systems in relation to the best practices that the industry recommends.

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 will 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.

Local Area Networks

The typical computer network of an organisation has to support heterogeneous, client-server computing to facilitate dissemination of information and sharing of resources. This module covers basic LAN structure, including types of physical cables used, how these cables are used for LAN connections and how hardware platforms (such as servers and workstations) are attached to LANs. The module also introduces students to the major network operating systems and applications that run on LANs.

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 will learn to determine which technology is best suited for a particular application to achieve optimal performance.

Information Security

This module provides an overview of the various domains of Information security. It aims to provide an appreciation of the Information security from an end-to-end perspective. This module covers security across the seven layers of InfoComm – organisation, people, physical access, system, application, network and data. This module takes a comprehensive and practical approach towards studying information security in its entirety.

C++ Programming

This module gives an overview of the syntax of C++ required for object oriented programming. Students will learn how to implement classes, inheritance, polymorphism and multiple inheritances in C++. An overview of the memory management model of C++ is covered as well as basic i/o operations such as file i/o and standard i/o. The module also covers standard templates such as linked lists, trees and other abstract data types to enable the students to develop large scale C++ programs.

GAMES DESIGN & DEVELOPMENT FOCUS

Game Design

The module adopts a “playcentric” approach to game design by understanding and designing for that player experience, regardless of platform. It explores innovation in design for an emotionally appealing gaming experience. The exercise focused module will take students through conceptualising a game, prototyping it, conducting playtest, tuning and balancing to refine the game’s design. Students will learn to make use of a game engine as a prototyping tool and a game design document to outline their game concept.

Games Programming

This module provides the techniques and skills for building games on a PC and console. It studies how to create 2D games from using sprite batches to creating sophisticated 3D games using a 3D particle system for special effects. The module covers topics that are central to game development such as programming input devices, sound, music, creating game components and services, physics and artificial intelligence, and applying performance tuning techniques. Students will experience the creation of complete games.

C++ Programming

This module gives an overview of the syntax of C++ required for object oriented programming. Students will learn how to implement classes, inheritance, polymorphism and multiple inheritances in C++. An overview of the memory management model of C++ is covered as well as basic I/O operations such as standard I/O and file I/O. The module also covers standard templates such as linked lists, trees and other abstract data types to enable the students to develop large scale C++ programs.

ELECTIVES

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 will be expected to develop client-server applications based on the two-tier model.

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 will also expose students to the “pointer based” implementation of various data structures. Topics include memory manipulation and interfacing with the operating system.

Developing Office Applications

This module imparts basic skills in the use of office automation tools. 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 will 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.

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.

Internet Computing

In this module, students will 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 for inventory management are also included.

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 will 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 will 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 will 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.

Programming Wireless Applications

This module highlights the development of applications for small devices such as smart cards, personal digital assistants (PDAs), mobile phones and pagers, all the way up to the set-top box. Students will acquire knowledge and hands-on experience in the client- and server-side Java software development of wireless applications. An emphasis is placed 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 and will undertake 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.

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 will examine case studies of real world examples of technopreneurship. They will also learn about the issues and challenges of transforming a technological innovation into a successful product or service in the market place.

Web Development & Administration

The module provides students with an understanding of the concepts and techniques behind developing typical web-based applications such as a Content Management System (CMS). Students will gain hands-on experience developing these types of applications, primarily using open source web development tools. They will also be equipped with the skills needed to administrate and maintain for web servers.

Web Server Administration & Security

This module equips students with the skills needed to plan, install and maintain websites and web servers. It will discuss issues such as Internet organisation and administration, website security, and server performance. Students will also cover 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. Introducing 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. These include the Integrated Services Digital Network (ISDN), frame relay, Asynchronous Transfer Mode (ATM), and synchronous optical networking (SONET).

Windows Programming using Visual C++

This module equips students with the knowledge and skills needed to develop Windows applications and components using Visual C++. Additional language constructs, libraries and tools will be introduced. This module also covers basic concepts and principles in the marketing of goods and services so that students gain an understanding of the interaction of marketing variables and their impact on marketing decisions. Students will also 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.

Internship

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.





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

The **Diploma in Multimedia & Animation (MMA)** is a practice-oriented course that provides students with strong design and programming fundamentals in the first year and discipline-specific core skills in the second year when they pursue a specialisation in either Game Art & Design or Interactive Art & Technology.

The Game Art & Design option prepares students to conceptualise, design and create an interactive entertainment experience as well as game assets – digital 3D environment and architecture, sci-fi, surrealism or fantasy. Students will be well-versed in game design theory and game level design and be able to pick up new game engine scripting languages independently to design and script the gameplay and player interaction of any games. This option prepares students for a career in game level design, digital 3D modelling and design of the environments, buildings and settings for games.

The Interactive Art & Technology option prepares students to conceptualise, design and develop media-rich interactive applications for a wide range of digital technologies, from web, 2D and 3D interactive platforms, to mobile devices such as iPhone and iPad. The aim is to train graduates who are competent in both art and technology and human-centred design theories and skills. Students will be prepared for a career in concept art, visual interface design, and interactive experience design and development.

Integrated into the curriculum are electives and Interdisciplinary Studies (IS) modules that enable students to widen and deepen their spectrum of knowledge beyond the core modules. Their perspectives are broadened and an innovative and enterprising spirit is nurtured. This is important for MMA professionals working in a complex business environment where problems are multi-faceted in nature and require knowledge and skills in different disciplines.

In the final year, students undertake a year-long production in ICT's Amphibi Studio™ to further develop their expertise and the spirit of innovation and enterprise.

Students are required to own a MacBook and purchase art materials.

ENTRY REQUIREMENTS

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

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

You must also have sat for a Science or Design & Technology or Food & Nutrition or a relevant OSIE / Applied Subject and fulfill the aggregate computation requirements.

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

Those with colour appreciation deficiency may be considered, subject to passing an in-house test.

CAREER PROSPECTS

MMA graduates can apply for jobs in game and interactive art pre-production and production. They can look forward to an exciting career as a Game Level Designer, Game Interface Designer, Concept Artist, 3D Game Environment Artist, Interactive Experience Designer/Developer, Visual Interface Designer, Web Designer, and Graphic Designer. Graduates can also work in the creative and design aspects of IDM-related projects.

ACCREDITATION FOR FURTHER STUDIES

The Diploma in Multimedia & Animation is recognised by both local and overseas universities, which offer advanced standing to our graduates. MMA graduates can pursue further studies in the creative field with universities such as:

- National University of Singapore
Bachelor of Arts in Communications & New Media
- Nanyang Technological University
Bachelor of Fine Arts in Art, Design and Media
- Digipen Institute of Technology (Singapore)
Bachelor of Fine Arts in Digital Art and Animation
Bachelor of Arts in Game Design
- Royal Melbourne Institute of Technology (Australia)
Bachelor of Arts in Animation & Interactive Media,
Multimedia or Games Graphics Design
- Sheridan College (Canada)
Bachelor of Applied Arts in Animation

COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (26 hours per week)	
Fundamentals for Creative Professionals	2
Drawing & Perspective	4
Light, Colour & Design	4
Principles of Animation	4
Storytelling & Scriptwriting	4
Principles of Programming	4
Idea Jumpstart^	2
Sports & Wellness^	2
Level 1.2 (24 hours per week)	
Figure Drawing	4
Tone, Colour & Composition	4
3D Form & Space	4
Storyboarding	4
Problem Solving & Programming	4
Communication & Contemporary Issues^	4

Module Name

Credit Units

YEAR 2

Level 2.1 (24 hours per week)

Anatomy for the Artist	4
4 Elective Modules	16
Idea Blueprint^	2
Interdisciplinary Studies (IS) modules^	2

Level 2.2 (24 hours per week)

Concept Art & Illustration	4
4 Elective Modules	16
Idea Launchpad^	2
Interdisciplinary Studies (IS) modules^	2

YEAR 3

Level 3.1 (24 hours per week)

Concept Development	4
4 Elective Modules	16
World Issues: A Singapore Perspective^	2
Interdisciplinary Studies (IS) modules^	2

Level 3.2 (25 hours per week)

Internship / Final Year Project	16
---------------------------------	----

Notes:

^ For more details on Interdisciplinary Studies (IS) modules, 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.

In the second year, students may choose to specialise either in *Game Art & Design* or *Interactive Art & Technology*.

Game Art & Design Option

Level 2.1

- Texture & Lighting
- 3D Modelling for Games
- 3D Animation for Games
- Game Mechanics

Level 2.2

- Architectural Spaces, Design & Lighting
- Advanced 3D Modelling
- Digital Audio Design
- Advanced Game Mechanics

Level 3.1

- 3D Environment Modelling
- 3D Character Rigging
- Simulation Game Production
- Game Level Design

Interactive Art & Technology Option

Level 2.1

- Digital Imaging
- 3D Modelling & Animation for Games
- Designing Visual Interface
- Authoring Interactive Experience

Level 2.2

- Digital Photography
- Digital Video & Audio
- Designing User Experience
- Authoring 3D Experience

Level 3.1

- Digital Audio Design
- Digital Effects
- Interactive Entertainment Production
- Developing Mobile Experience

** The elective modules offered are reviewed regularly and subject to updates to ensure relevance to the industry needs and the sequence of module offering may change as deemed fit.

COURSE MODULES

LEVEL 1.1

Fundamentals for Creative Professionals

This module aims to provide students with a broad introduction to the interactive and digital media industry. Students gain a good understanding of the critical success factors, professional roles and career development paths within the industry, professional practices and ethical expectations.

Drawing & Perspective

This module introduces drawing from observation. The emphasis is on developing the student's understanding of the formal elements of drawing, perspective, composition, and other perceptual concepts. It introduces line, value, composition, linear and atmospheric perspectives, expressive mark making, and also explores the basic professional habits in drawing practice.

Light, Colour & Design

This module explores the fundamental elements and processes of organising, displaying, and communicating ideas and information creatively to the minds of the intended audience through two-dimensional form, colour structure, and composition. It introduces the elements and principles of design, visual organisation, visual perception and communication theory. Emphasis is on concept development, problem solving, and creative process relevant to visual communication.

Principles of Animation

This module introduces the language and principles of classical animation through analysis and decomposition of movement frame-by-frame. Students will explore the importance of effective timing and spacing, and how their manipulation can affect the feel of an action.

Storytelling & Scriptwriting

This module explores the nature of storytelling and exposes students to the historical traditions of storytelling in all forms. It introduces the essential components in a compelling story and the techniques to create story that will hook the audience and keep them emotionally involved, and explores at the more subtle elements of story. This module also introduces practices in screenwriting such as characterisation, narration, dialogue, script forms, and alternatives.

Principles of Programming

This module introduces software development with emphasis on the process and programme design. It advocates object-oriented way of thinking, systematic way of problem solving of multimedia applications. It covers the three programming constructs, introduces data types and variables, and a variety of data structures and algorithm design. Other key topics include project management, debugging, development of test cases and test plans, and programme documentation as part of software quality management and assurance.

LEVEL 1.2

Figure Drawing

This module introduces the concepts and techniques of figure drawing. It provides students a thorough understanding of the structure and anatomy of the human figure, and how the underlying skeletal structure can affect the surface appearance of the body. It aims to develop students' ability to create drawings that communicate the dynamics of the body structure and movement.

Tone, Colour & Composition

This module explores the nature and use of tone, colour, and composition in drawing. It emphasises methods of creating tone, ways to use luminance as an organisational element, and stresses on the

importance of thinking critically. In addition, the module introduces a variety of classical tonal systems and tonal illusions. The module covers systems and traditions of organising hue and saturation, and examines methods of building from tonal preliminary studies. Students will explore the artistic use of colour, and the classical forms of compositional organisation.

3D Form & Space

This module develops students' ability to perceive objects in three-dimensional space and to translate two-dimensional form into three-dimensional volume, mass, space, and structure. It introduces the basic elements, principles, materials and methodologies of three-dimensional design. Working with both physical medium and digital tools, students explore the use of basic materials, elements and principles of design, basic abstract components to build three-dimensional form that accurately depict its measurement and proportion.

Storyboarding

This module explores the pre-production skills of storyboard art. It introduces the concepts of storyboard drawings, which map out camera angles, continuity, and lighting. Students learn about the basic of film grammar through the analysis of scripts, character, and set design, and translate these through drawings to create story flow, character development, mood, time, and place. Students will create both production and presentation storyboards.

Problem Solving & Programming

Building upon knowledge learnt in Principles of Programming, this module covers the object-oriented design and programming concepts for interactive media applications. It shows how programs can be decomposed into classes and objects. The focus of this module is on developing appropriate data structures and algorithms to handle programming jobs.

LEVEL 2.1**Anatomy for the Artist**

This module explores the skeletal and muscular structures of the human body, and how these anatomical elements function to create movement, attitudes and poses from head to toe. It also gives a comparative study of the human structure and the structure of a variety of animal types. Students will apply the understanding of the anatomy to drawing human and animal figure from direct observation.

GAME ART & DESIGN OPTION**Texture & Lighting**

The module introduces materials, texture and lighting strategies to add detail and realism to objects. It introduces different types of shaders and maps, and covers the tools and techniques for the creation of custom 2D texture maps. Students learn about different artistic styles, levels of craftsmanship, repetition structures, and tile-able and seamless motifs, with grounding in traditional painting. Texture mapping techniques will also be explored with emphasis on manual UV unwrapping.

3D Modelling for Games

This module covers modelling techniques used for building organic and hard surface objects and environments. The skills include analysing a concept drawing; breaking it down into model elements; optimising the model to minimise mesh complexity in order to reduce render times; and simplifying the mesh. It explores the techniques in polygon, NURB, and subdiv modelling as well as deformations, texture mapping, lighting, cameras, rendering, and MEL scripting.

3D Animation for Games

This module develops students' 3D game animation skills on various biped/human characters. It continues to develop students' understanding of the concepts of motion and body mechanics, and aim to develop

students' ability to create convincing movement, expression of mood, thought, attitude, and personality in the characters with a goal to bring the characters to life. It also gives a brief introduction to acting and dialogue elements in an animation.

Game Mechanics

This module studies the game mechanics – the rules intended to produce an enjoyable gameplay, and introduces the principles and methodologies behind the rules and play of games. It first studies board and card games, and examines what make these simple games enjoyable. It allows students to apply the game design concepts to arcade-action games, produce game prototypes, and conduct focus groups to gather feedback on their design.

INTERACTIVE ART & TECHNOLOGY**Digital Imaging**

This module explores and focuses on the electronic and creative conceptual design, image and digital colour manipulation, and illustration for digital art. It teaches students to creatively use best existing tools to create the intended effects given any creative concept. It requires students to be able to read and interpret the creative brief and requirements.

3D Modelling & Animation for Games

This module examines the techniques of creating and animating 3D digital models using a 3D graphic and animation package. It provides an overview to the process of digital asset creation, such as modelling, texturing, shading, lighting, rigging and animating. Emphasis is placed on professional habits and the digital workflow.

Designing Visual Interface

This module introduces the visual design process, and explores both the aesthetic and information components associated with creating effective human-computer interfaces. It covers key principles and techniques of creating aesthetically pleasing visual

interfaces for digital presentations. It covers information design concepts, copywriting, and human perception and cognitive principles, and studies how to present complex information crisply, clearly and concisely, and how to create the message for branding.

Authoring Interactive Experience

This module aims to develop students' ability to create engaging and experience-rich interactive applications. Students learn how to author high-impact interactive experience that is rich with video, graphics, text, audio, and animation using an authoring tool for various purposes, in particular for animation, visual effects and multimedia.

LEVEL 2.2**Concept Art & Illustration**

This module introduces character design and world development. It emphasises the importance of research, planning, exploratory sketches, and visual treatment in concept development of characters, props, machines, and environments that are unique and memorable. Emphasis is on the creative process with visual idea development, from roughs to clean tonal work as well as mastery of the digital technologies. It covers illustration, perspective, light, tone, colour and composition, research and basic techniques.

GAME ART & DESIGN OPTION**Architectural Spaces, Design & Lighting**

This module introduces students to the aesthetics and principles of 3D environment design for the theatrical sets, landscapes, terrain, objects, and architectural structures. It covers a survey of world architectural styles together with the concepts on how to blend the emotion, mood, lighting, shadows, aesthetics and flow into the design of the architectural structures. It also covers texturing, spatial design, negative space, dramatic lighting, and other concepts that affect not only the psychology of level design but also gameplay principles.

Advanced 3D Modelling

This module continues to build on students' 3D modelling skill through creation of hyper-realistic models. Subjects like bipedal characters and creatures will be tackled through the balance application of anatomy and technical efficiencies. Students will learn to fuse the traditional art of sculpting organic form with digital modelling techniques. It covers the use of anatomy as it pertains to modelling and speaks of the technical needs for creating quality in deformable and detailed surfaces.

Digital Audio Design

This module introduces the production techniques of audio and sound effect, ambient sounds, background music and dialogue to enhance the user experience and/or to advance a story and create mood, place, and emphasis. It covers its associated technologies, the equipment used, the procedures and explores the manipulations of various envelopes on amplitude, filter and modulation and the use of low frequency oscillator and noise in designing sound. It also covers subtractive synthesising, and studies the processing and reactions of sounds in an interactive environment.

Advanced Game Mechanics

This module continues to introduce game mechanics, and examines the game mechanics of various genres of published electronic games to find out what drives the gameplay. It also covers the most common types of game balance in games, and examines the structure of interactive stories and branching dialogue, and how various puzzles are incorporated into interactive stories. Students learn to write game design document, project and production plan and pitch the concepts.

INTERACTIVE ART & TECHNOLOGY

Digital Photography

This module aims to develop students' ability to visualise, plan, compose imagery and, see all things creatively through digital photography. It focuses on developing students' ability to observe and attend to details swiftly

while introducing the mechanics of the digital camera, and the art and techniques of digital photography. It also covers the history of photography, visual thinking, composition techniques, creative effects, lighting, digital workflow, black and white photography, and studio photography.

Digital Video & Audio

The module introduces the creative video production and editing methods and its practices of TV commercial and corporate video. It covers the technology, equipment, and techniques of digital video production and post-production that includes camera, lighting, editing, effects and transitions and the techniques of combining computer-generated imagery with audio, voice narration and sound. It also provides an overview of the various compression strategies and codec used in the production and distribution of digital audio and video content.

Designing User Experience

This module introduces experience design from information, interaction and sensorial perspectives. Students learn how to design sustaining user immersion, experience and emotion by striking a balance between forms, functions, usability and aesthetics. The cognitive aspects of engagement, the psychological aspects of play or experience are discussed. This module also introduces the interactive media production within the context of a small production pipeline. Students take projects from concept to completion. Emphasis is placed on teamwork and organisational skills.

Authoring 3D Experience

This module continues to develop students ability to design and author highly interactive experience applications. The programming focuses on interactivity authoring through the eyes of designers for animation, visual effects and multimedia. It covers advanced authoring, digital storytelling techniques, user experience design, and project management techniques.

LEVEL 3.1

Concept Development

This module introduces various idea generation and concept development techniques. Students learn the pre-production skills of concept illustration and visual development through the application of knowledge skills in drawing, storytelling and composition to communicate the concept effectively to an audience. Emphasis is placed on the creation of original, unique and useful concepts. Students will produce a range of proof of concept collaterals.

GAME ART & DESIGN OPTION

3D Environment Modelling

This module provides the opportunity for students to create architectural interior and the natural environments representing houses, buildings, and entire worlds contained under a roof, in which to place the game characters. It explores and integrates design and technology to develop matte paintings, virtual sets and digital backgrounds. Students acquire the knowledge and practical skill sets for digital matte painting production.

3D Character Rigging

This module deals with issues relating to character modelling, rigging and setup based-on production requirements. Students will be presented with various character setups and explore appropriate modelling and rigging solutions for their own characters. Topics include skeletons, forward/inverse kinematics and custom control panels. Students will acquire the ability to set up a character for a wide range of complex body movement, with an emphasis on techniques for creating controls, which are realistic, flexible and can be intuitively animated.

Simulation Game Production

This module introduces the simulation game development industry, the production pipeline, and various professional roles and career paths, and

exposes students to the game production documents. It examines the roles of different participants in the development process and how the technical development and the artistic development proceed in tandem.

Game Level Design

This module introduces the concepts and principles of game level design. It takes students on a creative journey using a 3D game engine that starts at a conceptual beginning and arrives at a polished end. Through this journey, students will learn the process of designing compelling worlds that immerse the player in interactive environments. It introduces the game engine technology, game loop, clock, modular coding, and the use of art, sound effects and music in games. Students will create fully functional levels for a game genre.

INTERACTIVE ART & TECHNOLOGY

Digital Audio Design

This module introduces the production techniques of audio and sound effect, ambient sounds, background music and dialogue to enhance the user experience and/or to advance a story and create mood, place, and emphasis. It covers its associated technologies, the equipment used, the procedures and explores the manipulations of various envelopes on amplitude, filter and modulation and the use of low frequency oscillator and noise in designing sound. It also covers subtractive synthesising, and studies the processing and reactions of sounds in an interactive environment.

Digital Effects

This module gives an overview of how to create creative visual effects for motion graphics. It covers methods of composing computer-generated imagery and live images, along with layering, keying and matting, effects creation, motion control and tracking, film and lighting effects, image manipulation, retouching, colour correction, painting, stabilisation and rotoscoping.

Interactive Entertainment Production

This module introduces the interactive digital media industry, the production pipeline, and various professional roles and career paths, and exposes students to various document required in the production of interactive experience. It examines the roles of different participants in the development process and how the technical development and the artistic development proceed in tandem.

Developing Mobile Experience

This module introduces various mobile digital technologies and its unique characteristics and features. It also aims to further develop the programming skill of students using the programming language of the mobile technology. The module focuses on the specific and core features of a mobile technology that will give rise to fun, rich and engaging mobile experiences such as the accelerometer, GPS, magnetometer, advanced multi-touch gestures and modern user interfaces.

LEVEL 3.2

Internship / Final Year Project

The primary aim of this final year industry-based project is to nurture the spirit of innovation and enterprise in students and broaden their experience beyond classroom learning. It also provides students with the opportunity to apply the knowledge and skills gained in the past semesters. Using the demo program prototyped in the earlier semester under the Concept Development module, students will develop the idea into a full working product. Local or overseas attachments are possible.

