COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (24.5 hours per week)	
Avionics Systems	3
Career & Professional Preparation I	1.5
Electrical Technology	4
Electronic Measurement & Prototyping Skills	3
Engineering Mathematics 1	5
Engineering Mechanics	4
Innovation Toolkit 1 ^	2
Sports & Wellness ^	2
Level 1.2 (27 hours per week)	
Computer Programming	4
Digital Logic	3
Discrete Analogue Electronics	6
Engineering Mathematics 2	5
Fundamentals of Aerospace Technology	3
Communication & Contemporary Issues ^	4
Innovation Toolkit 2 ^	2

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

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

COURSE MODULES

LEVEL 1.1

Avionics Systems
This module provides students with an appreciation of aircraft electronic systems. It includes topics such as cockpit instrumentation, aircraft navigation, communication, surveillance, control and lighting electronics. This module equips students with the knowledge required for the advanced modules on Aircraft Navigation and Communication Systems (ANCS) and Aircraft Electrical & Instrumentation Systems (AEIS).

Career & Professional Preparation I
This module helps to give students a foundational introduction to their three-year diploma course curriculum and how it prepares them for industry. It will help them to embark on their three-year course with the end in mind, through guided reflection of their personal characteristics, and producing an overall game plan for their future

education and career goals. The module aims to deepen students' commitment to the sector that the course prepares them for.

Electrical Technology
This module introduces the necessary foundation for electrical circuit analysis covering electrical theorems and techniques for analysing and solving direct and alternating current circuit problems. Laboratory assignments include basic electrical measurement skills and concepts learnt in lectures and tutorials.

Electronic Measurement & Prototyping Skills
This module equips students with the necessary hands-on practical skills in electronic circuit construction and measurements. Students will be introduced to basic practical skills such as soldering, identification of components and use of various electronic instruments.

Engineering Mathematics 1
This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast with the application requirements in engineering modules. The emphasis in each topic is on applications and problem solving. Topics include algebra, trigonometry, logarithms, plane analytic geometry, matrices and complex numbers.

Engineering Mechanics
This module introduces students to the study of external forces in two dimensions and their effect on particles and rigid bodies that are at rest. Students learn to analyse the forces acting on the bodies by drawing free-body diagrams and applying the conditions of equilibrium. Topics include forces and resultants, moments and couples, equilibrium, and the concepts of plane friction. This module also aims to equip students with the skills to analyse problems of rigid bodies in motion. Only linear and rotational motion in two dimensions will be covered. Topics include Kinematics of linear and rotational motion, and Kinetics of linear and rotational motion.

LEVEL 1.2

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

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

Discrete Analogue Electronics
The aim of this module is to lay a foundation in electronics. It will cover concepts pertaining to analogue devices. With the fundamentals of basic circuit theory frequently revisited, the module will deal with the operating characteristics, working principles and applications of discrete electronic devices such as the various types of diodes, MOSFETs and BJTs. Practical circuits will be used to enhance and strengthen students' knowledge so that they will acquire the relevant competencies to move on to more specialised modules. This module is the pre-requisite for the Analogue Circuit Design and Applications module.

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

Fundamentals of Aerospace Technology

This activity-based module introduces students to the basics of aerodynamics and principles of flight and traces the development of the aerospace technology. It highlights the nature and scope of the aerospace industry, and the broad technical training for the profession. The module aims to create professional awareness in students.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 2	
Level 2.1 (25 hours per week)	
Aircraft Maintenance Practices	3
Applications Programming	4
Career & Professional Preparation II	2
Digital Electronics	5
Electronic Design Prototyping 1	3
Engineering Mathematics 3A	4
Human Factors	2
Interdisciplinary Studies (IS) elective ^	2
Level 2.2 (27 hours per week)	
Aircraft Materials	3
Analogue Circuit Design & Applications	5
Electronic Design Prototyping 2	4
Engineering Physics	3
Microcontroller Programming & Interfacing	5
Telecommunication Principles	5
Interdisciplinary Studies (IS) elective ^	2

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COURSE MODULES

LEVEL 2.1

Aircraft Maintenance Practices

This module helps students to become familiar with the workshop as well as inculcates good workshop practices. It covers various soldering methods such as welding, brazing, soldering and bonding, aircraft weight and balance, aircraft handling and storage, disassembly, inspection, repair and assembly techniques, and maintenance procedure.

Applications Programming

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

Career & Professional Preparation II

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

Digital Electronics

This module covers the fundamentals of digital electronics. The basic principles and techniques of digital system and design are covered. It also prepares students for subsequent modules that discuss microprocessors and microcomputers. The main topics covered are number systems, Boolean Algebra, combinational logic circuits and minimisation techniques, flip-flops and multivibrators, IC counters, and data handling devices. Characteristics of standard TTL and high speed CMOS are also discussed.

Electronic Design Prototyping 1

This module builds upon the skills learned in the Electronic Measurement and Prototyping Skills module. The main objectives of this module are electronic circuit construction, measurement and simple troubleshooting techniques. Students will be introduced to Computer-aided design (CAD) tools to design printed circuit board (PCB) of simple circuits.

Engineering Mathematics 3A

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

Fundamentals of Financial Management

This module covers basic accounting and financial concepts and principles to enable students to understand and interpret financial statements and reports. Students will also have an understanding of costing concepts and the financial techniques used in making financial decisions and evaluating capital investment projects.

Human Factors

This module introduces students to human factors and how they affect performance at work. Topics include social psychology, physical environment, types of tasks, communication and human errors, with special reference to the aerospace industry.

LEVEL 2.2

Aircraft Materials

The module covers the family of common engineering materials comprising metals, ceramics, polymers and composites, with an emphasis on the structures, properties, performance and processing of such materials. Corrosion & various fastener components are included. Learning is enhanced by laboratory work on microstructures and mechanical testing.

Analogue Circuit Design & Applications

This module introduces students to the operating principles of commonly used analogue devices and circuits, such as operational amplifiers, oscillators and filters. Applications in various practical circuits are also illustrated.

Electronic Design Prototyping 2

This module builds upon the skills learned in the module, Electronic Design Prototyping 1. The main objectives of this module are to introduce prototyping and testing techniques, fault simulation and fault finding used in electronic project design. Students will also use CAD tools to design PCB of more complex circuits.

Engineering Physics

This module provides an understanding of engineering physics theories such as angular kinematics, universal gravitation and fluid mechanics. It also covers the laws and applications of thermodynamics. Moreover, it explains the kinetic theory of gases and introduces the fundamentals of heat engines.

Marketing Fundamentals

The module introduces concepts and principles of the marketing of goods and services to enable students to better understand and evaluate the marketing system in which products and services are planned, priced, promoted and distributed. Apart from the four P's in marketing, topics covered also include segmentation, targeting and positioning, product mix, service marketing, channel decisions and branding.

Microcontroller Programming & Interfacing

This module introduces students to the fundamentals of microcontroller programming and interfacing. C language programming is used to illustrate the operation of the microcontroller. Interfacing the microcontroller to basic input-output devices such as switches, LEDs, 7-segment displays and keypads help to demonstrate the behaviour of the application software running on a working system.

Telecommunication Principles

This module introduces students to radio communication. It builds an understanding of the basic concepts of analogue communication systems. The characteristics of a basic communication system and the environmental factors that affect communication will be discussed. The concepts that are necessary for an understanding of linear systems will be explained, with an emphasis on resonance and filters. Students will be taught the fundamental concepts of analogue modulation and demodulation techniques such as AM and FM and their applications.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 3	
INTERNSHIP	
Level 3.1 (24 hours per week)	
Aircraft Electrical & Instrumental Systems	5
Aircraft Navigation & Communication Systems	5
Avionics Project Design	5
Fundamentals of Control Systems	5
Interdisciplinary Studies (IS) elective ^	2
World Issues: A Singapore Perspective ^	2
Level 3.2 (22 hours per week)	
6-Month Internship	22
NON-INTERNSHIP	
Level 3.1 (23 hours per week)	
Aerospace System Design	4
Aircraft Electrical & Instrumental Systems	5
Project Design & Development 1	10

Interdisciplinary Studies (IS) elective ^	2
World Issues: A Singapore Perspective ^	2
Level 3.2 (22 hours per week)	
Aircraft Navigation & Communication Systems	5
Fundamentals of Control Systems	5
Project Design & Development 2	12

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COURSE MODULES

LEVEL 3.1 & 3.2

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

Aerospace System Design
This module aims to provide students with the basic understanding of the process of avionic system design, analysis and integration. Concept and fundamental understanding of flight control, avionic instruments, closed loop control system and PID Controllers will be introduced. Apart from the concept and theory introduced, another aspect of the learning experience will be through hands-on practical sessions and projects.

Aircraft Electrical & Instrumentation Systems
This module examines the theory of operations and the functional description of aircraft instrument and electrical systems found in the modern aircraft. Students will also learn about the auto flight, flight control and management systems, emergency electronics, and cabin entertainment system.

Aircraft Navigation & Communication Systems
This module provides students with the theory of operations and the functional description of airborne navigation and communication systems found in modern aircraft. Systems covered include ADF, VOR, DME, IRS, HF & VHF. The standard digital data-bus communications protocol, such as ARINC 429 and ARINC 629 used by commercial aircraft and MIL-STD- 1553B used by military aircraft, will also be discussed. Radio Frequency & Microwave Engineering Students are introduced to the basic principles, characteristics and applications of a wide range of commonly used RF and Microwave Integrated Passive and Active Circuit hardware.

Avionics Project Design
Using a Problem-based Learning (PBL) approach that combines the fundamental learning process and engineering problem-solving, this module is designed to impart pre-requisite skills and knowledge like problem analysis, defining and formulating a problem in engineering terms, and the use of software tools. Students will have the opportunity to apply these skills in real-life problem solving.

Fundamentals of Control Systems

This module provides students with a basic coverage of feedback control systems. The topics cover basic concepts of automatic control, components of control systems, simple analytical tools, and stability analysis of systems. Students are also introduced to the use of Matlab/Simulink as a computer tool in control systems analysis.

Project Design & Business Application 1

The objective of this module is to enable students to apply the concept of engineering, marketing, and financial management, learnt during the course of their study, in completing a final year project with business application. The concept of business application will be introduced and applied at different stages of product design and development cycle. Students will have opportunities to integrate engineering and business concepts, market research and strategy, in the design and development of a product. The design of a product will be developed based on the need of a specific industry or targeted users/stakeholders. While integrating the engineering and business concepts, the financial aspects of developing a product will also be incorporated into the product design and development.

Project Design & Business Application 2

This module is a continuation of Project Design & Business Application 1. Students are required to demonstrate their ability and resourcefulness in constructing and completing engineering experimental model(s) to demonstrate the functionality and feasibility of engineering design(s) of their identified solution(s) to meet and fulfil users'/stakeholders' needs and experiences identified in Project Design & Business Application 1.

Project Design & Development 1

In this module, students will work in teams of two or three to design and implement a project that demonstrates their engineering skills as well as teamwork over a period of two semesters. The module is structured to encourage creativity and innovative thinking. This will also help students to develop a positive work attitude and good team spirit.

Project Design & Development 2

This module follows on from Project Design and Development 1. Students are required to demonstrate their ability and resourcefulness in implementing their selected project design solution. The scope of work includes printed circuit board fabrication, wiring, assembly and testing of the final prototype according to the specifications and requirements defined in Project Design and Development 1. In addition, software based projects may require database coding, operating system implementation and testing, server and client system design, portable design field test and web-based integration.

Starting & Managing an Enterprise

Through this module, students generate business ideas and propose how these ideas can be developed into a business plan incorporating operational and financial requirements and marketing strategies for a new enterprise. In addition, students will learn how the principles of management can be applied to organise and develop the enterprise. Topics covered include entrepreneurial concepts and issues, business entry and exit strategies, types of business ownership, sources of business financing, venture launch and management principles.