Subject information (overview of syllabus)
The syllabus content is subject to change to accommodate industry changes. Please note: A more detailed syllabus is available at the department or in the study guide that is applicable to a particular subject.

A

ADVANCED INTELLIGENT INDUSTRIAL SYSTEMS IV (ADK401T) 1 X 3-HOUR PAPER
*(Subject custodian: Department of Computer Systems Engineering)*
The design and implementation of advanced intelligent systems. (Total tuition time: ± 40 hours)

APPLICATION TECHNOLOGY IV (ATE401T) 1 X 3-HOUR PAPER
*(Subject custodian: Department of Computer Science)*
PURPOSE: To equip students with skill and knowledge in the use of software design patterns. The subject exposes students to the commonly used creational, structural and behavioural design patterns. (Total tuition time: ± 20 hours)

ARTIFICIAL INTELLIGENCE IV (AIT401T) 1 X 3-HOUR PAPER
*(Subject custodian: Department of Computer Systems Engineering)*
AIM/PURPOSE: To introduce the fundamentals of the art of creating machines that perform functions that require intelligence when performed by people. The field includes Problem solving; Communicating, perceiving and acting; Learning; Knowledge, reasoning and planning; Uncertain knowledge and reasoning. (Total tuition time: ± 26 hours)

B

BUSINESS FUNDAMENTALS IV (BAB401T) 1 X 3-HOUR PAPER
*(Subject custodian: Department of Informatics)*
This subject covers the terminology of the business world and provides a working knowledge of the start-up and management of a business. The basic principles of globalisation are also covered. Students will complete a number of case studies to prove their mastery of this topic. (Total tuition time: ± 40 hours)

C

COMMUNICATION SKILLS I (COS101T) CONTINUOUS ASSESSMENT
*(Subject custodian: Department of Applied Languages)*
Communication theory, non-verbal communication (body language, etc.), oral presentations, interviews, developing leadership and participation skills. Technical reports and correspondence. (Total tuition time: ± 20 hours)

COMMUNICATION SKILLS (EXTENDED) I (FPCOS03) CONTINUOUS ASSESSMENT
*(Subject custodian: Department of Applied Languages)*
Speaking and communication skills, listening skills, reading for academic understanding, academic vocabulary, learning strategies and information gathering, writing, business and life skills. Oral presentations, technical reports, interviews, leadership and participation skills. Emphasis is placed on the use of different communication media in IT case studies. The basic concepts of hardware, software, data communication and elementary programming skills are covered in the theoretical component. The Windows operating system is studied. Application packages such as Microsoft Word and Excel are covered in the practical component. (Total Tuition time: ± 100 hours)

COMPUTER SKILLS I (CSK101T) CONTINUOUS ASSESSMENT
*(Subject custodian: Department of End-User Computing)*
Students have to acquire practical skills as end-users in operating systems and MS Office Suite applications (MS Word, MS Excel and MS PowerPoint) on an introductory level, as well as in MS Access Essentials. Students will do online and computer-based tests. The modules are mapped with SAQA. Open labs are available for additional practising. (Total tuition time: ± 40 hours)
COMPUTER SKILLS (EXTENDED) I (FPCK02)

(Subject custodian: Department of End-User Computing)

Students have to acquire theoretical knowledge (computing fundamentals) and practical skills as end-users in operating systems and MS Office Suite applications (MS Word, MS Excel, MS Excel Intermediate, MS PowerPoint, MS Access Essentials and MS Visio Professional), graphic design and dealing with the Internet, networks and how to search for information. Students will do online and computer-based tests. The modules are mapped with SAQA and IC3 Essential Skills for Digital Literacy (international certification). Open labs are available for additional practicing. (Total tuition time: ± 80 hours)

COMPUTING FUNDAMENTALS IA (CFS10AT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Web and Multimedia Computing)

AIM: To introduce the student to the fundamentals of computers and information systems, computer organisation and data processing. Knowledge attained from this forms a foundation to most of their second and third level subjects. The content covered for this subject was carefully selected to introduce all aspects of the different specialisation fields in the ICT faculty which serves as a guideline for the students when they start with their specialisation field in the second level. This subject covers a vast spectrum of information, information systems and technology which includes teaching students to become computer literate, understanding parts of the computer, the Use of Internet, building Application Software, Networking and security in the business world. The subject is presented in two modes: Theory classes – to coordinate and integrate learning material, and Practical sessions – for word applications and excel spreadsheets. (Total tuition time: ± 90 hours)

COMPUTING FUNDAMENTALS IB (CFS10BT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Software Engineering)

The basic concepts of system development, data management, management information systems, ethics, privacy and security, purchasing and maintaining microcomputers, number systems and binary logic. Knowledge attained from this subject is used in selecting student’s second- and third-level subjects. (Total tuition time: ± 54 hours)

COMPUTING SKILLS IA (CMK10AT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Informatics)

Thinking skills, learning styles, study skills, research skills, presentation skills, legal issues in IT, communication skills, and cultural sensitivity. (Total tuition time: ± 36 hours)

COMPUTING SKILLS IB (CMK10BT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Informatics)

Personality types, emotional intelligence, self-management, stress and time management, team dynamics, conflict, negotiation and assertiveness, dealing with change, relationship management. (Total tuition time: ± 54 hours)

COMPUTING SYSTEMS IA (CGS10AT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Computer Systems Engineering)

This subject deals with different aspects and technologies in data communication and networks, including concepts, such as network architecture, transmission, protocols and a number of IEEE standards. (Total tuition time: ± 54 hours)

COMPUTING SYSTEMS IB (CGS10BT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Computer Systems Engineering)

Provides the foundation of data communications and local area management, OSI model and/or TCP/IP protocol stack model, data transmission principles, media, major protocols, topologies, routing methods, introduction to networking principles and network operating system fundamentals. (Total tuition time: ± 54 hours)

DATA ENGINEERING IV (DEG401T) 1 X 3-HOUR PAPER

(Subject custodian: Department of Computer Science)

The aim of this subject is to address the issues of data representation for data mining. OBJECTIVE: On completion of this subject, students should be able to prepare and process data for meaningful interpretations. KEY TOPICS: Data engineering models, data mining tool, normalisations and redistributing variables, introduction to Neural network. (Total tuition time: ± 20 hours)
DATABASE ADMINISTRATION IV (DBA401T) 1 X 3-HOUR PAPER  
*Subject custodian: Department of Software Engineering*  
An introduction to the management of database systems. Problems in current database administration, as well as possible solutions to those problems, are discussed. The subject focuses on the design of data structures and storage techniques, tuning, distributed systems, database administration and support tools. (Total tuition time: ± 20 hours)

DATABASE PRINCIPLES III (DBR311T) 1 X 4-HOUR COMPUTER-BASED  
*Subject custodian: Department of Software Engineering*  
An introduction to databases and database management principles. Theoretical principles are applied in the query language SQL, using Oracle SQL. Students’ insight and skills are tested in the development, design and implementation of a relational database. (Total tuition time: ± 80 hours)

DATABASE PROGRAMMING IV (DBP401T) 1 X 4-HOUR COMPUTER-BASED  
*Subject custodian: Department of Software Engineering*  
The focus is on PL/SQL programming using Oracle 10g/11g as a tool, the content includes PL/SQL architecture, and PL/SQL nested control structures, PL/SQL iterative structures, records, exception handling, PL/SQL tables, explicit cursors, PL/SQL procedures and functions. (Total tuition time: ± 26 hours)

DATABASE SYSTEMS IV (DBS401T) 1 X 3-HOUR PAPER  
*Subject custodian: Department of Software Engineering*  
Purpose: This course assumes knowledge of databases and builds on this existing database knowledge by presenting database design and technology concepts. Fundamental database concepts are covered as well as relational database models and normalisation; entity-relationship modelling; transaction management and concurrency control; distributed database management systems; object-orientated databases; client/server systems; data warehousing, data mining and also databases in electronic commerce. (Total tuition time: ± 26 hours)

DECISION SUPPORT SYSTEMS IV (DPY401T) 1 X 3-HOUR PAPER  
*Subject custodian: Department of Software Engineering*  
The subject focuses on decision support systems and business intelligence, human decision making processes, decision making, systems, modeling and support, decision support systems concepts, methodologies and technologies, modeling and analysis, data mining for business intelligence, artificial neural networks for data mining, text and web mining, data warehousing and the CART algorithm. (Total tuition time: ± 26 hours)

DESIGN PROJECT III (PJD301B) CONTINUOUS ASSESSMENT  
*Subject custodian: Department of Computer Systems Engineering*  
The planning, design and implementation of an industry-related project by applying the knowledge obtained and the tools students were introduced to in the programme. The project should deal with an actual computer science problem and should include hardware and software elements. This subject is supported by short project management and entrepreneurship programmes. (Total tuition time: ± 10 hours)

DEVELOPMENT SOFTWARE IA (DSO15AT) 1 X 3-HOUR PAPER  
*Subject custodian: Department of Computer Science*  
AIM: To learn to solve programs using the basic programming principles, and then practically apply that knowledge in VB.NET. OBJECTIVES: To enable the student to understand problems and know how to solve them by using a computer, understand the general concepts and arithmetic used in programming, write algorithms containing sequential steps, selection and iteration control structures, applying them in VB.NET. KEY TOPICS: Basics of problem solving, solving problems using the sequential control structure, the selection control structure, the iteration control structure and these three control structures together, all applied in VB.NET. (Total tuition time: ± 72 hours)

DEVELOPMENT SOFTWARE IA (DSO17AT) 1 X 4-HOUR COMPUTER-BASED  
*Subject custodian: Department of Computer Science*  
AIM: To learn to solve problems using the basic programming principles, and then practically apply that knowledge in VB.NET. OBJECTIVES: To enable the student to understand problems and know how to solve them by using a computer; understand the general concepts and arithmetic used in programming, sequence, selection and iteration control structures and a variety of built-in data types, including strings. The students are exposed to the concept of event-driven programming in a visual programming environment focusing on the development of graphical user interfaces to solve real-life practical programming problems. (Total tuition time: ± 72 hours)
DEVELOPMENT SOFTWARE IB (DSO15BT) 1 X 4-HOUR COMPUTER-BASED  
*(Subject custodian: Department of Computer Science)*

**AIM:** To expand on the already obtained knowledge of DSO15AT, to solve programs using the basic programming principles, and then practically apply that knowledge in VB.NET. **OBJECTIVES:** The knowledge obtained in DSO15AT enables the student to write an algorithm using functions and subprocedures, write an algorithm containing one-dimensional arrays, do string manipulation and use standard functions, all applied in VB.NET. **KEY TOPICS:** Modularisation, functions, procedures and one-dimensional arrays, applied in VB.NET. (Total tuition time: ± 72 hours)

DEVELOPMENT SOFTWARE IB (DSO17BT) 1 X 4-HOUR COMPUTER-BASED  
*(Subject custodian: Department of Computer Science)*

**AIM:** To expand on the already mastered knowledge obtained in Development Software IA. **OBJECTIVES:** To broaden the programming skills base of the student by adding the following topics: write an algorithm and applying it in VB.NET using functions and subprocedures, and write an algorithm containing one-dimensional arrays. String manipulation will be continued as well as a brief introduction to text file processing. (Total tuition time: ± 72 hours)

DIGITAL PROCESS CONTROL II (DPC201T) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**Introduction to basic digital control techniques using an emulated PLC. Various realistic and practical projects are studied using the printer port as PLC. (Total tuition time: ± 80 hours)**

DIGITAL PROCESS CONTROL III (DPC301T) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**A detailed examination of the functional operations of a PLC, as used in factory automation. An introduction to robotics, electromechanical and sensory tactics and methods. (Total tuition time: ± 80 hours)**

DIGITAL PROCESS CONTROL IV (DPC401T) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**Review of PLC concepts and design techniques. Advanced PLC methods with applications in process control system design. (Total tuition time: ± 20 hours)**

DIGITAL SYSTEMS I (DSY131C) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**History and overview of digital systems, Number systems and codes, Binary arithmetic, Boolean algebra, Basic logic gates (AND, OR, NOT, NAND, NOR, XOR), Physical properties of logic gates(technology, fan-in, fan out, propagation delay), Networks of logic gates, 2-level networks (AND-OR, OR-AND, NAND-NAND, NOR-NOR), Elimination of timing hazards/glitches, Combinational systems, Arithmetic functions (adders, subtracers, carry look ahead), Introduction to memory elements. (Total tuition time: ± 70 hours)**

DIGITAL SYSTEMS (EXTENDED) I (FPDSY01) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**Binary, octal, decimal and hexadecimal number systems. The basic components of digital circuits such as NOT, AND and OR gates. The more complex gate and logic functions are built by using these basic components. Boolean algebra and Karnaugh maps are used to simplify functions. Combination logic circuits, including adders, multivibrators, comparators, decoders, encoders, multiplexer and demultiplexer, binary adders, binary adder/subtractor and arithmetic logic units are also discussed. Clock timing and parallel versus serial transmission. Fan-in, fan-out, current ratings. Propagation delay. Digital logic gate ICs, TTL and CMOS logic families. Interfacing logic families. I/O voltages and noise margins. Powering logic families. Logic probes and logic pulsers. The theoretical information is supported by practical experiments in a laboratory. (Total Tuition time: ± 80 hours)**

DIGITAL SYSTEMS II (DSY231C) 1 X 3-HOUR PAPER  
*(Subject custodian: Department of Computer Systems Engineering)*

**Un-clocked and clocked memory devices(latches, flip flops), Level vs edge sensitive and master- slave devices, Basic flip flops (SR, D, JK, T), Asynchronous flip flop inputs (preset, clear), Timing constraints (setup time, hold time) and propagation delays, Sequential logic circuits: data registers, shift registers, counters; Introduction to Finite state machines (FSM), CPLDs, FPGAs, ROMs, RAM, FLASH. (Total tuition time: ± 70 hours)**
DIGITAL SYSTEMS III (DSY341C)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Structure of a computer system (CPU, memory, I/O devices on a bus); CPU families used in microcontrollers (4-bit, 8-bit, 16-32-bit) and microprocessors; Basic I/O devices (timers/counters, GPIO, A/D, D/A), Polled I/O vs Interrupt driven I/O, Vectored and prioritised Interrupts, DMA transfers, MMU, Memory architectures and caches; Introduction of embedded application designs. (Total tuition time: ± 70 hours)

DISCRETE STRUCTURES I (DIC101T)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Review of functions, relations and sets. Review of proposition and predicate logic. Methods of theorem proving, strong and weak induction, finite and infinite sets, set operations, introduction to computational complexity, theta and big-O notation. Combinatorics, including permutations and combinations. Graphs and trees, discrete probability and binomial distribution. (Total tuition time: ± 90 hours)

E

ELECTRICAL ENGINEERING I (EEN111C)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Students are introduced to the correct use of SI units and their applications, the construction and maintenance of batteries, a network analysis of direct current circuits and AC theory, a study of various measuring instruments. An investigation into the effects of magnetic lines of force, the application and use of magnetic fields, inductance and the factors affecting it, capacitors and their operation. (Total tuition time: ± 70 hours)

ELECTRICAL ENGINEERING (EXTENDED) I (FPEEN02)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
The subject consists of theoretical and practical elements. Correct use of SI units and their applications. Physical and electrical quantities. Introduction to electricity. Introduction to electrical components such as the resistor, capacitor, inductor, transistors, colour code. Basic wiring skills, basic electromagnetics, transformer, basic DC and AC circuit theory. Network analysis on DC circuits and AC theory. An investigation of the magnetic lines of force and the application of magnetic fields. Inductance in DC circuits. RLC circuits and phase differences. Capacitors, their operation and applications. The practical sessions cover soldering, resistor circuits and advanced resistor networks, transistor and capacitor applications and the application of electromagnetism. (Total Tuition time: ± 80 hours)

ELECTRONICS I (ELC111B)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Introduction to electronic components, analysis and design using measuring instruments, diodes and rectification, simple power supplies, DC operating point of single-stage bipolar junction- and field-effect transistor amplifiers and basic operational amplifier configurations. Theory supported by assessed practical experiments in a laboratory, including soldered and proto-board projects. (Total tuition time: ± 70 hours)

ELECTRONICS (EXTENDED) I (FPELC02)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Basic concepts of electronics, such as current, voltage, resistance, electrical power, capacitance, and inductance. Mathematical model of currents and voltage through and across basic electrical elements such as resistors, capacitors and inductors. Ohm’s law; The venin’s theorem, and Kirchhoff’s law. Ac and dc circuit theory. The basic concepts of electronics, such as the use of measuring instruments, the semi-conductor theory, the P-N junction, diodes and rectification, simple power supplies, the bipolar junction transistor, the field-effect transistor and operational amplifiers are studied. The theoretical presentations are supported by practical experiments in a laboratory. (Total Tuition time: ± 80 hours)

ELECTRONICS II (ELC211B)  1 X 3-HOUR PAPER  
(Subject custodian: Department of Computer Systems Engineering)  
Modelling of electronic components and their application in circuit analysis and design. Unregulated and regulated linear power supplies with transistor and operational amplifier error correction, short-circuit protection and heat sink principles. Small-signal modelling of transistor amplifiers. Theory is supported by assessed project and practical experiments in a laboratory. (Total tuition time: ± 80 hours)

EXPERIENTIAL LEARNING I (EXP1ECS)  EXPERIENTIAL LEARNING  
EXPERIENTIAL LEARNING II (EXP2ECS)  EXPERIENTIAL LEARNING  
(Subject custodian: Department of Computer Systems Engineering)  
Students experience the IT- or engineering-related industry by becoming involved in its day-to-day operations. (Total tuition time: not available)
FOUNDATION ACADEMIC AND LANGUAGE SKILLS (FPALS01) 1 X 3-HOUR PAPER

(AIM/PURPOSE: To provide a sound foundation for, and to enhance basic language proficiency and academic skills necessary for reading, writing and studying in an ICT environment. OBJECTIVES: Analyse, adjust and improve study skills. Apply research skills in assignments. Interpret and reflect on all available and relevant resource material in proper English. Communicate in a comprehensible and clear manner in both a general and subject-specific manner showing cultural sensitivity. Demonstrate intermediate-level proficiency in oral and written English. KEY TOPICS: Learning styles, study skills, research skills, communication skills and cultural sensitivity, English vocabulary and grammar. Reading and writing skills. (Total tuition time: ± 84 hours)

FOUNDATION ICT MATHEMATICAL SKILLS (FPITM01) 1 X 3-HOUR PAPER

(AIM/PURPOSE: The focus of the subject is to ensure students have the necessary mathematical and numeracy skills needed for ICT. Students will also be introduced to abstract logical reasoning and computational thinking skills. These skills are further developed through practical exercises relating to various day-to-day problem-solving activities. OBJECTIVES: The main objective is to develop the problem solving skills as well as the computational thinking skills of the student and therefore prepare the student for the programming subjects to follow. KEY TOPICS: The Number System and Basic Arithmetic; Introduction to Algebra: Expressions and Equations; Fractions and Decimals, Algebraic Fractions; Percentages; Ratio and Rate; Perimeter, Area and Volume; Measuring Systems and Units; Time, Distance and Speed; Cartesian Plane and Coordinates; Algebraic Functions; Matrices. (Total tuition time: ± 96 hours)

FOUNDATION INFORMATION AND SOFTWARE DEVELOPMENT SKILLS (FPIDS01) 1 X 3-HOUR PAPER

(AIM/PURPOSE: To prepare students for computer programming by developing logical, critical and lateral thinking skills. OBJECTIVES: The main objective is to develop the students’ logical thinking and problem-solving skills as preparation for programming. Abstract logical reasoning and computational thinking skills will therefore be used to solve problems. KEY TOPICS: Brain teasers as introduction to problem-solving; analysis and solving of word problems; solving of various day-to-day problems; introduction to algorithmic problem solving - sequence, basic selection, basic repetition steps; statistics; financial matters. (Total tuition time: ± 96 hours)

FOUNDATION PRESENTATION AND REPORTING SKILLS (FPPRS01) 1 X 3-HOUR PAPER

(AIM/PURPOSE: To provide a sound foundation for, and to enhance basic language proficiency skills necessary for reading and writing in an ICT environment with specific reference to presentations and reports. OBJECTIVES: Preparation of effective and professional reports and Powerpoint presentations. Interpret, relate and reflect on all available and relevant resource material in proper English. Communicate orally in a comprehensible and clear manner specifically when presenting various IT topics, Demonstrate intermediate-level proficiency in written English. KEY TOPICS: Personality types; emotional intelligence; self management; stress and time management; team dynamics; conflict, negotiation and assertiveness; dealing with change; relationship management; reading, writing and presentation skills; English vocabulary and grammar. (Total tuition time: ± 84 hours)

FUNCTIONAL MANAGEMENT (FUM101T) 1 X 3-HOUR PAPER

(AIM/PURPOSE: A study of the effective management of information systems with the emphasis on the intersection of strategic management and information systems. Students will understand and be able to apply the principles, tools and techniques that are used in IS management situations. (Total Tuition time: not available)

GAMES PROGRAMMING IIA (GPM20AT) 1 X 3-HOUR PAPER

(AIM/PURPOSE: Students are introduced to games programming techniques and learn how to apply them practically. The emphasis is placed on the design and integration of artificial intelligence engineering for the purpose of controlling virtual-world objects. (Total tuition time: ± 80 hours)
GAMES PROGRAMMING II B (GPM20BT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Computer Systems Engineering)

Advanced games programming techniques are applied practically. The application of concepts such as 3D graphics and network synchronisation is explored. The focus is on 3D virtual-world object AI manipulation and more advanced AI techniques. (Total tuition time: ± 80 hours)

HARDWARE DESIGN IV (HWD401T) 1 X 3-HOUR PAPER

(Subject custodian: Department of Computer Systems Engineering)

An introduction to the methodology of computer hardware design. The problems of current computer hardware design, as well as possible solutions to these problems, are discussed. The focal points are embedded design, PC design and interfacing, the design of logic devices and the use of software support tools for design. (Total tuition time: ± 20 hours)

HUMAN COMPUTER INTERFACE DESIGN IV (HCI401T) 1 X 3-HOUR PAPER

(Subject custodian: Department of Web and Multimedia Computing)

AIM: To teach students knowledge and skills require for designing interactive products to support the way people communicate and interact in their everyday and working life. Students should know how to generate user requirement, design, evaluate and implement interactive computing systems for human use with other human factors and ergonomics. The subject's main topics include: the use of general HCI principles to design screens for Windows application and for the Web; understanding users and user-centred design; identifying needs and establishing requirements; doing conceptual design, prototyping and construction of Human Computer interfaces for different types of users, e.g. learning disabled or very young learners; including visualisation and sound in the design process, e.g. for GIS software; data and Video analysis as well as collaborative interface design; Components of interaction design and user experience; understanding users and conceptualising interaction; Social mechanisms in communication and collaboration; expressive interfaces and positive emotions; interface types and interaction; evaluation approaches/methods. (Total tuition time: ± 90 hours)

INDUSTRIAL PROJECT IV (IPR410B) CONTINUOUS ASSESSMENT

(Subject custodian: Department of Computer Systems Engineering)

The planning, design and implementation of an industry-related project in which the knowledge acquired in other subjects is applied. (Total tuition time: ± 20 hours)

INDUSTRY EXPOSURE III A (IDC30AT) 1 X 3-HOUR PAPER

(Subject custodian: Department of Informatics)

Organisational characteristics and behaviour, personal financial skills and techno-entrepreneurship. Ethical and professional conduct in the workplace. (Total tuition time: 6 months)

INDUSTRY EXPOSURE III B (IDC30BI) CONTINUOUS ASSESSMENT

(Subject custodian: Computer Systems Engineering)

Industry Exposure IIIB is career-orientated and is aimed at integrating academic training with practical skills, as demanded by industry. Students work in industry for six months. (Total tuition time: not available)

INFORMATION AND TECHNOLOGY MANAGEMENT IV (ITA401T) 1 X 3-HOUR PAPER

(Subject custodian: Department of Informatics)

The effective management of information systems with the emphasis on the interaction between strategic management and information systems. Students learn to master the principles, tools and techniques that are used in IS management situations. (Total tuition time: not available)

INFORMATION SECURITY IV (ITU401T) 1 X 3-HOUR PAPER

(Subject custodian: Department of Information Technology)

Encryption and decryption algorithms, protocols, operating systems, databases and network security. (Total tuition time: ± 20 hours)
INFORMATION SYSTEMS IA (ISY13AT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Web and Multimedia Computing)
AIM: To introduce the student to the fundamentals of computers and information systems, computer organisation and data processing. Knowledge attained from this forms a foundation to most of their second and third level subjects. The content covered for this subject was carefully selected to introduce all aspects of the different specialisation fields in the ICT faculty which serves as a guideline for the students when they start with their specialisation field in the second level. This subject covers a vast spectrum of information, information systems and technology which includes teaching students to become computer literate, understanding parts of the computer, the Use of Internet, building Application Software, Networking and security in the business world. The subject is presented in two modes: Theory classes – to coordinate and integrate learning material, and Practical sessions – for word applications and excel spreadsheets. (Total tuition time: ± 90 hours)

INFORMATION SYSTEMS IB (ISY13BT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Software Engineering)
The basic concepts of system development, data management, management information systems, ethics, privacy and security, purchasing and maintaining microcomputers, number systems and binary logic. Knowledge attained from this subject is used in selecting student's second- and third-level subjects. (Total tuition time: ± 54 hours)

INFORMATION TECHNOLOGY SKILLS IA (ITS11AT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Informatics)
Thinking skills, learning styles, study skills, research skills, presentation skills, legal issues in IT, communication skills, cultural sensitivity. (Total tuition time: ± 36 hours)

INFORMATION TECHNOLOGY SKILLS IB (ITS11BT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Informatics)
Personality types, emotional intelligence, self-management, stress and time management, team dynamics, conflict, negotiation and assertiveness, dealing with change, relationship management. (Total tuition time: ± 54 hours)

INTELLIGENCE PROGRAMMING IV (ITB401T) CONTINUOUS ASSESSMENT
(Subject custodian: Department of Computer Science)
A study of language assessment, artificial intelligence programming and new trends. (Total tuition time: ± 20 hours)

INTELLIGENT INDUSTRIAL SYSTEMS IIA (IIS20AT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
A study of system software assembly language and practical projects, using the printer port as PLC. (Total tuition time: ± 80 hours)

INTELLIGENT INDUSTRIAL SYSTEMS IIB (IIS20BT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
A more detailed study of the factory process to determine the controls regarding efficiency and safety of the environment that will have to be placed in the process. (Total tuition time: ± 20 hours)

INTELLIGENT INDUSTRIAL SYSTEMS III (IIS301T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
Students are introduced to the world of mobile robotics by implementing behaviour-based concepts to control an autonomous vehicle. (Total tuition time: ± 80 hours)

INTELLIGENT INDUSTRIAL SYSTEMS IV (IIS401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
A study of advanced PLC concepts. (Total tuition time: ± 20 hours)

IT ELECTRONICS IIA (IE20AT) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
Basic components of digital circuits, such as NOT, AND and OR gates. The more complex gate and logic functions are built by using these basic components. Boolean algebra and Karnaugh maps are used to simplify functions. Combination logic circuits, including adders, multi-vibrators, comparators, decoders, encoders, multiplexers and de-multiplexers, are discussed. Binary, octal, decimal and hexadecimal number systems are included. Theoretical presentations are supported by practical experiments in a laboratory. (Total tuition time: ± 80 hours)
IT ELECTRONICS IIB (IIE20BT)  1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
Basic components of sequential circuits, namely latches and flip-flops. More complex memory components, such as adders and registers, are derived from the basic components. Different analogue-to-digital and digital-to-analogue converters are discussed. In the introduction to microprocessor systems, the central processor, memory, ports and interrupts are dealt with. (Total tuition time: ± 80 hours)

IT ELECTRONICS IIIA (IIE30AT)  1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
The student should show a conceptual understanding of microcomputer systems, including microprocessors, microcomputers, microcontrollers and the MCS-51 family. Memory devices and design. Microcomputer programming. The MCS-51 instruction set, the use of serial and parallel ports, interrupts and timers (counters). The student should be able to perform a variety of tasks relating to the theoretical aspect of the subject, such as operating equipment, programming the 8031 and representing findings in a report. (Total tuition time: ± 80 hours)

IT ELECTRONICS IIB (IIE30BT)  1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
The development of logic circuits using VHDL. The student is guided through the complete design cycle of a logic circuit using the prescribed development environment. This involves the development of the logic circuit in VHDL and the implementation onto target hardware. The development of software consists of problem setting, state diagrams, timing diagram analysis and the writing of the VHDL. The next phase is the simulation of the program. The final phase consists of the downloading onto silicon and de-bugging of the software. (Total tuition time: ± 80 hours)

IT MATHEMATICS IA (ITT10AT)  1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)
Basic mathematics. Differentiation. Integration. Matrices and determinants. Vectors. Data handling. Complex numbers or mensuration. (Total tuition time: ± 90 hours)

IT MATHEMATICS IB (ITT10BT)  1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)

KNOWLEDGE MANAGEMENT IV (KNM401T)  1 X 3-HOUR PAPER
(Subject custodian: Department of Informatics)
Introduction to theory of organisations as a foundation for the consideration of knowledge management. Principles and practice of knowledge management in organisations. (Total tuition time: not available)

LOGIC DESIGN III (LOD311B)  1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
The development of logic circuits using VHDL. The student is guided through the complete design cycle of a logic circuit using the prescribed development environment. This involves the development of the logic circuit in VHDL and the implementation onto target hardware. The development of software consists of problem setting, state diagrams, timing diagram analysis and the writing of the VHDL. The next phase is the simulation of the program. The final phase consists of the downloading onto silicon and de-bugging of the software. (Total tuition time: ± 80 hours)

MATHEMATICAL APPLICATIONS III (MMA301T)  1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)
MATHEMATICAL APPLICATIONS IV (MMA401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)

MATHEMATICS I (MAT141F) 1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)
Basic mathematics. Differentiation. Integration. Matrices and determinants. Vectors. Data handling. Complex numbers or mensuration. (Total tuition time: ± 90 hours)

MATHEMATICS (EXTENDED) I (FPMAT04) 1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)

MATHEMATICS II (MAT251F) 1 X 3-HOUR PAPER
(Subject custodian: Department of Mathematics and Statistics)

NETWORK SYSTEMS II (NSY211T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Information Technology)
This subject covers various aspects and technologies involved in data communications and networking. Students are introduced to topics, such as network topologies, transmission fundamentals, contention protocols, data compression techniques, data security and integrity, flow-control protocols and the various IEEE standards. The subject is aimed at giving students a solid understanding of local area networks (LANs), although aspects of wide area networks (WANs) are also covered briefly. (Total tuition time: ± 80 hours)

NETWORK SYSTEMS III (NSY311T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Information Technology)
This subject covers the TCP/IP protocol suite in detail, including protocols such as IPv4, IPv6, TCP, UDP, ICMP, DNS, FTP. Other networking concepts like packet addressing, forwarding, and routing are also covered. The student will be equipped with skills to plan IP addresses using VLSM and to configure networks. The practical component concentrates on basic design of data networks, IP address planning, creating VLANs, configuration of routers using dynamic protocols like RIP, OSPF, etc. (Total tuition time: ± 80 hours)

NETWORK SYSTEMS IV (NSY401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Information Technology)
Wireless networks, which include spread-spectrum analyses, roaming and hand-over. (Total tuition time: ± 20 hours)

NETWORKS IV (NWS421T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Information Technology)
A study of advanced network management. (Total tuition time: ± 20 hours)

NEW TECHNOLOGY PROGRAMMING IV (NTP401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: To expose students to a programming paradigm not covered by typical application design strategies. OBJECTIVE: The learner must be able to identify mobile agents from similar technologies, create a mobile agent solution, understand the privacy and security concerns related to mobile agents and theorise on improvements which can be brought to bear on this paradigm. KEY TOPICS: Software agents, Intelligent Agents, AI, Relocatable code, RPC’s, RMI’s, Process Migration, Execution environments, Killer Apps. (Total tuition time: ± 20 hours)
OPERATING SYSTEMS III (OSY301T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
The development of the operating system as a control programme and resource manager. Principles to take into consideration when designing a modern operating system, such as memory management, process management, scheduling and input/output. The LINUX operating system. CPU scheduling, parallelism, secondary memory management, LINUX applications. (Total tuition time: ± 80 hours)

OPERATING SYSTEMS IV (OSY431T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
The main objective of this subject is to design and program a simple operating system (using layered technology), programmed in Assembler, C or C++ programming languages. The simple operating system will have a programmed boot process (written in Assembler only), a kernel (can be written in Assembler, C or C++ combination), file system (can be written in Assembler, C or C++ combination), and command interpreter or shell (can be written in Assembler, C or C++). Students should have prior (and solid) knowledge of operating systems and C or C++ programming language before embarking on this subject. The subject starts off with a revision of Assembler programming only. No revision of C or C++ is done, as this is required from students. When time permits, advanced concepts (in theory only), such as memory management, process management and process scheduling, as well as types of operating systems, such as distributed, parallel, embedded and/or real-time operating systems, are evaluated theoretically. (Total tuition time: ± 26 hours)

OPERATIONAL RESEARCH III (ORS311T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Computer Systems Engineering)
AIM/PURPOSE: To introduce students to the scientific approach to solving management science problems. OBJECTIVES: To be introduced to linear programming processes, Network modules, Queuing and decision analysis, Project scheduling, decision theory, forecasting, queuing models, simulation, inventory control. KEY TOPICS: Linear Programming, Distribution and assignment problems, Network Modules, Project scheduling. (Total tuition time: ± 72 hours)

PRINCIPLES OF RESEARCH IV (PAJ411T) CONTINUOUS ASSESSMENT
(Subject custodian: Department of Software Engineering)
Basics of paradigms, methodologies, and techniques of research in the behavioural sciences and their application in information technology. (Total tuition time: ± 40 hours)

PROGRAMMING I (PGG111T) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
This subject accommodates students from a broad spectrum of disciplines and interests. It includes a theoretical as well as a practical component. AIM: This module provides overview coverage of introductory C++ programming. OBJECTIVE: This is a career-focused information and communication technology qualification that will enable a graduate to design and create ICT software solutions using basic object-orientated concepts and technologies. KEY TOPICS: Basic C++ programs, classes, problem solving, OOP, methods, data manipulation, arithmetic operators, decision structures, loop structures, functions. (Total tuition time: ± 72 hours)

PROGRAMMING (EXTENDED) I (FPPGG01) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
Basic technical programming. An introduction to object-orientated programming, basic control structures and stream manipulation. (C++, JAVA and Visual Basic). An introduction to object-orientated programming that also covers control structures and stream manipulation. (Total Tuition time: ± 80 hours)

PROGRAMMING II (PGG211T) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: To cover advanced OOP (Object Oriented Programming) principles, including inheritance and abstract programming, as well as other advanced concepts in C++. OBJECTIVES: To enable students to be able to create and manipulate one- and two-dimensional arrays, manipulate a collection of characters as strings, Read and write data from text files, Apply advanced class features. KEY TOPICS: One- and Two-Dimensional Arrays, Strings and Character Manipulation, Text Files, Additional Class Features, Inheritance, Polymorphism, Dynamic Memory Allocation. (Total tuition time: ± 72 hours)
PROGRAMMING III (PGG311T) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)

AIM: The student is introduced to a modern C++ Rapid Application Development Tool for Win32 with the purpose of creating a human interface for pre-engineered C and assembly applications. OBJECTIVE: The student must be able to manipulate standard Windows components, graphical images, multiple forms, grid structures, selection structures, menu systems and dynamically created objects. The integration of C as well as assembly language routines including pre-manufactured as well as self-manufactured objects. A medium sized C++ GUI project is expected to be completed towards the end of the semester. KEY TOPICS: Advanced OOP, C++, C, ASM, dynamic object instantiation, event-driven programming, Back-end classes, strategic solution planning, systemic program design, flat file data handling. (Total tuition time: ± 72 hours)

PROJECT IV (PJ410J) CONTINUOUS ASSESSMENT
(Subject custodian: Department of Computer Systems Engineering)
The subject focuses on IT research and the application of research paradigms, methodologies and research techniques in the IT environment. (Total tuition time: not available)

PROJECT MANAGEMENT IV (PJG401C) 1 X 3-HOUR PAPER
(Subject custodian: Department of Informatics)
Advanced topics in project management are covered. The subject builds on the traditional PMBOK knowledge by giving the fourth-year IT student an in-depth understanding of project management in the IT industry. (Total tuition time: not available)

PROJECTS I (PJ101B) CONTINUOUS ASSESSMENT
(Subject custodian: Department of Computer Systems Engineering)
Use of instruments and equipment, such as multimeter, oscilloscope, power supply and function generator. Measurement of alternating and direct current, voltage and frequency. Component identification, application, measurement and testing. Reading basic schematic diagrams. Construction and testing of an electronic project. Stripping and insulating conductors. Wiring and placing components. Basic health and safety. Laboratory policies and procedures. Basic hand skills such as soldering, metal working including drilling. Building of a project into an enclosure. Web programming using appropriate Web system engineering environment such as http/html/php/MySql/FORMS, which includes direct socket connections. (Total tuition time: ± 70 hours)

SOFTWARE ENGINEERING III (SFE311T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Software Engineering)
The purpose of this subject is to present the essential knowledge and skills needed to solve the customer and the user problems through the use of domain analysis which helps to have the background information as well as to gather and validate requirements. This subject enables students to learn how to apply software engineering skills into real life situation by understanding what constitutes a good requirement, applying fundamental design principles, gaining in-depth knowledge of object-oriented development using Unified Modeling Language, translating requirements and designs into good quality programs and to test the programs effectively. (Total tuition time: ± 80 hours)

SOFTWARE REQUIREMENTS AND DESIGN IV (SRN401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Software Engineering)
Software engineering subject that concentrate on software requirements, software design, software construction and software testing knowledge area in addition to software project management. (Total tuition time: ± 26 hours)

SOFTWARE SYSTEMS IV (SWS401T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Software Engineering)
The subject focuses on the techniques for maintenance, software configuration management, and software engineering process and software quality. (Total tuition time: ± 26 hours)

SYSTEM SOFTWARE IA (SSF11AT) 1 X 3-HOUR PAPER
(Subject custodians: Departments of Computer Systems Engineering)
Basic functions of operating systems are dealt with by DOS and Windows platforms. (Total tuition time: ± 54 hours)
SYSTEM SOFTWARE IB (SSF11BT) 1 X 3-HOUR PAPER
(Subject custodians: Departments of Information Technology)
This subject deals with different aspects and technologies in data communication and networks, including concepts such as network architecture, transmission, protocols and a number of IEEE standards. (Total tuition time: ± 54 hours)

SYSTEMS ANALYSIS II (SYA201T) 1 X 3-HOUR PAPER
(Subject custodian: Department of Software Engineering)
A detailed study of the five phases of the systems development life cycle (SDLC), giving the student an in-depth understanding of how information technology supports operational and business requirements in today's competitive environment. The importance of communication, economic analysis and project planning skills in all phases of the SDLC is discussed. (Total tuition time: ± 80 hours)

TECHNICAL PROGRAMMING IA (TPG11AT) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: Students should understand and be able to solve problems with the help of the Object orientated C++ programming language. OBJECTIVE: The student must be competent in problem-solving skills and apply the C++ language as a powerful problem-solving tool, have good knowledge of problem-solving skills and good programming style, create classes and objects, develop methods and functions using value parameters and reference parameters, include the selection structure and loop structures in programming, use library functions, especially mathematical library functions, and create personal library. Use one-dimensional array to organise memory while solving problems using the object orientated C++ programming language. KEY TOPICS: Classes and objects, selection and looping structures, library functions, one-dimensional arrays. (Total tuition time: ± 78 hours)

TECHNICAL PROGRAMMING IB (TPG11BT) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: To cover advanced OOP (object-orientated programming) principles, including inheritance and abstract programming, as well as other advanced concepts in C++. OBJECTIVES: To enable students to create and manipulate one- and two-dimensional arrays, manipulate a collection of characters as strings, read and write data from text files, apply advanced class features. KEY TOPICS: One- and two-dimensional arrays, strings and character manipulation, text files, additional class features, inheritance, polymorphism, dynamic memory allocation. (Total tuition time: ± 80 hours)

TECHNICAL PROGRAMMING II (TPG201T) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: The student is introduced to a modern C++ Rapid Application Development Tool for Win32 with the purpose of solving every day programming challenges. Analyse and design. OBJECTIVE: Analyse and design software solutions to industry related information technology problems, utilise the required technical skills to effectively implement the designed solutions in a distributed IT environment. KEY TOPICS: Advanced OOP, C++, dynamic object instantiation, event-driven programming, back-end classes, strategic solution planning, systematic programme design, flat file data handling. Relational database application development, defensive programming, SQL implementation, triggers, events, implementation of data structures, advanced methods in data aware application development. (Total tuition time: ± 140 hours)

TECHNICAL PROGRAMMING IIA (TPG20AT) 1 X 4-HOUR COMPUTER-BASED
(Subject custodian: Department of Computer Science)
AIM/PURPOSE: The student is introduced to a modern C++ Rapid Application Development Tool for Win32 with the purpose of solving every day programming challenges. OBJECTIVE: Through the approach of problem solving the student will be confronted with industrial challenges to be solved inside the framework of the current GUI environment. More complex manipulations of standard Windows components form the basis of the subject, e.g. graphical images, multiple forms, grid structures, selection structures, menu systems, and dynamically created objects. The subject is completely OOP compliant and includes pre-manufactured as well as self-manufactured objects interacting. A medium sized C++ project ready to be sold is expected to be completed towards the end of the semester. KEY TOPICS: Advanced OOP, C++, dynamic object instantiation, event-driven programming, back-end classes, strategic solution planning, systematic programme design, flat file data handling. (Total tuition time: ± 72 hours)
TECHNICAL PROGRAMMING IIB (TPG20BT)  
(Subject custodian: Department of Computer Science)  
AIM/PURPOSE: To introduce students to programming multi-threaded applications that are able to communicate to databases. In addition network programming is introduced. OBJECTIVE: Understand life-cycle of multi-threaded application, how to store, retrieve and manipulate data in a database, Creating application based on TCP/IP and UDP protocols. Java language is used for this purpose. KEY TOPICS: Multi-threading, database connectivity, Network connectivity. (Total tuition time: ± 72 hours)