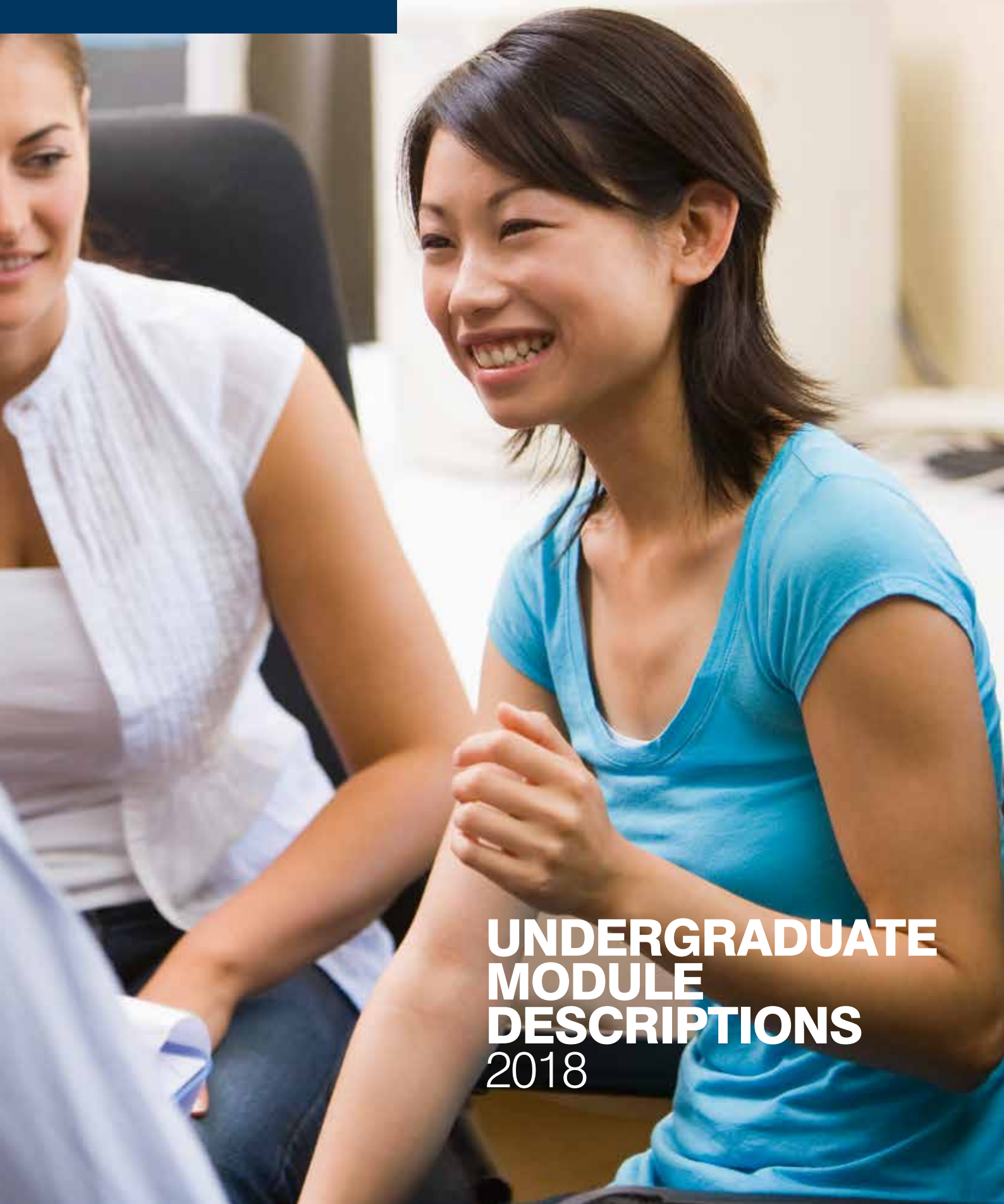
University of Glasgow

SINGAPORE INSTITUTE OF TECHNOLOGY



UNDERGRADUATE MODULE DESCRIPTIONS 2018

BRIEF MODULE DESCRIPTIONS RELATED TO BSc (HONOURS) IN COMPUTING SCIENCE

Algorithmic Fundamentals	This module will not be formally part of the collaborative programme. This bridging module must be taken by students admitted from certain eligible diploma programmes into the collaborative programme. It aims to introduce the foundational mathematics needed for computing science.
Linux	This module will not be formally part of the collaborative programme. It will be a bridging module that must be taken by students admitted from certain eligible diploma programmes into the collaborative programme. This module aims to make students competent in the use of Linux and associated software.
Team Project	Students design and implement, in a team, a software system that solves a (more-or-less) well-understood problem, creating a deliverable product in the form of a piece of working software.
Advanced Programming	This module aims to develop practical expertise in, and understanding of, concurrent programming in Java; explore a variety of different concurrency control mechanisms; substantially develop the knowledge of C gained during summer preparatory reading; develop the students' experience and understanding of programming in a low-level language; develop the ability to craft efficient and effective code in a pointer-rich language; introduce concurrent programming in C using the PThreads library; further develop the ability to select and re-use existing software components and libraries; enhance the students' skills in engineering software as interacting sub-systems, using interfaces and libraries to manage medium sized software development projects.
Algorithmics	This module aims to develop the student's skills in the design and analysis of algorithms; study algorithms for a range of important standard problems; introduce the student to the theory of NP-completeness together with its practical implications; make the student aware of fundamental concepts of computability.
Database Systems	This module aims to develop the software engineering and database administration skills required for designing, creating, running and developing a relational database application and its associated application software suite. This will include extension of pre-existing systems and arrangements for extending operational systems; understanding of how conventional programming languages interact with databases; understanding of the fundamental concepts, theories and methods of the relational data model; and an introduction to Information Retrieval concepts and techniques.
Interactive Systems	This module aims to offer students the opportunity to become familiar with one of the most important interaction paradigms; enable students to become skilled in the use of techniques and tools for modelling, implementing and evaluating interactive systems; enable students to apply the theories, techniques and tools presented in the module via challenging exercises which combine design, implementation and evaluation.
Networked Systems	This module aims to introduce the fundamental concepts and theory of communications; provide a solid understanding of the technologies that support modern networked computer systems; introduce low-level network programming concepts; provide students with the ability to evaluate and advise industry on the use and deployment of networked systems.
Operating Systems	This module aims to introduce the students to the styles of coding required with an operating system (OS); give a thorough presentation of the contents of a traditional OS, including the key abstractions; show the range of algorithms and techniques available for specific OS problems, and the implications of selection specific algorithms for application behaviour; develop an integrated understanding of what the computer is doing, from a non-naive view of hardware to the behaviour of multi-threaded application processes; present the alternatives and clarify the trade-offs that drive OS and hardware design.
Professional Software Development	This module aims to introduce students to modern software development methods and techniques for building and maintaining large systems; provide an opportunity for the students to apply these methods and techniques presented to them in the context of an extended group-based software development exercise; make the students aware of the professional, social and ethical dimensions of software development; instil in the students a professional attitude towards software development.
Programming Languages	This module aims to provide a conceptual framework that will enable students to understand familiar programming languages more deeply and learn new languages more efficiently; show how the syntax of a programming language can be formalized; explain the functions of compilers and interpreters, how they interact, and how they work; show how to implement a compiler using compiler-generation tools.
Professional Skills & Issues	This module aims to stimulate thinking about the social and ethical implications of the widespread use of computational devices; develop students' awareness of the laws and professional codes of conduct governing the IT industry; expose students to IT industry working practices; develop information gathering skills, from libraries, the Web, organisations, and elsewhere; encourage students to adopt principled, reasoned stances on important issues in the topic area; develop verbal and written argumentation skills. This module will be taught in block mode in Glasgow.
Individual Project	This module aims to allow students to undertake a substantial piece of individual work, involving planning, specification, design, execution, evaluation, presentation, and report-writing.

Big Data: Systems, Programming and Management	Big Data is nowadays manifested in a very large number of environments and application fields pertaining to our education, entertainment, health, public governance, enterprising, etc. This module will endow students with the understanding of the new challenges big data introduces and the currently available solutions. These include (i) challenges pertaining to the modelling, accessing, and storing of big data, (ii) an understanding of the fundamentals of systems designed to store and access big data, and (iii) programming paradigms for efficient scalable access to big data.
Cyber Security Fundamentals	This module aims to explain the properties of standard cryptographic primitives such as single-key and public-key encryption, digital signatures and secure hash functions; explain the principles of secure protocol design, selection and practice using standard cryptographic primitives; explain the principles, practices and tools of secure system development based on standard security protocols and primitives; explain how to analyse different security problems, generating security requirements that lead to the development of an appropriate secure system; explain how standard security systems and components such as internet communications, security kernels and firewalls are implemented; explain how technical vulnerabilities are identified and exploited by attackers and how these attacks can be countered.
Distributed Algorithms & Systems	Distributed systems are ubiquitous in commerce and industry, from the international banking network to process control in large industrial sites. This module builds on the introductions to operating systems and networked systems in level 3, specifically focussing on the software engineering issues raised by distributed systems and algorithms for use in distributed systems. The key feature of this module will be the assumption that a distributed system is one in which partial failure is to be expected, local and remote operations differ greatly in cost, and an element of message passing is required for communication.
Human-Computer Interaction	This module brings depth and breadth to the material covered in Interactive Systems. Human-Computer Interaction is moving away from desktops operated by one person using a keyboard and mouse. They are now used collaboratively for social activities and games. They are used in many different ways, for example, using audio, haptic or gestural interaction and they are used by many different people, with different skills and abilities. The aim of Human-Computer Interaction will be to equip our students with skills to design for this broad use of technology and also to feed into Mobile Human-Computer Interaction, which will concentrate on mobility.
Information Retrieval	This module aims to present students with an in-depth examination of the theoretical and practical issues involved in providing tools to access large collections of documents, especially in the context of the World Wide Web. It presents students with the practical engineering issues raised by the design and implementation of an information retrieval system.
Mobile Human Computer Interaction	This module aims to give students an overview of the fields of mobile human computer interaction and ubiquitous computing, and an understanding of the practical challenges associated with embedded software development; give students experience with a development environment for mobile/embedded software development (e.g., one of iPhone, qT/maemo, Symbian, Windows Mobile); give students ability to develop and deploy, evaluate and debug simple software on mobile devices; give students an overview of mobile service design, including privacy issues as well as access.
Web Science	This module aims to introduce students to the field of web science and critically examine methodologies and techniques used in the field. Web Science is the study of the World Wide Web (WWW), its components, facets and characteristics and the impact it has on both society and technology. The World Wide Web changed the way in which we create information, communicate and interact. New models of social networks (LinkedIn, Facebook, etc.) create opportunities, which were not available before. Exploiting such data and networks for the benefit of individuals and organizations has become a key in our knowledge society.
Safety-Critical Systems Development	This module encourages students to apply engineering techniques to support the development of safety-critical applications. It also encourages students to consider the particular methodological and professional issues that surround the development of safety-critical systems.

BRIEF MODULE DESCRIPTIONS RELATED TO BEng (HONOURS) IN AERONAUTICAL ENGINEERING (AE) AND/OR BEng (HONOURS) IN AEROSPACE SYSTEMS (AS)

Applicable Maths 2S (AE/AS)	The main topics include calculus of several variables, differential equations, Fourier series and Laplace transforms.
Applicable Maths 3S (AE/AS)	The main topics are vector calculus, partial differential equation and functions of a complex variable, whose applications to fluid flow will be described.
Aircraft Performance 3S (AE/AS)	This course will equip the student with a robust theoretical basis for development of elementary concepts in aircraft performance.
Simulations in Engineering Systems 3S (AE/AS)	This course provides an understanding of how continuous-time systems can be simulated by numerical solution of mathematical models. It introduces commonly used simulation tools and numerical methods.
Propulsion & Turbomachinery 3S (AE/AS)	Course consists of five basic elements which are: basic propulsion considerations; turbomachinery; gas dynamics; propeller based propulsion and environmental considerations.
Aircraft Structures & Materials 3S (AE)	Introduction to the concepts of shear flow and shear centre and will develop an understanding of the behaviour of structural materials under various load systems.
Real Time Computer Systems 3S (AS)	This course introduces the principles of real time computer systems and illustrates their practical implementation using a system based on an ARM Cortex-M3 microcontroller. The problems of multitasking, which arise when such systems have to respond to several simultaneous external events, are also considered.
Communication Systems 3S (AS)	Overview of analogue and basic digital communication system modulation, generation and detection techniques. In addition, the student will be introduced to the basic principles of spectral analysis and shown how this relates to a communication system.
Aerodynamics & Fluid Mechanics 3S (AE)	Understanding of incompressible fluid mechanics and will also provide an understanding of the aerodynamic forces generated on wings and bodies in incompressible flow and the ability to predict them.
Dynamics 3S (AE/AS)	This course introduces real world dynamics problems and formulates solvable models for practical problems. Student will understand what a dynamic system is and the differences between free and forced vibrations for undamped and damped systems. Students will be able to perform vibration analysis for one and multiple degrees freedom systems.
Control 3S (AE/AS)	This course provides a basic understanding of techniques used to model engineering systems and physical understanding of the factors influencing the steady-state and dynamic response of practical systems. Students are introduced to time-domain and frequency-domain methods of analysis of closed loop control systems, as well as the properties of PID controllers using computer-based techniques.
Instrumentation and Data Systems 3S (AE/AS)	This course provides an introduction to instrumentation and data systems for engineers covering error analysis, signal acquisition and processing.
Flight Mechanics 3S (AE/AS)	Theoretical basis for development of elementary concepts in atmospheric flight mechanics, and aircraft stability and control.
Aircraft Structural Analysis & Design 3S (AE)	Provides practical insight into the assessment of structural behaviour using combinations of analytical, experimental and numerical techniques. Develop experimental skills for validation of predicted behaviour of structural members under load.
Software Engineering 3S (AS)	Understand the nature and problems of software and the need for software engineering. Develop familiarity with selected software engineering processes and techniques. Explore the relationship between software engineering and more traditional engineering disciplines.
Electromagnetic Compatibility 3S (AS)	Origins of unwanted electromagnetic emissions in terms of the electric and magnetic fields causing them. Ability to analyse the propagation of electromagnetic waves in various media.
Aircraft Design 3G (AE)	Group work on a conceptual design project to develop a technical specification for a new aircraft from broad design requirements; first defining the needs and any operational constraints that apply to the design. Alternative concepts should be devised with the aim of seeking an innovative solution. The project is complemented by experiments using a wind tunnel.
Aerospace Systems Team Design Project 3G (AS)	Group work on the development of autonomous guidance and control algorithms for semi- constrained rotorcraft vehicles.

Flight Dynamics 4S (AE/AS)	In depth knowledge of aspects of flight dynamics and will enable students to analyse the dynamic characteristics of aircraft.
Professional Practice 5S (AE/AS)	Introduces the concepts of entrepreneurial planning through understanding and practice in the use of developing a business plan.
Aircraft Structures & Materials 4S (AE)	Finite element method, one and two-dimensional elements, bending, pressure loaded and buckling plates. Elastic instability of struts and rigidly jointed frames. Laminated plate theory, extensional and bending stiffness.
Aerospace Design Project (AE)	Group work on a detailed design project to continue developing a technical specification for a new aircraft. Detailed analysis of aerodynamic and structural performances, system definition (avionics, landing gear etc). Analysis of marketing potential and development of a business plan.
Aerospace Systems Design Project 4S (AS)	This project introduces a formal approach to systems engineering and provides the opportunity to apply this to the design and implementation of an aerospace system. It gives teams of students the opportunity to develop a flight control system, bringing together topics taught in lecture courses on aerospace systems and instilling a capability to solve problems over the wide range of activities that go to make up a total design.
Control 4S (AS)	Applies classical control theory to a range of different types of system. It includes the classic types of controller such as proportional-integral-differential (PID), simple compensators and the use of Nyquist and Bode plots. The state space representation is introduced and used to assess stability.
Navigation Systems 4S (AS)	This course introduces the engineering principles and current technology behind navigation systems. The course is broadly split into two sections, the first covering navigation equations and inertial methods, and the second covering satellite-based navigation and the Global Positioning System (GPS) in particular.
Radar and Electro-Optic Systems 4S (AS)	Introduction to the engineering principles behind radar based systems and electro-optical systems for remote sensing and target tracking, and how their performance is enhanced by signal processing and filter design. It leads to an assignment where students design and simulate a radar target tracking system.
Final Year Project 4S (AE/AS)	As part of the fourth year assessment, each B.Eng. Honours student is required to undertake a project of his/her choice and to give a presentation of such to a group of staff and students. B.Eng projects can be experimental, computational or dissertational and carried out during your final year under the supervision of a staff member. Projects will be available in different aerospace topics such as: aerodynamics; flight mechanics; avionics; structures and material; aeroelasticty; fluidmechanics; space systems engineering; propulsion; and turbomachinery.
High Speed Aerodynamics 4S (AE)	Understanding of how compressibility affects the global and local nature of the flow and its effects on the aerodynamic forces generated on wings and bodies in subsonic, transonic and supersonic flows.
Industrial Aerodynamics 4S (AE)	This course applies the principles of aerodynamics to industrial areas other than aerospace. Examples include the action of atmospheric wind on buildings and structures, including static, dynamic and aeroelastic effects, and the basic aerodynamic features of road vehicles. These examples increase students' awareness of wider applications of an aerospace education.
Computational Fluid Dynamics 4S (AE)	Governing equations of fluid dynamics, Partial differential equations, The computational mesh, Discretisation in space and time, Finite difference schemes, Finite volume method, Time integration schemes, Numerical solution of systems of equations, Solving the flow equations .

BRIEF MODULE DESCRIPTIONS RELATED TO BEng (HONOURS) IN CIVIL ENGINEERING

Civil Engineering & Sustainable Built Environment	An overview of civil engineering activities, built environment, environmental impact of civil engineering, urban planning and sustainable development in the Singapore context, and engineer's role in society at large.
Engineering Physics	Fundamental principles of mechanics and thermodynamics and their applications in engineering. Necessary applied mathematical skills for advanced learning of engineering courses.
Engineering Mathematics I	Basic concepts of limits, differentiation and integration. Applications of differential and integral calculus. Complex numbers, vectors and matrices that prepare the students for other courses in Year 1.
Civil Engineering Skills	Foundation for engineering skills including computing and surveying. Brief introduction to basic programming techniques and available techniques and solutions in the engineering context. Basic measurement techniques and skills needed in engineering works control, site supervision and map interpretation.
Statics and Structural Mechanics	Fundamental concepts of statics and mechanics of materials and their applications in engineering problems. Basic understanding of force vectors and their operations, force equilibrium, stresses and strains of a body subjected to external loads. Essential technical basis for the analysis and design of civil structures.
Graphical Communication	Principles of engineering drawings, Computer Aided-Design (CAD) tools, and civil and structural engineering drawings.
Effective Communication	Individual English language proficiency. Effective communication through a variety of activities such as group work, interaction, role-play and presentations.
Engineering Mathematics II	Extension of basic concepts of differentiation and integration learned in Mathematics 1. Operations of functions with multiple variables. Advanced applications of differential and integral calculus. Series and ordinary differential equations.
Fluid Mechanics	Basic knowledge of fluid statics and dynamics in buildings and building services. Applications of the piped/duct system, open channel flow, flow around buildings and structures, potential flow, boundary layers and compressible flows.
Civil Engineering Materials	Knowledge and skills in structural mechanics, and concrete, structural steel and timber. Fundamentals of material constitutive behaviours and failure models to appreciate the use of materials in structural design. Applications of concrete, steel and timber, for e.g. CLT and glulam as structural materials including its properties, design and quality control.
Engineering Geology & Soil Mechanics	Basic knowledge of engineering geology, the essential concepts of the physical properties of soils as a civil engineering material and the fundamental principles of soil mechanics.
Engineering Mathematics III	Computational solution of important problems of matric algebra, eigenvalues and mathematical modelling. Matrix algebra, rank of matrix and solution type, determinant of matrix, eigenvalues and eigenvectors, mathematical modelling, numerical integration and differentiation.
Hydraulics & Hydrology	Basic knowledge of the hydraulics and engineering hydrology. Essential and fundamental concepts for the design of water resources related projects.
Structural Analysis I	Principles of elastic and plastic structural analysis and behaviour of indeterminate structures. Classical and modern analysis techniques. Necessary tools to better appreciate the real behaviour of structures.
Geotechnical Engineering	Extended fundamental principles of soil mechanics. Application of fundamental soil mechanics concepts to geotechnical design.
BIM for Civil Engineers	Introduction to Building Information Modelling (BIM), a critical role in design, analysis, construction planning, 4D coordination and fabrication process. The information in BIM for different parties in the value chains of building delivery process including civil engineers. The understanding of BIM modelling specifics to civil engineering discipline. Structural analysis and design of different types of structural systems and work on BIM project for civil engineer.
Transportation Engineering	Transportation systems, transportation planning and management, and traffic flow studies. Geometric design of roads and intersections. Design of flexible and rigid pavements, including bituminous pavement materials.
Environmental Engineering	Water quality, Physical, chemical, and biological unit processes for water and wastewater treatment, Solid waste management, Air quality and control.
Structural Analysis II	Theory and applications of modern structural analysis, Concept of equilibrium, compatibility and force-displacement relationship, Direct stiffness method, Matrix formulation of trusses, beams and frames, Unit displacement method. Introduction to stability, Formulation of stability concepts associated with columns and frames. Elastic stability analysis of framed structures.

Structural Design	Introduction of Eurocode 0 and Eurocode 1: basic design requirement; limit states design and design situations; design variables and verification; general actions, wind actions, thermal actions, actions during execution and accidental actions. Computer modelling of 2D truss and frame structures using software SAP 2000 or MIDAS.
Professional Communication and Development	Conducted via small-group workshops and individual e-learning. Aimed at giving students gain meaningful learning and practice. Career planning and management, Job search strategies, Cover letter, resume writing and interview skills.
Foundation Engineering	Site investigation. Evaluation of soil parameters for foundation design. Shallow foundation: bearing capacity and settlement. Deep foundation: pile types, axial capacity, load tests and pile group. Retaining walls: gravity walls, embedded walls and braced excavation systems.
Construction Technology	Construction safety and legislation; construction machinery and operations; basement construction; caisson foundations; tunneling methods, construction of high-rise buildings; bridge construction; Lean and virtual construction; Design for Manufacturing & Assemble (DfMA); Prefabricated Pre-finished Volumetric Construction (PPVC); Design for Safety (DfS).
Design of Steel & Concrete Structures	Basic layout of steel & concrete structures, Basic material properties, Design of flexural members; Compression members; Current building code and standards.
Seminar & Site Visit	Regular technical seminar sessions by industry experts and leaders. Aspects of civil engineering practice. At least one site-visit per semester, more will be arranged if time permits.
Design Project OIP at Glasgow	The OIP course will involve a group design-based project which will examine both the conceptual and detailed aspects of structural design. It will involve different areas of the civil engineering discipline including site selection, architectural and structural concept design, structural analysis, computer aided drawing, foundation design and a full structural design of the building.
Integrated Work-Study Programme (IWSP)	This is an uninterrupted 8-month duration (2 trimesters) structured learning and work programme which will provide students with unique learning opportunities to achieve the following objectives, i.e. (1) applied learning – integration of theory and practice, acquisition of specialist knowledge and development of professional skills, (2) exposure to real-world conditions - appreciation of real-world constraints in respective industry contexts to develop skills of adaptability, creativity and innovation, and (3) smooth transition to jobs - practical experience which shortens work induction period. Field/site supervision experience is mandatory and this experience will contribute to professional accreditation and recognition of work experience required for registration of resident engineer with IES/ACES. Students will have the opportunity to develop innovative solutions for the design and construction projects they are working on. In this way, the IWSP will be a key platform to inculcate the SIT-DNA in every student.
Project Planning & Management	Knowledge in project planning and management with essential components in management principles, overview of government regulations, project planning and control techniques, financial management, time-cost trade off, cost estimating, scheduling and resources management and risk analysis.
Civil Engineering Practices	Contract strategy. Types of Contract. Construction contract Law. Contract management. Loss, damage and injury. Quality, testing and defects. Claims and adjustments. Payment. Termination. Disputes. Contract adjustment and other contractual issues with authorities, consulting engineers and contractors.
Ground Engineering	Soil improvement: shallow surface compaction; deep densification; deep stabilization; soil reinforcement; preloading and vertical drains. Slopes and embankments: methods of slope stability analysis; reinforced embankments over soft clay; principles of slope stabilization.
Rail Engineering	Introduction to the rail engineering, rail infrastructures and their impacts on the society and environment: Alignment, track geometry, superstructure and substructure components, switches, Railway planning and capacity, operation and maintenance of railway.
Capstone Project	Final year students will carry out the project work from any discipline in civil engineering. The project will mainly focus on computing analysis and design. **Student should start the project during IWSP and carry out it with the guide of IWSP work supervisor.** The project duration is over the entire academic year. An individual formal report is required. Each student is required to make an oral presentation.

BRIEF MODULE DESCRIPTIONS RELATED TO BEng (HONOURS) IN MECHANICAL DESIGN ENGINEERING (MDE) AND/OR BEng (HONOURS) IN MECHATRONICS (MT)

Applicable Mathematics 2N (MDE/MT)	The main topics include calculus of several variables, differential equations, Fourier series and Laplace transforms.
Electronic System Design 3N (MT)	Introduction to specification driven design of analogue systems. Topics covered are low frequency precision design, design of ground and differential signals and low noise design.
Engineering Design 3N (MDE/MT)	To develop the students understanding of: Availability, Reliability, and Maintainability thereby enhancing the students' ability to evaluate design proposals from a number of related viewpoints. To illustrate and develop an understanding of robust design from functional performance and manufacture viewpoints. To expose students to the discipline involved in researching a technical area and producing a report and presentation.
Mathematical Modelling and Simulation 3N (MDE/MT)	To provide an introduction to the mathematical modelling of engineering systems and the uses to which they can be put. These include simulation, analysis and design. The use of computers to achieve this will be discussed as will generic issues relating to the use of computers for solution of mathematical problems.
Mechanics of Materials and Structures 3N (MDE/MT)	This course requires knowledge of scalars, vectors and tensors, including vector calculus. The idea of contravariant and covariant components is introduced. An introduction to the calculus of variations allows integration of the governing differential equation using the principle of virtual work
Real-Time Computer Systems 3N (MT)	This course introduces the principles of real time computer systems and illustrates their practical implementation using a system based on an ARM Cortex-M3 microcontroller. The problems of multitasking, which arise when such systems have to respond to several simultaneous external events, are also considered.
Dynamics 3N (MDE/MT)	This course introduces real world dynamics problems and formulates solvable models for practical problems. Student will understand what a dynamic system is and the differences between free and forced vibrations for undamped and damped systems. Students will be able to perform vibration analysis for one degree of freedom and multiple degrees freedom systems.
Control 3N (MDE/MT)	This course provides a basic understanding of techniques used to model engineering systems and physical understanding of the factors influencing the steady-state and dynamic response of practical systems. Students are introduced to time-domain and frequency-domain methods of analysis of closed loop control systems, as well as the properties of PID controllers using computer-based techniques.
Instrumentation and Data Systems 3S (AE/AS)	This course provides an introduction to instrumentation and data systems for engineers covering error analysis, signal acquisition and processing.
Software Engineering 3N (MT)	Understand the nature and problems of software and the need for software engineering. Develop familiarity with selected software engineering processes and techniques. Explore the relationship between software engineering and more traditional engineering disciplines.
Fluid Mechanics 3N (MDE)	This course is designed to give the students an advanced knowledge and understanding of the various mechanisms of fluids whether static or in motion. It provides the students with an ability to analyse the effects of fluid forces and pressure derived by the flow conservation laws in various engineering systems.
Mechatronics Team Project 3G (MT)	Students are divided into teams of about 4-6 that design and construct a mechatronic system to perform assigned tasks, on time and within budget. Typically the system is based on a wheeled robot chassis. It requires the selection and implementation of sensors and actuators, design of electronic hardware including printed circuit boards, and programming a digital control system. The project changes every year. Singapore students undertake this course during a four week study period at the University of Glasgow.
Heat Transfer 3N (MDE)	Basic understanding of the various mechanisms of heat transfer and an understanding of heat exchangers and how such items of equipment are designed.
Materials and Manufacture 3N (MDE)	Detailed properties of metals and plastic and their selection methods for products, the joining of metallic and non-metallic materials including welding and adhesive bonding, and forming processes for metals, polymers and composites.
Design and Manufacture 3N (MDE)	This project based course introduces the student to a range of modern methods and techniques supporting industrial product design activity with particular emphasis on innovative conceptual design generation, human factors, environmental design and product architecture. 3D solid modelling CAD skills are developed throughout the project activity.
Design and Manufacture 3G (MDE)	This project based course introduces the student to a range of modern methods and techniques supporting industrial product design activity. 3D solid modelling CAD skills are developed throughout the project activity. Singapore students undertake this course during a four week study period at the University of Glasgow.
Power Electronics 2N (MT)	To understand the function, design, and characteristics of electrical and electronic components and sub-systems within the wider context of mechanical and aerospace products and systems. A major application is electronic drives for motors and actuators.

Professional Practice 5N (MDE/MT)	Introduces the concepts of entrepreneurial planning through understanding and practice in the use of developing a business plan.
Electronic System Design 4N (MT)	Introduces the basic concepts and techniques of digital signal processing (DSP) and to demonstrate some interesting and useful practical applications of DSP. To provide practical experience in using MATLAB/OCTAVE in analysis and design of DSP systems and algorithms.
Control 4N (MDE/MT)	Applies classical control theory to a range of different types of system. It includes the classic types of controller such as proportional–integral–differential (PID), simple compensators and the use of Nyquist and Bode plots. The state space representation is introduced and used to assess stability.
Autonomous Vehicle Guidance Systems 4N (MT)	This course introduces the concepts behind autonomous vehicle guidance and coordination and enables students to design and implement guidance strategies for vehicles incorporating planning, optimising and reacting elements.
Robotics 4N (MT)	To provide an introduction to robots. Introduce the types of sensors and actuators that are commonly used in robotics. Develop an appreciation of the application issues concerning sensors and actuators within the context of robot applications. Develop the mathematics required to locate the position of a robot head and use this to plan and control its trajectory.
Project 4N (MDE/MT)	The individual project is an extended piece of work that provides the opportunity to show enthusiasm and initiative in attaining a specified goal. It is designed to develop the student's ability to understand the field of the investigation, to select and justify the methodology adopted, to apply the methodology, to represent their results or findings accurately, and to understand and present the significance of the results or findings. In the case of the MDE project, this will be mechanical design and manufacture driven, following a generic design process. In the case of MT, it includes software, simulations, and often some form of mechanical or process application.
Advanced Materials Technology 4N (MDE)	Developments in metals and polymers; Design and manufacturing of polymeric composites; Stress analysis of composites; Advances in adhesive bonding and surface engineering; Sandwich constructions; Ceramics-properties, processes and reliability.
Microelectronics in Consumer Products 4N (MDE)	To illustrate how the design of consumer products is rapidly changing with the introduction of inexpensive programmable microelectronics technology. In addition, to engender a basic understanding of microprocessor operations.
Mechanical Design 4N (MDE)	The course provides additional design practice and engineering skills in terms of product development, design process, engineering evaluation, and documentation for the design of mechanical parts and components within engineering systems.
Mechanics of Solids and Structures 4N (MDE)	Following on from Mechanics of Materials and Structures 3N, we extend the finite element method to the analysis of continua in >1-space. This requires a deeper understanding of tensor algebra. Using all of the previously developed mathematics, the governing differential equations are integrated numerically to give the stiffness matrices for plane stress and plane strain elements.

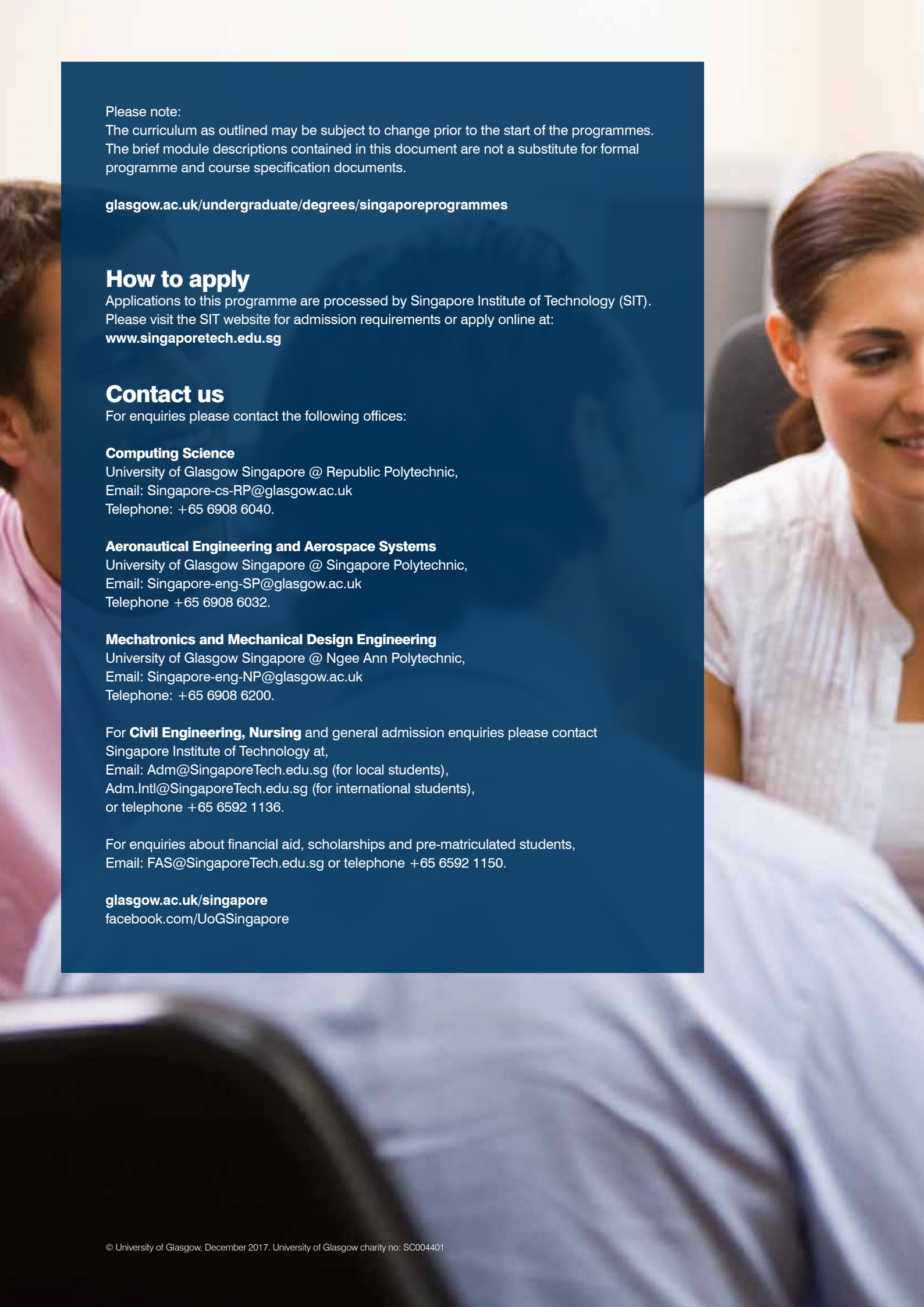
BRIEF MODULE DESCRIPTIONS RELATED TO BSc (HONOURS) IN NURSING

Healthcare Ethics and Law	This module aims to allow the student to revise ethical theories studied in the diploma and further develop their knowledge and understanding of moral philosophy and ethics and their application to health care. The student will have the opportunity explore a range of ethical issues including genomics, euthanasia, abortion, and do not resuscitate orders. In addition, the student will be able to discuss these issues in the context of the legal framework. The legal aspects of healthcare will be covered alongside the ethical considerations such as living wills and advanced medical directives.
Qualitative Research Methods	The aim of this module is to familiarise the student with the discipline of qualitative research and its relevance to all areas of nursing practice. The course will allow students to explore a range of qualitative methodologies, the appropriate data collection methods and approaches to analyses relevant to this paradigm. In addition, students will explore ethical issues related to research and research governance.
Health Assessment and Clinical Reasoning^	This module will provide an in-depth understanding of conducting a systematic health assessment, data collection, and interpretation of physical assessment findings. Topics covered in this module include history taking, conducting a focused physical examination, developing clinical reasoning skills, and developing a treatment plan for the patient. Students will be given the opportunity to develop systematic and focused health assessments that are sensitive to both the cultural and developmental needs of the individual.
Health Systems: Singapore's Perspectives	The World Health Organization (WHO)'s framework of a health system includes resource generation, stewardship, funding and provisioning. The goal of a health system is to improve health, respond to expectations and focus on fairness in financial contribution. In this module, the Singapore health system is described and analyzed within the WHO's framework. Students will learn to appreciate how policies are developed, health needs identified and met, intersectoral collaborations needed and established, and services organized and evaluated. Through interprofessional studies, they will learn about the needs of patients and the roles of different professions in the health systems addressing those needs.
Critical Analysis of Evidence and Clinical Application	The aim of this module is to enable the student to make links with the discipline of research and the development of an evidence base for clinical practice, and further develop knowledge and skills gained in the previous research methods modules. The student will develop an understanding of the importance of utilising robust evidence in the provision of clinical care and good nursing practice.
Fostering Evidence-Based Practice (EBP) in Clinical Settings	This module aims to explore the transition of EBP to practice, build on the knowledge and skills gained from modules such as research methods and EBP critical analysis. The student will reflect on their clinical experiences, work through case scenarios and make links between research evidence, clinical experiences and patient preferences, to make evidence based decisions. This module will also explore the development of evidence based guidelines, their application to practice and the role of critical thinking and decision making. According to clinical questions, students will work through the evidence from various types of studies, including qualitative studies, randomized controlled trials, cohort studies, case-control studies, cross sectional studies, systematic reviews, meta-analysis, meta-synthesis, and clinical practice guidelines, to look for evidence and its applicability. Organizations such as the Cochrane Collaboration and Joanna Briggs Institute will be introduced to facilitate awareness of the various ways by which nurses can get involved in evidence based practice in healthcare settings.
Health Innovation and Informatics^	The focus of this module is to examine key issues relating to health innovation and health informatics. This module provides an introduction to the foundation of nursing science and information science. The role of nurse informatics will be described in relation to the use of patient care support systems and current programmes being run in the Singapore setting. This module also covers the use of technology and its application, in particular, ways by which innovation in healthcare is being implemented through the use of design thinking skills. Other concepts that are covered include an introduction to quality assurance and quality improvement in healthcare organizations. Students will understand how data is collected and managed effectively. Areas such as clinical governance, patient safety, and risk assessments will be discussed. To prepare nurses to undertake future roles in informatics, there will also be an Introduction to emerging technologies in nursing informatics (e.g. genomics, cloud technology, and nanotechnology). Students are required to complete a clinical placement that includes clinical observation and to critically reflect on the programme that involves informatics and technology.
Quantitative Research Methods and Statistical Appraisal	The first part of this module builds on the existing knowledge of research gained during the student's diploma studies. Four main types of quantitative research designs: descriptive, correlational, causal-comparative or quasi-experimental, and experimental research designs will be discussed in detail. The student will learn how to formulate research questions and to answer these effectively; certain principles must be addressed before developing and implementing the most appropriate research design. In addition, ethical issues related to research and research governance will be explored. The second part of this module will concentrate on statistical appraisal and data interpretation. The module will focus on the understanding of key statistical principles, for example, hypothesis testing, estimation, p-value, 95% confidence level and measures of association, such as odds ratio, relative risk, means difference, hazard ratio and graphical representation. The appropriateness of the statistical methods such as correlations, t-test, analysis of variance, simple linear regression, multiple linear regression logistic regression and cox regression will be determined by discussing relevant published papers.

Development in Nursing Practice	Nursing is a profession with rich career opportunities. It evolves with time to meet socio-political, economic, and healthcare technology changes, as well as globalisation. This module explores the conceptualization of professionalism of the health professionals with respect to identity, knowledge, skills, and values expected by the nursing discipline. Accordingly, it will address issues related to professionalism, professional values, and attitudes required of a registered nurse. Topics covered in this module include the socialization of nursing, historical development and evolution of nursing overseas and in Singapore; socio-cultural, political and economic perspectives of professionalism, and role negotiation in the development of nursing practice. Students will develop skills in interdisciplinary collaboration and partnerships as well as developing effective communication among other health professions, patients, and their families in the delivery of person-centered care. Other key topics such as policy implications for nurse education and careers in nursing will be covered.
Population Health	Population health is defined as the health outcomes of a group of individuals. It focuses on determinants of health which include social, economic, cultural and physical environment as well as group characteristics and behaviours. It involves the measurement of health, which includes health outcomes such as morbidity, healthcare cost, health-related quality of life and mortality. The overall goal of population health management (PHM) is to maintain and improve the health of the entire population and optimise distribution of health outcomes between population groups. PHM looks into geographical location and communities underpinning the planning of healthcare services at national level. Other key elements of PHM such as inter-sectoral collaboration and public involvement will also be discussed using local initiatives as example. You will examine various health programmes, theoretical frameworks and behaviour change models for PHM approaches for group of individuals and communities in order to improve health. You will also be required to critically evaluate the application of such theories and models into practice for specific health programs across different levels of care and lifespan in the local context in terms of efficacy and effectiveness.
Health and Social Policy	The aim of this module is to introduce the student to some of the key concepts in health and social care at international, national and local levels. This will enable students to gain insight into the organisations responsible for the introduction and implementation of policy within a health and social care environment, what drives policy development and strategies for policy implementation. The students will have an opportunity to critically discuss the role of the nursing profession in the influencing and implementation of policy and enable the student to understand how policy translates into practice in a diverse range of health care settings.
Intermediate and Long Term Care	The aim of this module is to introduce the student to aspects of care provision for individuals with long term conditions, taking cognisance of the physical, psychological and social implications. The student will have an opportunity to explore the concept of advance care planning and supported self-management to maximize quality of life. Increasingly people are living longer, with multiple health care problems that may be controlled and managed but not cured, resulting in complex care needs over a protracted period. This module considers the challenges arising from such situations and the role of, and impact on, carers supporting individuals with long term conditions or requiring end of life care.
Teaching and Learning^	This module aims to enable the student to develop the skills necessary to teach health care colleagues, patients and carers effectively in the clinical setting. The student will explore theories of teaching and learning and will develop skills in planning for teaching, as well as learning how to assess and evaluate teaching.
Leadership and Change Management	With the increasing demands on health care systems including an ageing population, it is important that registered professional nurses develop an understanding of the managerial and leadership qualities required to shape and manage increasingly complex and diverse health care services. This course will allow the student an insight into the theory of leadership and management and how it applies to practice. The course will provide an opportunity to explore various aspects of leadership and management, including: change theories, management styles, leadership styles allow the student to consider how theory can be applied to practice in the context of health care. The course will also facilitate the development of skills to effectively to lead, facilitate and supervise others involved in providing care in an evolving health and social care environment.
Integrated Work Study Programme (Clinical Placements)#	This module allows students to develop their critical reflective skills as a result of their clinical placements. Students are expected to complete 6 weeks of clinical placements in Singapore and 4 weeks of Overseas Immersion Programmme in Glasgow, UK. The 6-week clinical placements are embedded within the following modules: – i) Health Assessment and Clinical Reasoning, ii) Health Innovation and Informatics, iii) Teaching and Learning. The assessment consists of reflective diaries based on students' reflective thinking on each of the mentioned modules. Students will be guided through critical understanding of different reflective models such as Gibb's, Donald Schön's and Driscoll's reflective models. Through reflective practice, learners are encouraged to critically analyse patient centred approaches in health assessment, care planning, implementation of care and the evaluation of care. The interest in care innovation and the use of technology to improve and enhance care is awakened in their search for better quality and evidence based practice. Such reflective practice is an important part of the learning process to allow students to gain a better understanding of knowledge that is consolidated from practice.
Honours Thesis	The aim of this module is to provide students with the opportunity to complete an academically rigorous dissertation related to an area of clinical/nursing practice of particular interest to the student and of relevance to clinical practice. The student will also have an opportunity to utilize skills developed in the research methods and evidence based practice modules.

^ Includes 2 weeks of clinical placement in Singapore

This module aims to develop graduates who are reflective practitioners



Please note:
The curriculum as outlined may be subject to change prior to the start of the programmes. The brief module descriptions contained in this document are not a substitute for formal programme and course specification documents.

glasgow.ac.uk/undergraduate/degrees/singaporeprogrammes

How to apply

Applications to this programme are processed by Singapore Institute of Technology (SIT). Please visit the SIT website for admission requirements or apply online at:
www.singaporetech.edu.sg

Contact us

For enquiries please contact the following offices:

Computing Science
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For **Civil Engineering, Nursing** and general admission enquiries please contact Singapore Institute of Technology at,
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